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About

Pakistan Society of Clinical Oncology

PSCO is the largest body to represent all the specialists treating cancer patients in the country. Since the birth of PSCO, Society members are increasing day by day from the various disciplines: clinical oncologists, radiation oncologists, medical oncologists, nuclear physicians, hematologists, pediatric oncologists, surgical oncologists, medical physicists, radiotherapy technologists, and specialist nurses trained in cancer patient management are the part of the society.Clinical oncologists are specialist doctors who treat cancer patients with radiotherapy and systemic therapy including chemotherapy, hormone therapy, targeted agents, immunotherapy, biologic agents, etc, without using surgery.

Clinical oncologists are actively involved in the management of all types of cancer patients in the country in a cost effective manner. They work closely with other colleagues and focus to develop multidisciplinary teams and tumor board meetings to improve the cancer patient management.

Introduction

The Journal of Clinical Oncology Pakistan (JCOP) is a peer-reviewed academic journal established to support the dissemination of high-quality oncology research and to strengthen evidence-based cancer care in Pakistan and the wider region. The journal provides a dedicated platform for clinicians, researchers, and academicians to share scientific work that reflects both global advances and regional healthcare realities.

With rapid developments in cancer biology, diagnostics, and therapeutics, oncology practice continues to evolve toward increasingly multidisciplinary and patient-centered models. JCOP aims to capture this evolution by publishing original research, review articles, clinical studies, case reports, and expert perspectives across the full spectrum of oncology, including medical, radiation, surgical, and pediatric oncology, as well as allied disciplines.

The journal also focuses on emerging and transformative areas such as precision medicine, immunotherapy, molecular diagnostics, artificial intelligence in oncology, and survivorship care, while maintaining a strong commitment to ethical practice, scientific rigor, and editorial independence. As an academic initiative associated with the Pakistan Society of Clinical Oncology, JCOP seeks to promote collaboration, knowledge exchange, and continuous improvement in oncology practice at both national and international levels.

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MAINSTREAM

"Beyond the Beam": Integrating Innovation and Individualization in Breast Cancer Radiotherapy

By Dr. Quratulain Badar

Abstract: (for Oral Presentation/Invited Talk)
Breast cancer radiotherapy experienced a lot of change in past decade. In era of neoadjuvant chemotherapy and availability of SLNB, indications of RT has changed significantly. On the other hand, with reducing surgery in breast cancer, radiotherapy has to be considered in several cases even in early stage cancer. Moderate hypo fractionation is now a standard of care but ultra-hypo fractionation has to be chosen with great caution and safety measures as there are several points which can easily be ignored by treating radiation oncologist while doing ultra-hypo fractionation.
The presenter will cover recent updates, including NSABP-51 trial and will critical appraise trials of ultra-hypo fractionation.

Superiority of rigid over fiberoptic flexible endoscope in the diagnosis and follow up of upper aero digestive tract growth.

By Prof. Dr. Mohammad Salehuddin Sayed

Abstract: Endoscopes either rigid or flexible are becoming an important diagnostic as well as post- operative follow up tool for detection and management of cancers in upper aero digestive tract. This allows the larynx and/ pharynx to be examined in greater detail. A retrospective study of hundred and fifty (150) cases of laryngeal carcinoma in three (03) tertiary care hospitals over a period of six months, both government and private, were included in our study. The objective of this study was to compare the diagnostic accuracy, disease progression, post -operative/ chemo-radiotherapy follow up, recurrence assessment and the cost of rigid and flexible endoscopy as well as patient's compliance in the evaluation of upper aero-digestive tract growth. Hundred and six (106) cases with hoarseness of voice, thirty (30) cases with dysphagia, seventeen (17) cases with neck mass and seven (7) cases with globus sensation were diagnosed with laryngeal carcinoma. Visualization of larynx with 0, 30 and 70 degree telescope were more precise than flexible endoscope. Nasal irritation, bleeding, difficulties of introduction of flexible endoscopes could have been overcome by rigid endoscopes. The average cost of rigid telescope was much lower than flexible endoscopes. The choice of instrument must be dictated by the comfort level of the physician oncologists in particular, so that an appropriate examination or procedure can be performed with the least risk and suffering to the patients.

Palliative Care: A need of Time for Cancer Patients in Pakistan

By Dr. Qurat. Ul. Ainn Hashmi

Abstract:
Introduction: Cancer remains a major contributor to morbidity and mortality in Pakistan, with many patients diagnosed at advanced and non-curable stages. The majority experience severe pain and psychological issues and social distress yet access to palliative care is minimal. Integrating symptoms control and supportive care into oncology practice is essential to reduce suffering and enhance quality of life. This study aimed to evaluate the current landscape of palliative care in Pakistan, identify barriers to its expansion, and propose evidence-based strategies for improvement.
Methods: A narrative review methodology was employed to gather and analyze relevant literature and national data. Research articles published between 2018 and 2025 were retrieved from PubMed, Google Scholar, and WHO databases using the keywords "palliative care," "cancer Pakistan," "hospice," and "opioid access." Additional information was obtained from national cancer control plans, GLOBOCAN statistics, and all palliative care guidelines issued by Pakistani institutes. Studies and documents addressing service provision, workforce training, opioid availability, and policy development were included. The extracted data were categorized thematically into five domains: service availability, human resource capacity, opioid regulation, community awareness, and policy framework. International models from comparable low-and middle-income countries were reviewed to identify adaptable and sustainable approaches for Pakistan.
Results: The review highlights significant gaps in Pakistan's palliative care infrastructure. Only a few private and tertiary care centers in major cities offer partial palliative services, while rural and district hospitals lack even basic pain management facilities. Home-based and community programs are largely absent. Key challenges include morphine access due to restrictive regulations, workforce shortages, minimal

training in pain and symptom management, lack of coordination among health sectors, and minimal public awareness. However, positive developments are emerging, including pilot training modules for primary care physicians, paramedics, volunteers, advocacy by oncology societies, and the introduction of palliative care concepts in medical curricula. Moreover, international experiences demonstrate that integrating essential palliative packages into primary care, task-sharing with nurses and community health workers can substantially improve coverage even with limited resources.

Conclusion: Palliative care is a vital and urgent component of cancer management in Pakistan. To meet patient needs, it must be formally integrated into the national cancer control strategy with specific funding, policy support, and training programs. Regulatory reforms for opioid accessibility, communitybased hospice initiatives, and interdisciplinary collaboration are necessary to ensure equitable, compassionate, and quality care for all cancer patients.

Choosing Wisely Pakistan: A Call for Value-Based Oncology Practice in Resource-Limited Settings

By Dr. Sadia Sadiq

Abstract:

Background:

The Choosing Wisely campaign, initiated by the ABIM Foundation, aims to promote evidence-based decision-making and reduce unnecessary medical interventions that provide little benefit to patients. While several countries have adopted national versions of this initiative, Pakistan currently lacks an organized framework to translate these recommendations into practice within its healthcare system.

Objective:

To explore the key principles of the Choosing Wisely campaign and propose Pakistan-specific strategies for optimizing cancer care delivery through judicious use of investigations and treatments, ensuring better utilization of limited oncology resources.

Materials/Methods:

This concept originates from an early-career oncologist's perspective, based on day-to-day clinical observations in tertiary cancer care. Pakistan faces unique challenges, including limited healthcare resources, absence of national clinical guidelines, lack of patient awareness, and frequent overutilization of diagnostic procedures .Existing Choosing Wisely Oncology recommendations were reviewed, and areas of potential adaptation were identified, emphasizing diagnostic, treatment, and radiotherapy practices commonly observed in Pakistan.

Results:

Several potentially low-value practices were recognized, such as performing FNAC instead of core biopsy in breast cancer patients, initiating suboptimal surgery before receptor status determination or multidisciplinary input, and overuse of PET-CT in cases where results are unlikely to alter management. Other gaps include delayed diagnosis due to empirical treatment in lung cancer, lack of awareness in cervical cancer and fear of needle biopsy in head and neck cancer patients. Lack of prioritization for patients receiving radical radiotherapy is also a common practice. These issues highlight opportunities for evidence-based and patient-centered decision-making. Implementation of Choosing Wisely Pakistan would require:

1. Development of context-specific recommendations through collaboration between medical societies and tertiary hospitals.
2. Promotion of effective patient–physician communication regarding necessity, cost, and risks of interventions.
3. Integration of evidence-based oncology training into residency curricula.
4. Encouragement of multidisciplinary tumor boards and peer review to reduce redundant imaging and overtreatment.

Conclusion:

Adopting a Choosing Wisely Pakistan framework could substantially enhance value-based oncology practice. Collaborative national efforts to establish specialty-specific recommendations and virtual tumor boards would help ensure equitable, cost-effective, and evidence-driven cancer care across Pakistan.

Adaptive Radiotherapy: a step forward from VMAT/IMRT in the field of radiation oncology

By Dr. Asghar H. Asghar

Abstract:

Adaptive radiotherapy (ART) is transforming radiation oncology by enabling real-time adjustments to treatment plans in response to anatomical and biological changes during the course of therapy. Driven by advances in imaging, deformable

image registration, and artificial intelligence, ART enhances precision, reduces toxicity, and supports personalized treatment. A key component of this evolution is the integration of advanced delivery techniques such as Intensity-Modulated Radiotherapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT). While both offer highly conformal dose distributions, VMAT provides faster delivery with superior dose conformity and reduced treatment time compared to traditional IMRT, making it particularly well-suited for adaptive workflows. VMAT's continuous arc delivery facilitates efficient plan adaptation in response to daily anatomical variations, whereas IMRT's fixed-field approach, although effective, is more time-intensive and less flexible. Emerging technologies such as MR-guided ART and AI-driven auto-contouring are further optimizing both VMAT and IMRT applications. As ART continues to advance, comparative evaluation of these modalities within adaptive protocols will be essential to guide clinical decision-making and maximize therapeutic outcomes.

Management of Locally Advanced Head and Neck Cancer in Resource-Limited Settings: A Study of Triple Metronomic Chemotherapy with or without Low-Dose Nivolumab

By Dr. Asghar H. Asghar

Abstract:

Head and neck cancer is among the most prevalent cancers in Pakistan, with many patients presenting with advanced disease that is not amenable to surgical intervention. In such cases, alternative treatment modalities, including chemotherapy, radiotherapy, or best supportive care, are often considered. However, a significant proportion of these patients are clinically unfit to tolerate the rigors of chemotherapy or radiotherapy.

Triple metronomic chemotherapy (TMC) has emerged as a promising palliative option. Data presented at ASCO from India, later published in the Journal of Clinical Oncology (January 2023), highlighted the efficacy of TMC in this context. The regimen consisted of oral methotrexate (9 mg/m² once weekly), celecoxib (200 mg twice daily), and erlotinib (150 mg daily). A variant of this regimen, incorporating low-dose intravenous nivolumab (TMC-I, 20 mg every three weeks), demonstrated significantly improved outcomes. The study reported a one-year overall survival of 16% with TMC alone versus 43% with TMC-I, and a median overall survival of 6.7 months versus 10.1 months, respectively.

Given the similarities between Pakistan and India in terms of socioeconomic constraints and healthcare challenges, this protocol was adapted for patients in Pakistan. Due to the unavailability of erlotinib, gefitinib was used as a substitute. A total of 200 patients with locally advanced, unresectable head and neck cancer were treated in a 1:1 ratio: 100 patients received TMC, while the remaining 100 received TMC-I.

The results were encouraging, with a partial response rate of approximately 70% in the TMC group and 80% in the TMC-I group. Notably, responses were observed within 1-2 months of initiating treatment. Patient satisfaction rates were high, reaching nearly 90%. Side effects were minimal, with occasional instances of oral mucositis or diarrhea. Importantly, no cases of cytopenia were reported.

Conclusion:

Triple metronomic chemotherapy, alone or in combination with low-dose nivolumab, is an effective and well-tolerated option for managing locally advanced head and neck cancer in patients who are not candidates for surgery, chemotherapy, or radiotherapy. This regimen offers a viable solution in resource-constrained settings, providing significant clinical benefits with minimal adverse effects.

Comparison of Three-Dimensional Conformal Radiotherapy (3DCRT) and Intensity-Modulated Radiotherapy (IMRT) in Breast Cancer Patients: A Dosimetric and Clinical Outcome Analysis

By Dr. Asghar H. Asghar

Abstract:

Objective: This study aims to compare three-dimensional conformal radiotherapy (3DCRT) and intensity-modulated radiotherapy (IMRT) in breast cancer patients, focusing on dosimetric parameters, clinical outcomes, and toxicity profiles.

Methods: A total of 200 post-operative breast cancer patients were included, with 100 patients treated using 3DCRT and 100 using IMRT. Dosimetric evaluation included target volume coverage, dose homogeneity, and organ-at-risk (OAR) sparing. Acute and late toxicities were assessed using standardized criteria, and treatment-related side effects were compared between the two groups.

Results: IMRT demonstrated superior dose homogeneity and conformity compared to 3DCRT, with significantly reduced doses to the heart and lungs, particularly in left-sided breast cancer patients. Acute skin toxicity (≥ grade 2) was lower in the

IMRT group (30%) compared to the 3DCRT group (45%). Late toxicity, including fibrosis and lymphedema, was also reduced in the IMRT group. However, IMRT required higher monitor units, leading to increased low-dose radiation exposure.

Conclusion: IMRT offers improved target coverage and better OAR sparing while reducing acute and late toxicity compared to 3DCRT. However, its higher complexity and resource requirements must be considered. Further follow-up is needed to evaluate long-term oncologic outcomes and potential secondary malignancy risks.

Clinical and epidemiological profile of patients with colorectal cancer in Bhutan: a cross-sectional study

By Dr. Prabhat Pradhan

Abstract:

Introduction: Globally, colorectal cancer is the third most common cancer and the third leading cause of cancer-related deaths. This study describes the epidemiological and clinical profile of patients with colorectal cancer diagnosed in Bhutan.

Methods: This was a cross-sectional study based on the review of records of patients diagnosed with colorectal cancer at the National Referral Hospital, the only hospital with onco-surgery services, between 2018 and 2024.

Results: There were 182 patients diagnosed with colorectal cancers. The crude incidence of colorectal cancer was 3.58 per 100,000 population and the overall prevalence was 25.03 per 100,000 population. The overall age-standardized incidence rate was 206.43 per 100,000 population. The highest crude prevalence rates were observed in the Pema Gatshel (63.47), Lhuentse (62.34) and Trashigang (61.51) districts. The mean age at diagnosis was 61.51 ±15.64 years; almost half were males (52.20%) and a higher age-standardized incidence rate was noted among those aged ≥70 years. The common presenting symptoms were abdominal pain (59.26%), altered bowel habits (43.21%) and per rectal bleeding (40.74%). The predominant location of the tumour was in the middle/lower rectum (35.54%) and the right colon (33.06%). The majority of the patients were diagnosed with stage III (71.08%) and stage IV (19.28%) diseases. The dominant histology pattern was adenocarcinoma (86.36%). The common form of treatment offered was surgery with chemotherapy.

Conclusion: This study provides the baseline prevalence and age-standardized incidence rates of colorectal cancer in Bhutan. The country will benefit from improving oncology diagnostic and treatment facilities and the adoption of a dedicated screening program for colorectal cancer for high risk population.

Rosai-Dorfman Syndrome: Navigating Complex Pathology and Treatment Challenges

By Dr. Khadiga Elfadil Ahmed Mohammed

Abstract:

Background:

Rosai-Dorfman syndrome (RDS) is a rare, benign histiocytic disorder usually presenting with cervical lymphadenopathy but often affecting extranodal sites including the paranasal sinuses, orbit, and central nervous system. Treatment is not standardized. While some patients improve spontaneously or with corticosteroids, others require surgery, systemic therapy, or radiotherapy.

Case Presentation:

A 24-year-old man with biopsy-confirmed RDS presented with temporal and sphenoid sinus disease, bilateral cervical lymphadenopathy, and right optic nerve compression causing severe visual loss (6/60). His disease, first diagnosed in 2018, had progressed despite repeated steroid therapy. Surgery was considered high-risk, and the response to systemic treatment was modest especially in the setting of intracranial involvement. Given the threat to vision, radiotherapy was chosen. He was treated with 45 Gy in 25 fractions (Figure 1) The course required adaptive replanning because of soft tissue and nodal changes.

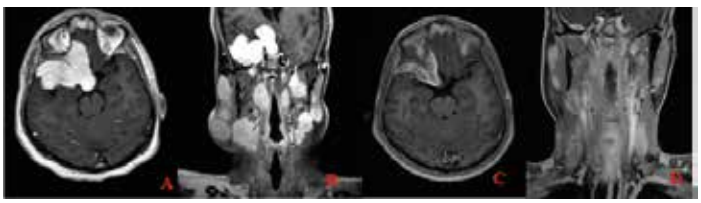

Fig 1) *A-B) Axial and coronal T1 and post-contrast images at presentation revealing the extent of disease, C-D) 12 months post-radiotherapy showing further interval reduction in size and extent of widespread dural thickening, with decreased extension, reduced enhancement, and improved mass effect.*

Follow-up imaging at four months post radiotherapy showed partial regression of intracranial and cervical disease. At one year, further significant reduction was seen. Vision remained stable without further decline. No major late toxicities were reported.

Conclusion:
This case demonstrates that radiotherapy can provide effective and durable disease control in RDS with critical organ involvement. Although rarely used, it should be considered when other options are unsuitable or ineffective.

Clinical and epidemiological profile of patients with breast cancer managed at the National Referral Hospital between the years 2021 to 2024.

By Dr. Sangay Wangmo

Abstract:

Introduction: Breast cancer the most commonly diagnosed cancer among women world-wide and also the leading cause of cancer deaths globally. Although the incidence is higher in the developed countries as compared to developing countries, morbidity and mortality related to BC is higher in the developing countries. In Bhutan, it is the third commonest cancer and is noted to be rising in incidence.

Objective: The objective of this study was to describe the clinical and epidemiological profile of patients with breast cancer managed at the National Referral Hospital between the years 2021 to 2024.

Method and results: This is a cross-sectional study with retrospective review of records of a total of 130 patients, 128 females (98.46%) and 2 males (1.54%) diagnosed with breast cancer. The mean age was 51.12 (+_ 12) years and the overall crude prevalence was 30.36 per 100,000 population. It was observed that most of breast cancer patients were either overweight (37.5%) or obese (34.48%) and alcohol was the most commonly used illicit substance (13.85%). The majority of the patients presented with stage II (39.78%) and stage III (38.71%) breast cancer. The most common treatment performed was modified radical mastectomy (80.81%) while 12.12 % received palliative care. However only one third of the breast cancer patients received chemotherapy (55.36%) with radiotherapy and hormonal therapy of 20% and 5.36% respectively.

Conclusion: Our current study shows high prevalence of Breast cancer in Bhutan with majority of the cases presenting at stage II and III disease thus requiring radical treatments. The study confirms the need for improved awareness and screening strategies to improve overall patient outcomes.

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RESIDENT CORNER

Dosimetric comparison of heart and lung doses between coached and un-coached left sided breast cancer patients undergoing adjuvant radiotherapy using Deep Inspiration Breath Hold (DIBH) technique.

By Dr. Laraib Khan

Abstract:

INTRODUCTION:

Radiation exposure to heart in women with left sided breast cancer can lead to cardiac disease related mortality, and an excess of cardiac deaths in postmastectomy irradiated breast cancer patients was shown in a meta-analysis (1). In a study it was reported that rates of coronary events increased with the mean dose to the heart linearly by 7.4% per gray (2). Therefore, it is important to improve cardiac avoidance in patients undergoing radiotherapy for left sided breast cancer. For improving cardiac outcomes, several techniques have been used such as deep inspiration breath hold (DIBH), respiratory gating, radiotherapy in prone position, accelerated partial breast irradiation (APBI), and use of modern 3-dimensional and intensity modulated radiation therapy (IMRT) planning (3). DIBH technique is based upon the observation that during inspiration, the flattening of the diaphragm and expansion of the lungs pulls the heart away from the chest wall hence reduces the cardiac and lung doses (4). Kim et al in his study reported further reduction in cardiac doses using DIBH when the patients were given coaching as compared with the non-coached patients (5).

OBJECTIVE:

The aim of our study is to compare the maximum, mean and V5, V10, V30 Gy doses of heart and lung doses (V17 and V20) between coached and un-coached patients using DIBH technique in left sided breast cancer radiotherapy.

MATERIALS AND METHODS:

Patients with left-sided breast cancer who had received adjuvant radiotherapy, utilizing DIBH technique, were included in the study. This cohort was designated as uncoached patients. While these patients received verbal guidance regarding the breath hold technique, they did not undergo any formal coaching or structured training.

In contrast, the second cohort involved the implementation of a comprehensive coaching protocol for the DIBH technique, which commenced in January and continued through June 2022. This protocol aimed to enhance the patients' understanding and execution of the breath hold technique to optimize cardiac protection during radiation therapy.

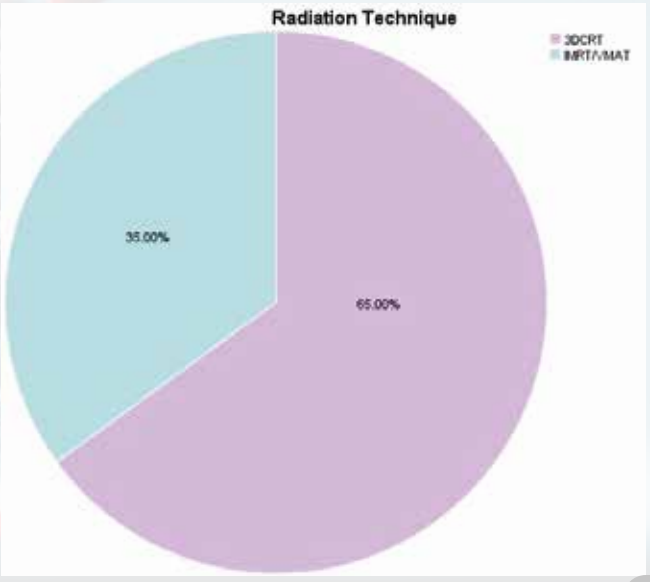
The acceptance rate of the DIBH plan was noted based on several parameters, including the maximum and mean doses, as well as the V5, V10, and V30 Gy doses to the heart, and the V17 and V20 Gy doses to the lungs from both patient cohorts. These parameters were analyzed using Dose Volume Histograms (DVH), which are part of the routine evaluation and approval process for radiation treatment plans. Radiation therapy planning was conducted using the Aria-15 planning system on the Eclipse workstation by a clinical medical physicist.

RESULTS:

Our interim analysis indicates that there is a statistically significant reduction in the maximum radiation dose delivered to the heart in patients who received coaching compared to those who did not (p=0.02). Conversely, the analysis revealed no statistically significant differences in the other dosimetric parameters assessed between the two cohorts.

CONCLUSION:

These findings suggest that coaching may play a crucial role in optimizing treatment delivery while minimizing potential cardiac toxicity and can be mandated for all compliant left sided breast cancer patients.



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By Dr. Amna khan

Abstract:

Background: Breast cancer is the most frequently diagnosed malignancy and a leading cause of cancer-related mortality among Pakistani women. Despite its high prevalence, patients in Pakistan are often diagnosed at advanced stages, resulting in poor prognosis. This study aimed to assess the frequency of different breast cancer subtypes, clinical features, staging, grading, and receptor statuses among patients in southern Punjab.

Methods:

A retrospective analysis was conducted at Nishtar Cancer Center, Multan, from October 2024 to February 2025, using medical records of 193 female patients diagnosed with breast tumors in 2024. Demographic details, risk factors, tumor characteristics, and receptor status were analyzed using statistical package for the social sciences (SPSS) version 26.0.

Results:

Most patients (47.2%) were aged 40–60 years, with 96.9% being married and 17.6% having a history of breastfeeding. Most tumors were invasive ductal carcinoma (90.7%), commonly located in the upper outer quadrant (69.4%). Advanced-stage disease was prevalent, with T4 tumors (38.3%) and N1 lymph node involvement (43.5%). Grade III tumors were frequent (60.1%), and receptor analysis showed luminal B (31.6%) as the most common subtype, followed by luminal A (30.1%) and triple-negative (25.4%).

Conclusions:

The findings highlight the late-stage diagnosis and aggressive nature of breast cancer in this region, emphasizing the urgent need for enhanced awareness, early screening programs, and improved healthcare accessibility to facilitate early detection and better treatment outcomes.

Comparative Efficacy and Safety of Pembrolizumab versus Ipilimumab in Advanced Melanoma: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

By Dr. Inbsaat Iqbal

Abstract:

Background: Immune checkpoint inhibitors have transformed advanced melanoma treatment, yet optimal first-line therapy remains debated. This meta-analysis compares pembrolizumab (anti-PD-1) versus ipilimumab (anti-CTLA-4) across efficacy and safety endpoints to guide clinical decision-making.

Methods: We systematically searched PubMed, Embase, Cochrane, and ClinicalTrials.gov through June 2025. Dichotomous outcomes were pooled as risk ratios (RR) and continuous outcomes as mean differences (MD) with corresponding 95% CIs using random-effects models in RevMan 5.4. Heterogeneity was assessed using I^2 and χ^2 statistics. A p-value of <0.05 was considered statistically significant

Results: Five randomized controlled trials involving 4303 patients (2835 pembrolizumab vs. 1468 ipilimumab) had median age 53-63 years, 40% female, predominantly stage IIIC/IV disease (66-82%), with 35-39% BRAF mutations, 32-35% elevated LDH, and 9-20% brain metastases were included. Pembrolizumab significantly improved overall survival versus ipilimumab (MD=11.70 months; 95% CI:[2.85–20.55]; p=0.01), with greater benefits at 5 years (MD=7.70 months; p=0.04) and 10 years (MD=16.80 months; p=0.0006). Overall survival rate was higher with pembrolizumab (RR=1.28; 95% CI:[1.05–1.56]; p=0.01), particularly at longer follow-up. Progression-free survival was prolonged (MD=3.53 months; 95% CI:[1.56–5.51]; p=0.0004). Pembrolizumab achieved higher clinical remission (RR=2.78; p<0.0001) and partial response rates (RR=2.77; p < 0.00001). Treatment discontinuation due to adverse events was lower with pembrolizumab (RR=0.35; p=0.0009). Overall adverse event rates were similar (RR=1.04; p=0.31), though time-stratified analyses indicated lower early AE risk but slightly higher rates with extended follow-up.

Conclusion: Pembrolizumab demonstrated superior survival and response outcomes versus ipilimumab in advanced melanoma, with a favorable early safety profile. Limitations include heterogeneity in follow-up durations and lack of biomarker-stratified analyses. Future studies should evaluate long-term toxicity and combinatorial strategies in biomarker-defined subgroups.

Overall Survival (months)

Two studies, involving a total of 1,668 patients (1,112 receiving pembrolizumab and 556 receiving ipilimumab), reported overall survival in patients with advanced or metastatic melanoma. The pooled analysis showed a significant improvement in overall survival with pembrolizumab (MD 11.70 months; 95% CI:[: [2.85 to 20.55]; p = 0.01) without significant heterogeneity (I^2 = 55%). At 5 years, pembrolizumab demonstrated a significantly longer overall

survival compared to ipilimumab (MD=7.70 months; 95% CI:[: [0.42 to 14.98]; p = 0.04). At 10 years, the survival benefit was even greater (MD=16.80 months; 95% CI:[:[7.23 to 26.37]; p = 0.0006).

Overall Survival Rates

Four studies, comprising 3,336 patients (2,224 receiving pembrolizumab and 1,112 receiving ipilimumab), reported overall survival rates in advanced or metastatic melanoma.). The pooled analysis demonstrated a significant improvement in overall survival rate with pembrolizumab (RR= 1.28; 95% CI:[1.05 to 1.56; p = 0.01; I^2 = 82%). At 12 months, there was no significant difference between the two groups (RR= 1.04; 95% CI:[0.95 to 1.15; p = 0.40). At 24 months, pembrolizumab significantly improved survival rates compared to ipilimumab (RR= 1.28; 95% CI:[1.10 to 1.50; p = 0.002). At 8 years, the survival benefit remained evident (RR= 1.49; 95% CI:[1.18 to 1.87; p = 0.0008), and at 10 years the advantage persisted (RR= 1.45; 95% CI:[1.14 to 1.85; p = 0.002)

Progression-free Survival (months)

Four studies, involving 3,051 patients (2,036 receiving pembrolizumab and 1,015 receiving ipilimumab) reported progression-free survival in advanced/metastatic melanoma. The pooled analysis demonstrated a significant improvement in PFS with pembrolizumab (MD=3.53 months; 95% CI:[1.56 to 5.51]; p = 0.0004), with moderate heterogeneity (I^2 = 72%). Subgroup analyses showed consistent benefits: at 6 months (MD=2.00 months; 95% CI:[0.68 to 3.32]; p = 0.003), 2 years (MD=2.05 months; 95% CI:[0.45 to 3.65; p = 0.01]), 5 years (MD = 5.00 months; 95% CI:[2.57 to 7.43]; p < 0.0001), and 10 years (MD = 7.90 months; 95% CI:[3.61 to 12.19]; p = 0.0003).

Clinical Remission

Two studies involving 1,668 patients (1,112 receiving pembrolizumab and 556 receiving ipilimumab) reported clinical remission rates in advanced/metastatic melanoma. The pooled analysis demonstrated a significantly higher CR rate with pembrolizumab (RR=2.78; 95% CI:[: [1.70 to 4.54]; p < 0.0001), with no heterogeneity (I^2 = 0%). Subgroup analyses showed consistent benefits: at 12 months (RR=3.88; 95% CI:[1.37 to 10.99]; p = 0.01) and 24 months (RR=2.46; 95% CI:[1.41 to 4.30]; p = 0.001).

Partial Response

Two studies involving 1,668 patients (1,112 receiving pembrolizumab and 556 receiving ipilimumab) reported partial response rates in advanced/metastatic melanoma. The pooled analysis demonstrated a significantly higher PR rate with pembrolizumab (RR= 2.77; 95% CI:[2.10 to 3.65]; p < 0.00001), with no heterogeneity (I^2 = 0%). Subgroup analyses showed consistent benefits: at 12 months (RR= 2.66; 95% CI:[1.83 to 3.84]; p < 0.00001) and 24 months (RR=2.91; 95% CI:[1.92 to 4.43]; p < 0.00001).

Treatment Discontinuation Due to Adverse Events

Two studies involving 1,870 patients (676 receiving ipilimumab and 1,194 receiving pembrolizumab) reported treatment discontinuation rates due to adverse events. The pooled analysis showed a significantly higher risk of discontinuation with ipilimumab (RR= 2.85; 95% CI:[1.54 to 5.30]; p = 0.0009), with substantial heterogeneity (I^2 = 89%).

Adverse Events

Pooled data from three studies (N=3,516 patients: 2,306 pembrolizumab, 1,210 ipilimumab) showed comparable overall AE rates between treatments (RR=1.04; 95% CI:[0.96-1.13; p=0.31]), though with significant heterogeneity (I^2=90%). Time-stratified analyses revealed dynamic patterns: pembrolizumab demonstrated lower early AE risk (RR=0.96, p=0.005) in Grossmann 2022, but higher rates emerged at 12 months (RR=1.13, p=0.01) and 5 years (RR=1.05, p=0.01). The 2-year data (Schachter 2017) showed neutral results (RR=1.07, p=0.11).

Gut Microbiome Composition and Its Influence on Bladder Cancer Therapy: A Systematic Review and Meta-Analysis of Efficacy and Toxicity

By Dr. Inbsaat Iqbal

Abstract:

Background: The gut microbiome has emerged as a critical factor influencing the efficacy and toxicity of cancer treatments. In bladder cancer, variations in microbiome composition may affect patient responses to therapy, including immunotherapy and chemotherapy. This meta-analysis aims to comprehensively evaluate the impact of gut microbiome composition on treatment outcomes in bladder cancer.

Method: The PubMed, Embase, Scopus and Cochrane databases were systematically searched from inception until June 2024 using relevant keywords. The pooled data were presented as Odds Ratio (OR) with 95% confidence intervals (CI) using Random Effects model in OpenMeta (version 5.3). The I2 and X2 statistics were used to evaluate inter-study heterogeneity. An I2 value of >50% was considered significant

heterogeneity. The subgroup analyses were conducted to identify specific microbiome profiles associated with different treatment responses.

Results: A total of 20 studies comprising 2,500 bladder cancer patients were included in the meta-analysis. Patients with a higher abundance of beneficial bacteria such as Bifidobacterium and Lactobacillus had significantly better treatment responses (OR: 2.5, 95% CI: 1.8-3.4) and lower toxicity rates (OR: 0.6, 95% CI: 0.4-0.9). Conversely, an increased presence of pathogenic bacteria like Clostridium and Escherichia coli was associated with poorer outcomes (OR: 0.5, 95% CI: 0.3-0.8) and higher toxicity (OR: 1.9, 95% CI: 1.3-2.7).

Conclusion: This meta-analysis highlights the significant influence of gut microbiome composition on the efficacy and toxicity of bladder cancer treatments. Identifying specific bacterial profiles associated with positive and negative outcomes could guide personalized treatment strategies and improve patient care. Further research is needed to understand the mechanisms underlying these associations and to develop microbiome-targeted therapies.

Keywords: Gut microbiome, Bladder cancer, Treatment efficacy, Treatment toxicity, Immunotherapy, Chemotherapy, Meta-analysis.

Regional, National and Sub-National Burden of Breast Cancer Pakistan from 1990-2050: A Systematic Analysis of Global Burden of Disease Study 2021

By Dr. Inbsaat Iqbal

Abstract:

Background

Breast cancer is the leading cause of cancer-related mortality among women in Pakistan, which has the highest incidence in South Asia and ranks eighth globally in mortality. Despite its substantial burden, trends in breast cancer within Pakistan remain under-characterized.

Methods

We utilized data from the Global Burden of Diseases (GBD) 2021 study to estimate age-standardized mortality (ASMR), incidence (ASIR), and disability-adjusted life years (ASDALY) rates per 100,000 individuals from 1990 to 2021. Trends were analyzed using Joinpoint regression to calculate annual percentage changes (APCs) and average annual percentage changes (AAPCs).

Results

In 2021, Pakistan reported 19,894 deaths and 34,153 new cases of breast cancer, an increase of 263% and 327% respectively, from 1990. The ASMR increased from 20.03 in 1990 to 29.76 in 2021 (AAPC: 1.3; 95 % CI: 1.28 to 1.32). Concurrently, ASIR showed a consistent rise, surging from 26.47 in 1990 to 45.91 in 2021 (AAPC: 1.81; 95 % CI: 1.78 to 1.83). The ASDALY rate had also been on the rise since 1990, reaching a value of 927.37 (AAPC: 1.27; 95 % CI: 1.25 to 1.29) in 2021. In subregion-wise analysis, Azad Jammu & Kashmir had the highest age-standardized rates, while Sindh had the lowest. Females aged 50 and above experienced the highest increase in the burden of breast cancer.

Conclusion

Breast cancer remains a growing health concern for women in Pakistan, with steadily increasing incidence and mortality rates over the past three decades. Regional disparities highlight the urgent need for targeted interventions, while the rising burden among women aged 50 and above underscores the need for improved early detection and treatment.

CAR-T Cell Therapy in Penile and Urethral Carcinomas: A Meta-Analysis of Efficacy and Safety from Preliminary Clinical Trials and Case Studies

By Dr. Inbsaat Iqbal

Abstract:

Background: Penile and urethral carcinomas are rare and aggressive cancers with limited treatment options, often leading to poor prognoses. Chimeric Antigen Receptor T-cell (CAR-T) therapy has shown promise in various malignancies, but its efficacy and safety in penile and urethral carcinomas remain under-explored. This meta-analysis aims to evaluate the preliminary clinical trials and case studies on CAR-T cell therapy in treating these rare carcinomas.

Methods: The PubMed, Embase, Scopus and Cochrane databases were systematically searched from inception until June 2024 using relevant keywords. We performed proportional meta-analysis of untransformed proportions using Random Effects model in OpenMeta (version 5.3). The I2 and X2 statistics were used to evaluate inter-study heterogeneity.

An I2 value of >50% was considered significant heterogeneity. Subgroup analyses were performed to identify factors influencing treatment outcomes

Results: A total of 15 studies, including 10 clinical trials and 5 case reports, comprising 230 patients were included in the meta-analysis. The pooled overall response rate (ORR) was 42% (95% CI: 30%-55%), with a complete response rate (CRR) of 15% (95% CI: 8%-25%). Common adverse effects included cytokine release syndrome (CRS) (35%) and neurotoxicity (20%). Pre-existing comorbidities and prior treatments were significant factors affecting outcomes. No treatment-related mortality (TRM) was reported.

Conclusion: CAR-T cell therapy demonstrates encouraging efficacy in penile and urethral carcinomas, with manageable safety profiles. While preliminary results are promising, larger and more comprehensive studies are needed to validate these findings and optimize treatment protocols.

"Efficacy of Atezolizumab and Bevacizumab in Conjunction with Platinum-Based Chemotherapy for Ovarian Cancer: A Systematic Review and Meta-Analysis of RCTs"

By Dr. Inbsaat Iqbal

Abstract:

Background:

Ovarian cancer continues to be a major factor in cancer-related morbidity and mortality worldwide. Recent developments in treatment have investigated the effectiveness of combining immune checkpoint inhibitors, like atezolizumab, with bevacizumab in combination with platinum-based chemotherapy. This study evaluates the clinical effectiveness and safety of this combination in comparison to conventional therapies.

Methods:

PubMed, Embase, Scopus, and Cochrane CENTRAL databases were queried to retrieve studies evaluating the efficacy and safety of atezolizumab in combination with bevacizumab and platinum-based chemotherapy for ovarian cancer. Odds ratios (OR) with 95% CI were pooled using a random-effects model, and a p-value of <0.05 was considered statistically significant.

Results:

Four studies involving a total of 3,641 patients were analyzed. The use of atezolizumab with bevacizumab in combination with platinum-based therapy for ovarian cancer showed a significant advantage in progression-free survival (PFS) for the treatment group (mean difference 1.61; 95% CI: 0.61–2.61; p = 0.002), though notable heterogeneity limits generalizability. However, overall survival (OS) did not reveal a significant difference (mean difference 2.97; 95% CI: –0.71–6.66; p = 0.11). The risk of developing autoimmune disorders was significantly greater in the treatment group (RR 1.62; 95% CI: 1.10–2.38; p = 0.02, I^2 = 37%). There were no significant differences found for treatment-related adverse events (RR 1.00; 95% CI: 0.98–1.02; p = 0.78) or for any grade of adverse events (RR 1.03; 95% CI: 0.99–1.08; p = 0.15).

Conclusions:

The atezolizumab therapy showed a marked enhancement in progression-free survival; however, the considerable variability among the studies makes it challenging to interpret and apply these results broadly. The lack of significant difference in overall survival suggests that further investigations are needed to clarify long-term benefits. While the treatment was linked to an increased risk of autoimmune disorder occurrences, its safety profile concerning treatment-related side effects remains uncertain. Large-scale, robust trials are warranted to determine the most optimal management.

Bevacizumab plus Re-Irradiation Therapy vs. Bevacizumab Monotherapy in the Treatment of Recurrent Glioblastomas: A Systematic Review and Meta-analysis

By Dr. Inbsaat Iqbal

Abstract:

Background: Glioblastomas are the most aggressive primary brain tumors, characterized by high recurrence rates. Standard treatment involves maximal surgical resection, followed by chemotherapy and radiotherapy. Bevacizumab has emerged as a promising therapeutic agent when combined with re-irradiation for recurrent glioblastomas. This study evaluates the efficacy of re-irradiation combined with bevacizumab compared to bevacizumab alone in treating recurrent glioblastoma.

Methods: A comprehensive literature review was conducted using PubMed, Cochrane, Embase, and Clinicaltrials.gov from inception until January 2025. A random-effects model of meta-analysis was applied using the Mantel-Haenszel method to synthesize hazard ratios (HR) for dichotomous outcomes with 95% confidence intervals. The I^2 and χ^2 statistics were used to evaluate interstudy heterogeneity. All analyses were performed using R Studio.

Results: This meta-analysis included four studies with a total of 390 patients (205 vs 185). We found significantly improved progression-free survival (HR 2.00, 95% CI: [1.64-2.45]), p < 0.0.1, I2=0%) and overall survival (HR 2.00, 95% CI: [1.45-2.77]), p < 0.0.1, I2=58%) in bevacizumab combined with re-irradiation compared to bevacizumab monotherapy.

Conclusion: The combination of re-irradiation and bevacizumab provides better treatment benefits and disease control compared to bevacizumab alone in treating recurrent glioblastoma. Our findings are limited by a small sample size, and we suggest conducting more robust studies with larger samples to understand the full potential of these modalities.

Efficacy and Safety of Nivolumab plus Chemotherapy vs. Chemotherapy Alone in Gastric Adenocarcinoma: A Systematic Review and Meta-analysis

By Dr. Inbsaat Iqbal

Abstract:

Background:

Gastric adenocarcinoma, isthe fourth leading cause of cancer death worldwide. Standard chemotherapy achieves modest efficacy and is limited by toxicity . Nivolumab, a PD-1 immune checkpoint inhibitor, appears to restore T-cell function and enhances antitumor immunity.

Objective:

To evaluate the efficacy and safety of nivolumab plus chemotherapy compared with chemotherapy alone in advanced gastric adenocarcinoma.

Methods:

PubMed, Embase, and Cochrane databases were systematically searched through February 2025. Outcomes were pooled as hazard ratios (HRs) and risk ratios (RRs) using random-effects model. Meta-analyses were conducted using RevMan 5.4. Heterogeneity was assessed with I^2 statistics, and sensitivity analyses were performed. Certainty of evidence was appraised via GRADE, and risk of bias with Cochrane RoB 2.0. Results: Five RCTs, including patients across PD-L1 combined positive score (CPS) subgroups, were analyzed. Nivolumab plus chemotherapy significantly improved OS compared with chemotherapy alone (HR 0.80, 95% CI:[0.75–0.85]; p<0.00001; I^2=5%), with greater benefit in PD-L1 CPS ≥5 (HR 0.69, 95% CI 0.64–0.76; p < 0.00001; I^2 = 0%). PFS and ORR were also significantly improved, irrespective of PD-L1 status. However, nivolumab was associated with higher risks of AEs (RR 1.06, 95% CI 1.04–1.08), serious AEs (RR 1.80, 95% CI 1.60–2.03), and treatment discontinuations (RR 1.60, 95% CI 1.47–1.74).

Conclusions:

Nivolumab plus chemotherapy confers significant survival and response advantages over chemotherapy alone in advanced gastric adenocarcinoma, especially in patients with PD-L1 CPS ≥5. However, increased toxicity underscores the need for careful patient selection and vigilant monitoring.

Comparative Efficacy of Sequential Intravesical Gemcitabine and Docetaxel Versus Bacillus Calmette-Guérin in Non-Muscle Invasive Bladder Cancer: A Meta-Analysis

By Dr. Inbsaat Iqbal

Abstract:

Background: Bacillus Calmette-Guérin (BCG) remains the standard treatment for non-muscle invasive bladder cancer (NMIBC). However, treatment limitations due to global shortages, unresponsiveness, and recurrence highlight the need for effective alternatives. Sequential intravesical gemcitabine and docetaxel (Gem-Doce) has been proposed as a potential therapeutic option.

Methods: We conducted a systematic search of PubMed, Embase, Cochrane, Scopus, and ClinicalTrials.gov from inception through December 2024. Eligible studies compared Gem-Doce with BCG in NMIBC. Outcomes included high-grade recurrence-free survival (HG-RFS), recurrence-free survival (RFS), progression-free survival (PFS), cystectomy-free survival (CFS), cancer-specific survival (CSS), and overall survival (OS) at 6, 12, 24, and 36 months. Risk ratios (RR) with 95% confidence intervals (CI) were pooled using Mantel-Haenszel random-effects models. Heterogeneity was assessed using the I^2 statistic.

Results: Six observational studies including 830 patients (Gem-Doce: n=399; BCG: n=431) were analyzed. Gem-Doce significantly improved CFS at 24 months (RR: 1.05; 95% CI: 1.01–1.10; p=0.02) and 36 months (RR: 1.06; 95% CI: 1.02–1.11; p=0.007). PFS was also improved with Gem-Doce at 12 months (RR: 1.03; 95% CI: 1.00–1.06; p=0.04), 24 months (RR: 1.04; 95% CI: 1.01–1.08; p=0.01), and 36 months (RR: 1.10; 95% CI: 1.03–1.17; p=0.003). BCG showed superior OS at 24 months (RR: 0.93; 95% CI: 0.88–0.99; p=0.02). No significant differences were observed for HG-RFS, RFS, or CSS.

Conclusions: Gem-Doce provides significant benefits in CFS and PFS compared with BCG in NMIBC, while BCG maintains an OS advantage at 24 months. These findings support Gem-Doce as a potential alternative when BCG is limited or ineffective. Larger prospective trials are needed to define its long-term survival impact.

Adenoid Cystic Carcinoma: Management Outcomes from a Decade of Single-Center Experience

By Dr. Kaynat Siddiqui

Abstract:

Background

Adenoid cystic carcinoma (ACC) is a rare malignancy known for late recurrences and poor disease-free survival. It most commonly arises from the salivary glands and is often associated with perineural invasion. Surgery followed by postoperative radiotherapy is commonly used for optimal disease control. There is limited literature on predisposing factors and management of advanced disease, especially in low- and middle-income countries where patients often present at advanced stages. We aimed to report the management outcomes of head and neck ACC treated at our center over the past decade.

Methods

This was a retrospective review of all head and neck ACC cases treated at our center in the last decade. Data on demographics, tumor site, surgical management, adjuvant radiotherapy, and local and regional recurrences were collected from clinical records. Analysis was performed using SPSS version 27.

Results

This single-center study included 62 patients with a mean age of 37.6 years. The most common tumor site was the parotid (21%). Surgical resection was performed in 56 patients (90.3%), and adjuvant radiotherapy was given to 28 patients (45.2%). After excluding missing data, at a median follow-up of 36 months, local recurrence was observed in 14 patients (25%) and regional recurrence in 4 patients (7.4%). Distant metastases were seen in 15 patients (26.8%), most commonly in the lung and bone. Three patients (5%) died during follow-up.

Conclusion

ACC is a slow-growing tumor most commonly involving the salivary glands. Adequate surgical resection and postoperative radiotherapy contribute to better local control. However, local and regional recurrences remain common and often occur years after initial treatment.

Institutional Approach to Homogeneous Craniospinal Irradiation in Paediatric Medulloblastoma to Minimize Spinal Growth Asymmetry

By Dr. Fabiha Shakeel

Abstract:

Introduction:

Medulloblastoma is the most common malignant paediatric brain tumour, accounting for up to 30% of CNS tumours in the first decade of life. Craniospinal irradiation (CSI) remains a key treatment modality. However, in young children, uneven vertebral dose distribution during CSI can lead to spinal growth asymmetry. To mitigate these risks, CSI planning must balance adequate target coverage with dose homogeneity, especially in children under pubertal age. The European Society for Paediatric Oncology (SIOPE) guidelines suggest significant bone growth impairment occurs at radiation doses >15 Gy in children aged 2–6, and >35 Gy in older children.

Methods:

We retrospectively analysed CSI plans for 6 paediatric medulloblastoma patients (age between 4–9.5 years) treated at our institution between 2023–2025. All were classified as standard-risk and received a CSI dose of 23.4 Gy. Craniospinal target volumes were contoured using SIOPE consensus guidelines. Vertebral bodies were contoured as organs at risk (OARs) and analysed for dose distribution. Our planning goal was to minimize dose gradients across vertebrae to reduce long-term growth-related deformities.

Results:

Dose gradients across the vertebral bodies were maintained at 1800 cGy in all patients. In children aged <6 years (n=2), vertebral dose gradients were successfully limited to 1800 cGy with 99% homogeneity. In older patients, gradient control remained within acceptable limits meeting current safety recommendations.

Conclusion:

Homogeneous vertebral dose distribution during CSI is feasible using guideline-based planning. Adhering to age-specific dose constraints and minimizing dose gradients across vertebrae may reduce the risk of late-onset spinal deformities in paediatric medulloblastoma patients.

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Frequency of Acute Toxicity of Concurrent Chemoradiation in Oral Cavity Cancers

By Dr. Zainab Bashir

Abstract:

Introduction:

Oral cavity cancers represent a significant health burden in Pakistan, with high prevalence and mortality. Concurrent chemoradiation (CCRT) is the standard treatment for locally advanced oral cavity squamous cell carcinoma (OCSCC), providing improved locoregional control. However, CCRT is associated with substantial acute toxicities, including mucositis, dermatitis, dysphagia, and hematologic adverse effects, which can impair treatment compliance, increase unplanned hospitalizations, and reduce quality of life.

Methods:

This prospective, descriptive cross-sectional study was conducted at the Department of Radiation Oncology, Atomic Energy Medical Center, Karachi. A total of 69 patients with histologically confirmed OCSCC were treated with standard fractionation radiotherapy (66– 70 Gy over 7 weeks) alongside concurrent chemotherapy, primarily weekly cisplatin. Acute toxicities were assessed weekly using the Common Terminology Criteria for Adverse Events (CTCAE v5.0).

Results:

Grade 3–4 oral mucositis was observed in 76% of patients, consistent with international data showing mucositis as the most common dose-limiting acute toxicity in head and neck chemoradiation. Grade 3 dermatitis occurred in 52%, and dysphagia in 59% of patients. Approximately 32% developed hematologic toxicity (grade ≥2 anemia or neutropenia), and 18% experienced treatment interruptions exceeding 3 days due to toxicity. These rates align with studies highlighting mucosal and skin toxicities as the most frequent acute effects of CCRT in oral cavity and head and neck cancers. Advanced radiation techniques (e.g., VMAT/IMRT) have shown potential in reducing toxicity but were not universally available during the study period.

Conclusion:

CCRT for OCSCC is associated with a high incidence of acute toxicities, particularly mucositis, dermatitis, and dysphagia, which can adversely impact treatment delivery. These findings underscore the importance of proactive toxicity monitoring and supportive care strategies during treatment.

"Translating Global Evidence to Local Practice: Outcomes of Cervical Cancer Patients Managed with Neoadjuvant Chemotherapy, Concurrent Chemoradiation followed by Brachytherapy"

By Dr. Maroona Syed

Abstract:

Introduction:

Cervical cancer remains the fourth most common malignancy among women in low- and middle-income countries, contributing substantially to cancer-related morbidity and mortality. In Pakistan, its incidence is rising, yet evidence on disease patterns and treatment outcomes remains scarce. Limited radiotherapy availability has led to the adoption of neoadjuvant chemotherapy (NACT) followed by concurrent chemoradiotherapy (CCRT) as a standard approach. However, data evaluating treatment response, recurrence patterns, and survival outcomes in our population are lacking.

In our setting, platinum- and taxanes based NACT regimens are commonly employed, followed by CCRT and brachytherapy.

This study aims to provide a comprehensive evaluation of treatment outcomes, with emphasis on survival and recurrence trends over a three-year follow-up period.

Methods:

We conducted a retrospective observational study of patients diagnosed with cervical cancer and treated in Radiation Oncology Department of a Tertiary Care Hospital Rawalpindi from August 2021 to August 2024. Data were collected from hospital records, including demographic details, disease stage at presentation, treatment regimens administered and follow-up outcomes. Patients received either neoadjuvant chemotherapy with carboplatin and paclitaxel, followed by concurrent chemoradiotherapy 4500 cGy in 25 Fractions and subsequent vaginal brachytherapy boost of 800cGy per fraction for 3-4 fractions, or directly concurrent chemoradiotherapy followed by brachytherapy, depending on stage, performance status, and treating team decision. Chemotherapy regimens were administered according to institutional protocols. Radiotherapy was delivered with external beam radiotherapy (EBRT) followed by vaginal brachytherapy, in line with international standards. Follow-up was performed regularly for three years,

during which survival status and recurrence events were recorded. The primary endpoints were three-year overall survival (OS) and disease free survival. Secondary endpoints included recurrence patterns. Data were compiled, tabulated and analyzed descriptively.

Results:
A total 68 patients of cervical cancer were analyzed, with a mean age of 53.1 years. Squamous histology was the most prevalent, accounting for 87% of all cases. 54% patients presented with stage III, with 37% patients having positive pelvic nodes. A total of 23 recurrences were observed, comprising 16 distant and 7 local, with overall survival of 80% at 3 years.

Conclusion:
Our institutional data show a three-year overall survival of 80%, with recurrence predominantly distant in nature. These outcomes are consistent with international reports suggesting our patient population responds comparably well to treatment regimens employed internationally. The predominance of distant failures highlights the pressing need for more effective systemic therapeutic strategies.

Linac-Based Radiosurgery for Trigeminal Neuralgia: A Single-Center Experience

By Dr. Maryam Ejaz

Abstract:

Introduction: Trigeminal neuralgia (TN) is a debilitating neuropathic pain condition that significantly impacts a patient's quality of life. While pharmacotherapy is the first-line treatment, many patients become refractory to medication or experience intolerable side effects. Linear accelerator (Linac)-based stereotactic radiosurgery (SRS) has emerged as a non-invasive and effective alternative for these patients. This article presents a single-center experience with Linac-based SRS for the treatment of trigeminal neuralgia, evaluating its clinical efficacy and safety.

Methods: We enrolled patients with medically refractory trigeminal neuralgia with the Barrow Neurological Institute (BNI) Pain Scale 4-5. All patients underwent Linac-based SRS with a single fraction dose of 75 Gy to the trigeminal nerve root entry zone. Patients were actively followed up at regular intervals to assess pain relief using the Barrow Neurological Institute (BNI) Pain Scale. Neurological side effects were also monitored and recorded.

Results: 20 patients were included in the study. Patients had a mean age of 67.5 years, with pain on the right side in 65% of cases. The median follow-up period was 18 months (range, 6-24 months). A total of 18 patients (90%) experienced pain relief (BNI I-III). The median time to initial response was 3 weeks. At 3 months, 15 patients (75%) had a BNI score of I-III. At 12 months, with 16 patients (80%) maintained a BNI score of I-III. The most common complication was mild facial numbness, affecting 25% of patients. One patient was lost to follow-up, and one died from an unrelated cause.

Conclusion: Our findings confirm that Linac-based SRS is a highly effective and safe treatment for patients with refractory trigeminal neuralgia. The high rate of sustained pain control and the low incidence of significant side effects demonstrate its value as a non-invasive therapeutic option. We will continue to follow these patients to evaluate the durability of pain relief and to monitor for any long-term effects.

Adenoid Cystic Carcinoma of the Left Nasal Cavity with Pulmonary Metastasis in A Young Non-Smoking Female: A Rare Case Report

By Dr. Muhammad Asad

Abstract:

Adenoid cystic carcinoma (ACC) is a rare malignant tumor of salivary glands with indolent local growth, tendency for perineural invasion and distant metastasis. Treatment is surgery with negative margins followed by local control of disease by radiotherapy. Here we present a case of adenoid cystic carcinoma of left nasal cavity which eventually metastasized to the lungs despite initial treatment success.

Introduction: Adenoid cystic carcinoma (ACC) represents less than 1% of all head and neck tumors. (1,2) ACC of the nasal cavity is a rare malignancy accounting 5% of all paranasal sinus malignant tumors (3) with an indolent course and a propensity for perineural invasion and distant metastasis, most commonly to the lungs. (4,5,6) Rate at which distant metastasis occur in ACC is 8-60%. (7) Due to its slow-growing nature and late recurrences, long-term follow-up should extend at least >15 years. (4) Here, we present a case of a young non-smoker female who registered at Institute of Nuclear Medicine and Oncology, Lahore (INMOL) with ACC of the left nasal cavity, that eventually metastasized to the lungs despite initial treatment success.

Discussion: Adenoid cystic carcinoma was initially reported in

two sites; one lesion in parotid and two lesions in nasal tumors by Lorain and Laboulbene in 1853 and 1854. They noted spread along nerves and invasion of surrounding structures. (4,5,6) As stated above ACC represents less than 1% of all head and neck cancers (1,2) and about 10% of salivary gland tumors. (8) ACC is 14-17% in paranasal sites and its proportion ranges from 32-71% in minor salivary glands. (9,10) Among three distinct growth patterns; tubular, cribriform and solid, classic ACC shows a combination of cribriform and tubular combination patterns, while a solid growth pattern is associated with worse prognosis, advance staged and development of distant metastasis. (4) In our case, it showed classic type of ACC with solid and cribriform growth patterns on histology. Smoking doesn't influence the incidence and there are no distinct risk factors in case of ACC. (11) In all head and neck cancers combined, women are affected slightly more than men. (Michel et al. 2013, as cited in Martinez-Rodriguez N et al. 2011). The most common symptom observed is slowly growing mass followed by pain due to its tendency of perineural invasion. (4,5,6) The presentation may depend upon site of disease; nasal obstruction, epistaxis, deep facial pain and eye symptoms are more common in nose and paranasal sites. (7,9,12) Preoperative imaging with CT or MRI is necessary to know the exact extent of disease and crucial for accurate staging of the disease. (13) Histopathology remains gold standard, especially when we are planning therapeutic intervention like radical surgery. (14) Metastasis to regional lymph nodes is rare while hematological spread commonly to lungs, bone and liver. (Coca-Pelaz et al. 2015, as cited in Stell et al. 1986). ACC is a high-grade tumor and is treated radically as surgical resection, ensuring free resection margins followed by post-operative radiotherapy. (15,16,17,18) Post-operative RT not only delays but also prevents local recurrence of ACC. (19) Chemotherapy should be reserved as a palliative treatment and is recommended in patients demonstrating rapidly progressive disease or were having symptomatic metastases. (Coca-Pelaz et al. 2015, as cited in Terhaard CH et al. 2004). ACC has a poor prognosis and neural invasion is considered as poor prognostic factor associated with distant metastasis and adverse final outcome. (20,21) Surveillance of other anatomical sites is also mandatory as Spiro suggested that incidence of metastasis is likely higher in other distant anatomical sites. (22)

Conclusion: ACC of the nasal cavity is a rare malignancy with a prolonged clinical course, requiring long-term surveillance. Despite initial tumor control with surgery and radiotherapy, distant metastases, particularly to the lungs, are common. This case highlights the importance of vigilant follow-up and the role of systemic therapy in managing metastatic disease.

Ewing Sarcoma of the Nasopharynx : A Rare Case Report on Diagnosis and Treatment

By Dr. Ifra Shahid

Abstract:

Background:

Ewing sarcoma (ES) is a highly malignant small round cell tumor, most commonly arising in the long bones and pelvis, while its occurrence in the head and neck, particularly the nasopharynx, is exceptionally rare.

Case Presentation:

A 13-year-old girl with well-controlled celiac disease presented with progressive headaches, right nasal obstruction, mucoid discharge, and sudden right-eye vision loss. CT and MRI revealed a large nasopharyngeal mass extending into adjacent sinuses, orbit, and anterior cranial fossa with optic nerve compression. Histopathology showed small round cells with scant cytoplasm and frequent mitoses. Immunohistochemistry was positive for CD99, NKX-2.2, and FLI-1, confirming Ewing sarcoma of the nasopharynx.

Management and Outcome:

The patient underwent complete surgical excision followed by radiotherapy (54 Gy in 27 fractions) and three cycles of VAC/IE. As the disease did not show significant improvement, five cycles of VDC combined with Oncothermia were administered. Follow-up imaging demonstrated a good response with no residual disease. She remains clinically stable under ongoing surveillance.

Conclusion:

Nasopharyngeal Ewing sarcoma is an exceedingly rare malignancy requiring a high index of suspicion for diagnosis. Multimodal therapy involving surgery, chemotherapy, and radiotherapy is essential for disease control, and long-term surveillance is crucial to detect recurrence or progression.

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By Dr. Qasim Khan Achakzai

District Wise Government Health Facilites in Balochistan

S.No	Districts	BHU	CD	RHC	MCH	DHQ	CH	THQ	SHS	SHC	T.B.C	MD	LC	LH	HOSP	HAU	THOS	F	NF	Total
1	Kalat	16	13	2	3	1	0	0	1	0	0	0	0	0	0	0	0	36	2	38
2	Kharan	22	4	0	2	1	0	0	0	0	0	0	0	0	0	2	0	31	0	31
3	Khuzdar	45	30	6	1	1	0	0	1	0	1	1	1	0	1	0	0	88	2	90
4	Lasbella	44	26	4	4	1	1	0	0	1	0	0	0	0	1	1	0	83	0	83
5	Mastung	24	6	6	2	1	0	0	0	0	0	0	0	0	1	0	0	40	10	50
6	Awaran	7	17	2	1	1	0	0	0	0	1	0	0	0	0	0	0	29	5	34
7	Washuk	28	12	2	0	0	0	1	0	0	0	0	0	0	0	0	0	43	0	43
8	Gwadar	23	15	3	3	1	0	0	1	0	1	0	2	1	0	0	0	50	5	55
9	Panjgur	29	11	6	4	1	0	0	0	0	1	1	1	0	1	0	0	55	10	65
10	Keich (Turbat)	39	39	13	4	0	0	0	0	0	0	0	0	1	0	0	0	96	16	112
11	Jaffarabad	19	20	1	3	1	1	0	0	0	1	0	0	0	1	1	0	48	1	49
12	Kachhi (Bolan)	12	19	5	3	1	2	0	0	0	0	0	0	0	0	0	0	42	0	42
13	Naseerabad	18	9	3	3	1	0	0	1	0	0	0	0	0	0	1	0	36	0	36
14	Jhal Magsi	14	11	3	2	1	0	0	0	0	0	0	0	0	0	0	0	31	2	33
15	Chagai	15	11	4	4	1	0	0	0	0	0	0	0	0	0	0	0	35	1	36
16	Pishin	34	11	9	4	1	0	1	0	0	0	0	0	0	0	0	0	60	0	60
17	Quetta	40	6	4	14	0	0	0	1	0	0	0	0	0	2	1	7	75	3	78
18	Killa Abdullah	38	13	5	2	1	2	0	0	0	1	0	0	0	0	0	0	62	8	70
19	Nushki	14	14	2	2	1	0	0	1	0	0	0	0	0	0	0	0	34	0	34
20	Dera Bugti	34	26	1	3	1	0	0	0	0	0	0	0	0	1	0	0	66	1	67
21	Kohlu	40	30	3	1	1	0	0	0	0	0	0	0	0	0	4	0	79	0	79
22	Sibi	15	15	3	4	1	0	0	1	0	0	0	0	0	0	0	0	39	0	39
23	Ziarat	15	7	5	3	1	0	1	0	0	0	0	0	0	0	0	0	32	3	35
24	Harnai	7	8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	18	0	18
25	Barkhan	10	9	0	2	1	0	0	0	0	0	0	0	0	0	2	0	24	0	24
26	Killa Saifullah	17	14	5	2	1	0	1	0	0	0	0	0	0	0	0	0	40	1	41
27	Loralai	22	20	1	2	1	0	0	0	0	1	1	1	0	0	1	0	50	2	52
28	Musa Khail	20	14	1	2	1	0	0	0	0	0	1	0	0	0	0	0	39	0	39
29	Zhob	22	17	4	2	1	0	0	0	0	1	0	0	0	0	0	0	47	0	47
30	Sherani	8	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	18	0	18
31	Surab	27	6	1	1	1	0	0	0	0	0	0	0	0	0	0	0	36	0	36
32	Sohbatpur	23	15	0	4	0	0	0	0	0	0	0	0	0	0	2	0	44	4	48
33	Duki	20	26	1	2	1	0	0	0	0	0	0	0	0	0	0	0	50	2	52
TOTAL		761	501	108	91	28	6	4	7	1	8	4	5	2	8	15	7	1556	78	1634

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Transforming Esophageal Cancer Care: The Promise of Concurrent Chemoradiotherapy.

By Dr. Asma Saleem Khan

Abstract:

Background: Esophageal cancer is one of the most lethal cancers worldwide because of its violent nature and poor survival rate. According to the site of origin, it is classified into two types: squamous cell carcinoma and adenocarcinoma. Squamous cell carcinoma may occur throughout the length of the esophagus, whereas adenocarcinoma occurs just above the esophagogastric junction. The treatment for locally advanced esophageal cancer is from neoadjuvant CCRT followed by esophagectomy or definitive CCRT with a higher dose. The objective of this study was to determine the frequency of the overall disease response after concurrent chemoradiotherapy in esophageal carcinoma after 6-8 weeks of completion of treatment. To show that definitive CCRT yields no lesser results than Neoadjuvant CCRT followed by surgery, providing esophageal preservation thereby decreasing the morbidity of an extensive surgical procedure.

Methods: This prospective cohort study was conducted at Dr. Ziauddin Hospital, Karachi, Pakistan. All patients with biopsy-proven, esophageal cancer were included in this study after having a PET CT scan or a contrast-enhanced CT scan of the chest abdomen, and pelvis. The patients after standing the inclusion criteria were added to the study and received CCRT. Data were gathered including radiological and histopathological reports. The primary outcome which is the overall response to the treatment was analyzed using SPSS v.26.0.

Results: Among 44 patients, post-treatment PET showed complete response (CR) in 52.3%, partial response (PR) in 31.8%, stable disease (SD) in 11.4%, and progressive disease (PD) in 4.5%. Biopsy confirmed pathological complete response (PCR) in 65.9%.

Histology was significantly associated with both PET ($p = 0.026$) and biopsy response ($p < 0.001$), with SCC showing better outcomes. Radiation dose showed a borderline association with biopsy response ($p = 0.044$), while tumor grade and treatment gap were not significant.

Conclusion:

This study highlights the efficacy of concurrent chemoradiotherapy (CCRT) in the treatment of esophageal cancer, demonstrating significant overall response rates. Patients with squamous cell carcinoma showed markedly better PET and pathological complete responses, underscoring their strong radiosensitive profile.

Given these outcomes, definitive chemoradiation may represent an effective, organ-preserving alternative to neoadjuvant therapy followed by surgery in selected patients. Histology remains a key determinant of therapeutic response and should guide treatment decisions.

Clinical Outcomes of Five-Fraction Stereotactic Radiosurgery for Meningiomas: An Institutional Experience with Literature Context

By Dr. Zainab Rafat Ali

Abstract:

Introduction

Meningiomas are the most common nonglial intracranial tumors, often benign but potentially morbid due to proximity to critical neurovascular structures. While complete surgical excision provides excellent long-term control, many tumors are unresectable or subtotally resected. Stereotactic radiosurgery (SRS) is an established treatment option, but single-fraction SRS in large or peri-optic lesions carries risks of edema and cranial neuropathy. Hypofractionated SRS (3–5 fractions) offers a balance between efficacy and safety, with increasing evidence supporting its use. This study reports the institutional experience from the Neurospinal and Cancer Care Institute (NCCI), Karachi, evaluating clinical outcomes, toxicity, and survival in benign intracranial meningiomas treated with a five-fraction SRS regimen.

Methods

This retrospective observational study included 100 patients with radiologically or histologically confirmed benign meningiomas treated with five-fraction SRS over six years. Treatment was delivered on an Elekta Synergy-S linear accelerator using a 3 mm micro-multileaf collimator and cone-beam CT guidance. A per-fraction dose of 4–5 Gy was prescribed to a mean isodose line of 80%. Follow-up was performed at 6 weeks, 3 months, and every 6 months thereafter. Data were analyzed using SPSS v29, with survival estimated via Kaplan–Meier methods and predictors assessed using Cox regression analysis.

Results

The mean age was 44.1 ± 14.9 years; 55% were female. The most common sites were the cerebellopontine angle (34%) and

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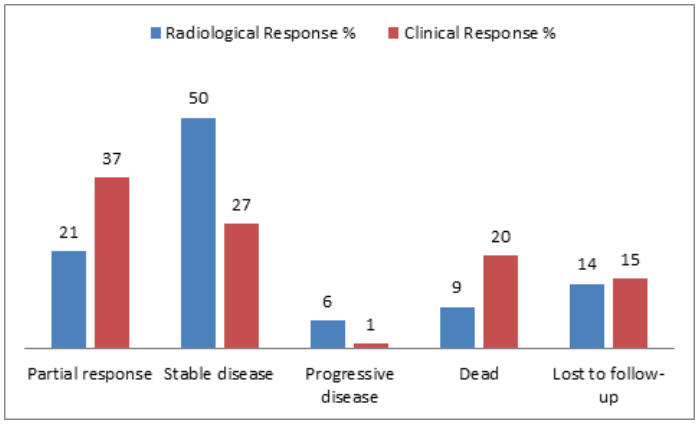
suprasellar region (19%). Prior surgery was performed in 24%, and 36% had comorbidities. The mean total dose delivered was 24.8 Gy in five fractions. Radiologically, 21% showed partial response, 50% stable disease, and 6% progression. Clinically, 37% improved, 27% remained stable, and 1% deteriorated. Acute toxicity was minimal, with 95% experiencing none; late Grade I toxicity occurred in only 3% up to 5 years. The 5-year overall survival was 90% (median follow-up 4.2 years), significantly associated with radiological response ($p < 0.001$) and comorbidity status ($p = 0.014$).

Conclusion

Five-fraction SRS provides excellent local control and overall survival with minimal toxicity in patients with benign intracranial meningiomas, including large or critically located lesions. This regimen is a safe and effective alternative to single-fraction radiosurgery. Larger prospective multicenter studies are warranted to confirm optimal dosing and long-term outcomes.



Radiological and Clinical response rates

Bacterial Spectrum and Their Susceptibility Pattern in Febrile Neutropenic Patients of Hematological Malignancies

By Dr. Hina Tahir

Abstract:

Introduction: An oral temperature of more than 38o C sustained for more than one hour with an absolute neutrophil count of ≤ 1500/µL is called Febrile Neutropenia. Cytotoxic chemotherapy is the cause of 90% cases of Febrile Neutropenia. It is an oncological emergency requiring prompt measures to decrease associated complications and mortality. The number of complications associated with febrile neutropenia rises up to 25 to 30%, with an estimated mortality of around 11%. According to NCCN guidelines, patients with acute leukemia and allogeneic hematopoietic stem cell transplant carry the highest risk of infection. In contrast to this, the risk of infection in solid tumor is low. With the frequent use of empirical antibiotic therapy, the bacterial spectrum in febrile neutropenic patients shifted towards gram positive organisms. However, many studies still report gram negative bacteria to be the most prevalent with higher mortality and poor prognosis. A study done in Iran showed that among 212 participants, 62.3% had hematologic malignancies and 37.7% had solid tumors. The study showed domination of Gram-negative bacteria (84.9%). In observation with the changes in bacterial spectrum and the variations in different study results, it is very crucial to understand the epidemiology of bacterial isolates and their resistance patterns according to geographical distribution. This research study would assist in the formation of a local antibiogram in accordance with the susceptibility patterns of variegated bacterial strains which would address the issue of the prevalence of multi-drug resistance organisms and their sensitivity pattern and consequently delivery of targeted and economical therapy.

Objective: To determine different bacterial isolates and their sensitivity pattern in febrile neutropenic patients of hematological malignancies

Operational Definition:

Febrile Neutropenia: An oral temperature of more than 38o C sustained for more than one hour with an absolute neutrophil count of ≤ 1500/µL is called Febrile Neutropenia. (4)

Bacterial Patterns: The bacterial isolates would be divided into two groups based upon their gram staining. The most common gram-positive organisms would be Staphylococcus aureus and coagulase- negative Staphylococcus. The most common gram-negative organisms included would be Pseudomonas aeruginosa, Escherichia coli, Klebseilla species and Actinobacter.

Bacterial Susceptibility: The susceptibilities of all isolates to 14 different antibiotics were determined using disk diffusion (Kirby-Bauer method according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Antimicrobial susceptibility tests were conducted on Mueller-Hinton agar medium using commercial antibiotic disks The antibiotic disks used in the current study were cefixime (5µg), cefotaxime (30µg), ceftriaxone (30µg), ceftazidime (30µg), ciprofloxacin (5µg), meropenem (10µg), imipenem (10µg), amikacin (30µg), co-trimoxazole (25µg), gentamicin (10µg),

nitrofurantoin (300µg), clindamycin (2µg), vancomycin (30µg), cloxacillin (1µg). E. coli (ATCC 25922) and S. aureus (ATCC 29213) were used as the reference strain for the antibiotic susceptibility tests.

Study Design: Cross-sectional Descriptive Study
Place of Study: INMOL Cancer Hospital, Lahore.
Duration: 6 months after the approval of synopsis from January 2024 to January 2026
Sampling Technique: Non-probability consecutive sampling
Sample Size Calculation: The prevalence of gram negative positive blood culture in febrile neutropenic patients is 85%.(anticipated population proportion = 0.85) Confidence level applied will be 95% with margin of error selected will be 10%.
Sample size calculated is 49.
Inclusion Criteria: Patients aged from 5 years to 75 years would be included in the study. Patients diagnosed with hematological malignancies and a report of febrile neutropenia defined as per operational definition.
Exclusion Criteria: Age below 5 years and more than 75 years of age. Patients with solid tumors will be excluded. Patient missing data on antibiotic treatment and pathogens reported other than bacteria will be excluded.
Results and Conclusion: Out of 49 patients who had documented episodes of febrile neutropenia, only 6% showed growth on the culture media with all of them reporting gram negative bacteremia with Escherichia coli being the most prevalent followed by equal incidence of Pseudomonas aeurignosa, Acinobacter and Morganella morganii. All culture positive organisms were reported to be MDR except for Morganella morganii.

MR-Guided Breast Radiotherapy and the Magnetic Field's Impact on Skin Dose

By Dr. Sheikh Hammad

Abstract:

The Dow University of Health Sciences MRI-Linac (MRL) design enables radiotherapy with high soft-tissue contrast imaging. Breast cancer patients represent a key demographic that could benefit from this enhanced guidance. Nevertheless, the presence of the magnetic field induces an electron return effect (ERE) that potentially elevates skin dose. As breast radiotherapy often involves large skin areas, we quantified the magnetic field's impact on skin dose for whole-breast (WBI) techniques.

Introduction: Magnetic resonance imaging (MRI)-guided radiotherapy (RT) offers high softtissue contrast for precise targeting, which is highly beneficial for breast cancer treatments like whole-breast irradiation (WBI). However, the magnetic field induces an electron return effect (ERE), which can increase skin dose—a significant concern for this superficial treatment site. This study evaluates the impact of magnetic fields on skin dose in WBI using a dedicated MRI-linac treatment planning system.

Methods and Materials: Ten early-stage breast cancer patients scheduled for WBI were retrospectively selected for this treatment planning study. Two intensity-modulated radiotherapy (IMRT) techniques were investigated: a conventional tangential two-field setup (WBI-2) and a seven-field IMRT technique (WBI-7). Using a dedicated Monte Carlo-based treatment planning system, IMRT plans were generated and calculated for magnetic field of strength 1.5 T. A standardized class solution was applied for all plans. Dosimetric analysis focused on target coverage and skin dose, with the skin structure defined as the first 5 mm under the surface. Statistical significance was assessed using a paired t-test.

Results: All IMRT plans achieved comparable target coverage across all magnetic field strengths. A significant magnetic field-dependent increase in skin dose was observed for both whole-breast irradiation (WBI) techniques. For the two-field WBI (WBI-2), the mean skin dose increased by 12.5%, with a corresponding significant rise in V35Gy. The seven-field WBI (WBI-7) also showed a significant but slightly lower dose enhancement. The maximum skin dose (D2cc) was elevated. Doses to other organs at risk, such as the heart and lungs, were largely unaffected by the magnetic field.

Conclusion The magnetic field significantly increases skin dose in both conventional and multifield whole-breast irradiation (WBI), posing a clinical challenge for MR-guided radiotherapy. This finding highlights the necessity for careful treatment plan optimization and specific guidelines to manage skin toxicity when administering MR-guided WBI.

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Efficacy Of Radiotherapy Using Simultaneous Integrated Boost On Radiologically Invovled Neck Nodes In Patients With Squamous Cell Carcinoma Of Oral Cavity- A Single Centre Experience

By Dr. Hajra Shakil

Abstract:

Introduction:

According to the National Cancer Registry of Pakistan for the year 2-14-2019, oral cavity (OC) cancer is the most common cancer in males in Pakistan and the third most common cancer among females. About 80% patients report in locally advance stage and are often treated with combination of chemotherapy and radiotherapy. Simultaneous Integrated boost (SIB) allows to deliver higher daily doses to the tumor volume and involved nodes with respect to the clinical target volume (CTV) within the same radiotherapy session. The aim of this study is to study the effect of SIB on neck nodes in patient with advanced oral cavity cancers receiving external beam radiotherapy by IMRT/VMAT

Materials and Methods

It was a descriptive cohort study conducted in the department of radiation oncology at NORI hospital over a period of 6 months. 110 patients were included in the study . All patients of stage III and IV of squamous cell carcinoma of oral cavity were included in the study. Patients who had previously received radiotherapy for any head and neck site and those with other co-existing malignancies were excluded. Data including the stage of disease, co morbidities, dose of radiotherapy given, radiological response using RECIST criteria and acute toxicities including dysphagia, hoarseness of voice and mucositis was collected using structures proforma. Data was analyzed using spss version 27 and relevant statistical tests were applied using 95% confidence interval and 5% degree of freedom

Results:

Yet to be published.

Conclusion:

Awaited.

Association Of Varying Radiological Features With Brca Related Genetic Mutations; A Ten Years Retrospective Experience At Shaukat Khanum Medical Hospital.

By Dr. Mehria Khan, Dr. Mamoona Murad, Dr. Fatima Sultan Ahmad, Dr. Zainab Rahim

Abstract:

INTRODUCTION:

The American Cancer Society (ACS) recommends that women with a BRCA1 or BRCA2 gene mutation undergo annual breast MRI and clinical breast exams, and that women with a high risk of carrying a BRCA mutation be offered genetic testing. There is an essential role for screening MRI in women with an increased risk for breast cancer. Women with a BRCA mutation, annual Magnetic Resonance Imaging MRI screening should begin by age 25, and be combined with mammograms starting at age 30. ,

Epidemiological patterns of breast cancer in our local settings are shifting with a trend of presentation in younger female patients who are having more dense breasts. The sensitivity of MRI with annual surveillance still ranges from 71% to 94%. This relatively wide sensitivity range may be due to the false-negative diagnoses of hereditary breast cancers that appear atypical and benign in nature, in contrast to sporadic cancers, at mammography, breast sonography, and MRI.

We would like to study the varying radiology features on ultrasound, mammography and MRI in histopathologically proven breast carcinoma patients having associated BRCA genetic mutation, in our institution to possibly formulate working guidelines apt to our low and middle income country.

OBJECTIVES:

The purpose of this study is to retrospectively evaluate the varying radiology features on ultrasound, mammography and MRI in histopathologically diagnosed breast carcinoma patients with the BRCA genetic mutation.

STUDY DESIGN: retrospective observational, cross-sectional study.

DEPARTMENT: Department of Diagnostic Radiology in collaboration with Pathology Department of Shaukat Khanum Memorial Hospital.

SAMPLING: Purposeful sampling

DURATION OF STUDY: After ethical approval, two months

duration for Retrospective data collection to be retrieved from Hospital Management Information System dated from July 2025 to January 2015.

ETHICAL CONSIDERATION: After ethical approval by Institutional Ethical Review Board/ Research Committee. Individual consent forms would be waived in accordance to Decleration of Helsinki.

INCLUSION CRITERIA: Biopsy proven breast cancer patients radiologically imaged at Shaukat Khanum Memorial Hospital with BRCA genetic mutation testing.

Patients of both genders.

EXCLUSION CRITERIA: Patients testing positive with BRCA genetic mutation, but presented for screening purposes.

METHODS:

All patients testing positive for BRCA genetic mutation, any subtype or collectively both subtypes, using next generation sequencing technology panel.

Biopsy proven breast cancer patients who had underwent mammography performed by a Mammomat 3000 Nova Siemens mammography machine, and ultrasound examinations using Aplio Toshiba technology, categorized by Breast Imaging-Reporting and Data System (BI-RADS) assessment categories. Magnetic Resonance Imaging using 1.5 or 3 Tesla unit machine with multiplanar multisequential imaging techniques.

Details of imaging would include size, site, number and morphological characteristics of histopathology subtype, grade of tumour and include various imunohistochemistry markers. of lesions, and axillary nodal involvement details.

The details of tumour specimen would include histopathology subtype, grade of tumour and various imunohistochemistry markers.

DATA ANALYSIS: For data analysis SPSS version 23 would be used. Descriptive statistics to summarise frequencies and percentages of various categorical variables like BRCA genetic mutation subtype, site and morphological characteristics of lesions, axillary nodal status, histopathology subtype, grade of tumour and various imunohistochemistry markers.

The mean, median mode would be calculated for numeric values of age of patients and tumour size calculated in millimeter. Inferential statistics would be applied accordingly.

Hyams Grade IV, Kadish Stage C Olfactory Neuroblastoma in a Comorbid Elderly Patient: A Therapeutic Challenge

By Dr. Iqra Khalid

Abstract:

Introduction:

Olfactory neuroblastoma is a rare malignant tumor originating from the olfactory epithelium of the nasal cavity. It accounts for approximately 3% of all nasal cavity tumors, with an estimated incidence of 1 in 2.5 million individuals annually. Typically diagnosed in patients aged 50–70 years, common presenting symptoms include nasal obstruction, epistaxis, anosmia, and, in advanced stages, orbital or intracranial extension. Diagnosis is based on histopathology, with treatment often involving surgery, radiation, and chemotherapy.

Case Report:

We report the case of a 63-year-old woman with a history of hypertension, ischemic heart disease, and stroke, presenting to oncology clinic with a three to four months history of left-sided nasal obstruction, anosmia, intermittent epistaxis, headaches, and progressive left eye proptosis. Computed tomography revealed a mass occupying the left nasal cavity and paranasal sinuses with local spread. Endoscopic surgical resection was performed and histopathology confirmed Hyams Grade IV, Kadish Stage C olfactory neuroblastoma, composed of uniform round blue cells with rosette formation, brisk mitosis, and necrosis. Immunohistochemistry was positive for synaptophysin, cytokeratin, CD56, and calretinin. Postoperative imaging showed residual disease, and a cycle of platinum-based chemotherapy with etoposide was given. Patient showed marked clinical improvement with visible tumor reduction and was discharged one week later in stable condition with plans to continue chemotherapy. However, she was lost to follow-up and reportedly died shortly after discharge, likely due to her comorbidities or chemotherapy intolerance. The exact cause of death is unknown, as no further evaluation or hospital contact occurred.

Conclusion:

This case highlights therapeutic challenges in managing advanced olfactory neuroblastoma in patients with multiple comorbidities. Although the patient initially responded well but loss to follow-up and an unknown cause of death emphasizes the need for multidisciplinary care and close monitoring to ensure better outcomes in patients with aggressive malignancies.

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Financial Toxicity in Rural Colorectal Cancer Patients Receiving CAPOX Chemotherapy: A Cross-Sectional Study

By Dr. Shah Zeb Khan

Abstract:

Introduction:

Financial toxicity, the subjective burden of treatment-related costs, has become an important focus in oncology alongside physical toxicities. Rural cancer patients are at greater risk due to lower household income, travel distance, and loss of work capacity. Evidence on the financial distress associated with CAPOX chemotherapy in colorectal cancer patients in rural regions is limited.

Methodology:

A cross-sectional study was conducted on 60 colorectal cancer patients from rural areas of KPK undergoing CAPOX chemotherapy at AECH-BINOR. The study was conducted at Out patient department of Clinical Oncology (January 2025 to June 2025) .Demographic, socioeconomic, and clinical details were recorded using a structured questionnaire. Financial toxicity was assessed using the Comprehensive Score for Financial Toxicity (COST) tool. Scores were categorized as severe (≤14), moderate (15–25), and mild/none (≥26).

Results:

The mean age of patients was 54 years, with 60% males and 40% females. More than half (55%) reported household income below PKR 50,000 per month. Nearly half of patients (47%) traveled more than 50 km to reach the treatment center. Based on the COST questionnaire, 28 patients (46.7%) experienced severe financial toxicity, 21 (35.0%) had moderate toxicity, and only 11 (18.3%) reported mild or no toxicity. Patients with lower income and longer travel distance reported higher levels of distress.

Conclusion:

Almost half of rural colorectal cancer patients on CAPOX chemotherapy suffer from severe financial toxicity, reflecting a substantial hidden burden of treatment. Routine financial toxicity assessment and support measures, including social and travel assistance, are recommended to reduce this impact in vulnerable populations.

Multiple Myeloma Masquerading as a Temporal Brain Tumor

By Dr. Aleesha Ilyas.

Abstract:

Introduction:

Multiple myeloma (MM) is a systemic plasma cell neoplasm that rarely presents with brain tissue involvement (Fitzgerald E, et & al 2019). Temporal bone and brain tissue extension are exceptionally uncommon and can mimic meningioma, lymphoma, or primary brain tumors (Terada T. et & al. 2009). Such presentations highlight the need for early recognition and systemic evaluation in accordance with International Myeloma Working Group and National Comprehensive Cancer Network guidelines (Fitzgerald E, et & al 2019)

Case Presentation:

A 52 years old woman presented with complains of proptosis and gradual loss of vision for 2 months. She also has history of headache for 18 months.

MRI brain done in march, 2025 showed multiple neoplastic intra osseous and right temporal brain tissue lesions largest lesion arising from right temporal tissue 3.8×4.3×5.3 cm having intracranial extra axial extension. CT brain plain done on 5 April 2025 revealed multiple lytic calvarial lesions. Right temporal region lytic lesion with soft tissue component of 2.4× 0.8×2.8 cm and another dominant 3.8 × 3.5 × 3.0 cm right temporal bone with mass effects.

Right temporal lesion was excised and histopathology turned out to be plasma cell tumor. Microscopy showed sheets of plasmacytoid cells having eccentric nuclei and stippled chromatin pattern. On immunohistochemical staining, CD138 was positive, kappa and lambda were negative. Bone marrow biopsy confirmed 80% plasma cell infiltration. Whole body low dose CT scan revealed extensive skeletal disease.

We planned whole brain radiotherapy (WBRT) of 30 Gray in 10 fractions with palliative intent. WBRT was completed on 22nd July, 2025. Patient clinically improved. After WBRT, patient has been planned for 6 cycles of bortezomib, lenalidomide and dexamethasone (VRD). Until now patient has received 1 cycle. Response evaluation will be done after completion of chemotherapy.

Discussion:

The case discussed above is atypical presentation of multiple myeloma in the form of brain parenchymal lesion associated

with lytic lesions throughout the skeleton. Patient is still under treatment. Response will be evaluated at the end of planned treatment.

"An Institutional Experience of Stereotactic Radiosurgery and Stereotactic Body Radiotherapy in the Management of CNS Tumors and Metastases.

By Dr. fabiha shakeel

Abstract:

Background: Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiotherapy (SBRT) has become an integral component of treatment for patients with limited brain or spine metastases as well as a curative treatment option for grade 1 meningioma and vetibular schwannomas offering precise, high-dose radiation delivery while sparing adjacent normal tissue. We report our institutional experience and early clinical outcomes of SRS in patients with metastatic brain,spinal lesions, grade 1 meningioma and vestibular schawannomas.

Methods: A retrospective analysis was conducted of 17 patients who underwent fractionated SRS/ SBRT between september 2023 till june 2025 for metastatic lesions of brain (n=13) ,spine (n=2), as well as evaluating the effictiveness of SRS in post-op grade 1 meningioma (n=1) and post-op vestibular schwanoma (n=1). Metastatic Patients were selected based on good performance status, controlled extracranial disease, and limited metastatic burden (≤5 lesions). Treatments were delivered using image-guided SRS systems. Brain lesions received a median fractionated dose of 30Gy in 5fractions, while spinal lesions were treated with a median dose of 32.5 Gy in 5 fractions (6.5 Gy per fraction). SRS Doses for meningioma and vestibular schwannoma were 25Gy/5 and 18Gy/3 fractions respectively. Clinical evaluation and MRI were performed at 3-month intervals to assess local control, symptom response, and toxicity.

Results: The median age of the cohort was 54 years (range: 32–71). The most common metastatic tumors were gynaecological and genitourinary malignancies (40%), followed by breast cancer (33.3%) and lung cancer (13.3%), while sarcoma and salivary duct carcinoma each accounted for 6.7% of the total 17 cases. Additionally, two postoperative cases, one of grade I meningioma and one of vestibular schwannoma were included. The median treated lesion volume was 4.2 cc. At a median follow-up of 6 months, local tumor control was achieved in 85% of treated lesions. Neurological or pain improvement was observed in 60% of symptomatic patients. Two deaths occurred due to systemic disease progression. Treatment was well tolerated, with mild acute toxicities (headache, grade 2 dermatitis and fatigue) in 25% of patients and no ≥Grade 3 adverse events observed. The patient treated for postoperative vestibular schwannoma showed stable disease at 3 months follow-up.

Conclusion: Our early institutional experience indicates that SRS and spine SBRT are safe, effective and convenient treatment options for patients with limited brain and spinal metastases, as well as for curative treatment of vestibular schwannomas and grade I meningiomas. These techniques provide excellent local control, meaningful symptom relief, and minimal toxicity, supporting their integration into multidisciplinary oncologic care.

Effect of Radiotherapy using Simultaneous Integrated Boost (SIB) on Radiologically Involved Neck Nodes in Patients with Locally Advanced Squamous Cell Carcinoma of Larynx and Hypopharynx – A single centre experience

By Dr. Hafiz Abu Safian

Abstract:

Introduction:

Squamous cell carcinoma of the larynx is the most common cancer arising in the head and neck region. Conversely, carcinoma of the hypopharynx is the one with the worst prognosis. Definitive radiotherapy administered concomitantly with chemotherapy (CRT) is the current standard of care as an alternative to surgery of head-neck squamous cell carcinoma (HNSCC). Nonetheless, the 5-year overall survival remains under 20% for advanced stage hypopharynx cancer and around 40% for nonglottic larynx cancer indicating a strong need to maximize treatment efficacy to improve outcomes.

Materials and Methods:

Study design: Descriptive longitudinal study

Study setting: Department of Radiation Oncology, Atomic Energy Cancer Hospital NORI, Islamabad

Duration of study: January – December, 2025

Sample size: 80

Sampling technique: Non-probability consecutive sampling

Inclusion criteria:

- Patients aged 18 and above
- Diagnosed cases of stage III or IV Squamous cell carcinoma of larynx and hypopharynx receiving post-operative or definitive CCRT/ EBRT by IMRT or VMAT technique

Exclusion criteria:

- Patients not fit for radiotherapy due to poor performance status (PS)
- Pregnant females
- Patients receiving palliative chemotherapy/ radiotherapy

Data Collection procedure: After approval from the institutional ethical review board, written consent will be taken from every patient. Data will be collected through a self-structured questionnaire containing demographic details, clinical, histopathological, tumor and treatment related parameters. Effect of simultaneous Integrated Boost (SIB) will be checked through RECIST criteria starting from three months post treatment.

Data Analysis procedure: All the statistical analysis would be carried out using SPSS v.27.0 (Armonk, NY: IBM Corp.). Frequencies and percentages of demographic, clinical and histopathological variables would be calculated through descriptive statistics. Response evaluation would be analyzed through comparative and descriptive statistics

Results: Under process

Conclusion: Under process

The Correlation between Pathological Parameters with Lymph Node Metastasis in Oral Cavity Squamous Cell Carcinoma (OCSCC)

By Dr. Asra Saeed

Abstract:

Objective: The current study investigates association of pathological parameters of primary tumors to that of lymph nodal metastases in oral cavity squamous cell carcinoma (OCSCC).

Introduction: Oral Cavity Squamous Cell Carcinoma (OCSCC) occurs commonly as the most prevalent and aggressive tumors of the head and neck cancers in Pakistan. The pathological parameters that frequently influence treatment decisions and serve as prognosticators include the tumor size, tumor depth of invasion, lympho-vascular space invasion, perineural invasion, and tumor grade.

Methodology: A single institutional, retrospective analysis was conducted of OCSCC patients who underwent primary surgery from January 2021 till December 2024. Histopatholgical records of these patients were identified through electronic medical record (EMR). Relevant histopathological parameters were identified along with lymph node metastasis and their association were evaluated. Chi-Square test and T-test were used to determine significance of association between pathological parameters and lymph node metastasis

Results: A total of 106 patients were included in the study with complete histopathological record available. 87 males and 19 females were part of the study. The predominant tumor site included buccal mucosa (81.13%), tongue (16.03%), others (2.83%). Frequently occurring histology included SCC (100%). PNI was present in 32 patients, LVSI in 7 patients, out of the total 106, and mean depth of invasion ranging: 1.3 ± 0.90 cm. Nodal metastasis was present in 48 patients (45.28%). Chi-square analysis revealed that histological grade ($p=0.045$), PNI ($p=0.019$), and DOI ($p=0.032$) were significantly associated with lymph node metastasis, whereas tumor size ($p=0.298$) and LVSI ($p=0.15$) were not significantly associated.

Conclusion: Pathological parameters are pivotal in determining independent prognostic factors for neck lymph node metastasis in OCSCC. These parameters are crucial in treatment decision making and may serve as an imperative tool determining adverse prognostic outcomes.

Diagnostic Performance of Serum PIVKA-II Alone and in Combination with AFP for Hepatocellular Carcinoma: A Comparative Cross sectional Study

By Dr. Inbsaat Iqbal

Abstract:

Background and Objectives: Hepatocellular carcinoma (HCC) commonly develops on the background of chronic liver disease. Protein Induced by Vitamin K Absence-II (PIVKA-II), being mechanistically linked to HCC pathogenesis, is considered a more specific and potentially superior biomarker than alpha-fetoprotein (AFP) and other diagnostic tools that often struggle to distinguish HCC from background liver pathology. This study aimed to evaluate the diagnostic performance of serum PIVKA-II alone and in combination with AFP, and to compare their diagnostic efficacy against AFP alone.

Methods: Serum AFP and PIVKA-II levels were measured using ELISA in patients with HCC, non-HCC liver malignancies, and benign liver diseases. Group comparisons

were conducted using non-parametric tests, correlations were assessed with Spearman's rank correlation, and diagnostic accuracy was evaluated by receiver operating characteristic (ROC) analysis, including AUC, optimal cut-offs, sensitivity, and specificity. Combined diagnostic performance was assessed using binary logistic regression.

Results: A total of 128 participants (mean age 55.2 ± 13.1 years) were included. AFP was analyzed in 45 HCC, 51 non-HCC malignancy, and 32 benign cases, while PIVKA-II was measured in 20, 16, and 8, respectively. Median AFP levels were significantly higher in HCC than in non-HCC malignancies and benign liver diseases (both P<0.001). Similarly, median PIVKA-II levels were markedly elevated in HCC (1387.9 mAU/ml) compared with non-HCC malignancies (38.5 mAU/ml) and benign conditions (46.0 mAU/ml; both P<0.001). ROC analysis showed superior diagnostic performance of PIVKA-II (AUC = 0.956) compared with AFP (AUC = 0.815) for distinguishing HCC from non-HCC malignancies, though the difference was not statistically significant (P = 0.222). PIVKA-II also outperformed AFP in differentiating HCC from benign liver diseases (AUC = 0.906 vs. 0.796; P = 0.025). The optimal cut-offs for HCC detection were 105.8 mAU/ml for PIVKA-II (sensitivity 95%, specificity 87.5%) and 33.6 ng/ml for AFP (sensitivity 68.9%, specificity 86.3%). Combining AFP with PIVKA-II did not improve diagnostic accuracy beyond PIVKA-II alone. No significant correlation was found between AFP and PIVKA-II in HCC (r = 0.371, P = 0.108).

Conclusion: PIVKA-II demonstrated superior diagnostic performance compared with AFP in distinguishing HCC from both benign liver conditions and non-HCC malignancies; however, the optimal cut-off identified did not achieve ideal specificity. The addition of AFP did not enhance diagnostic accuracy, suggesting that PIVKA-II alone, with an appropriately defined cut-off, may serve as a reliable biomarker for HCC detection.

Transglottic Synovial Sarcoma: A Rare Case of Advanced Laryngeal Sarcoma Managed with Multimodality Therapy

By Dr. Maham Khalid

Abstract:

Introduction

Synovial sarcoma is an rare mesenchymal malignancy that predominantly arises in the extremities of young adults. Head and neck involvement is rare (<5%), and primary laryngeal origin is exceptionally unusual, with fewer than 30 cases documented worldwide [1–3]. The clinical and radiological similarity to squamous cell carcinoma complicates diagnosis and management [4]. The tumor's aggressive biological behavior, coupled with the difficulty of obtaining wide surgical margins in the confined laryngeal space, necessitates a multimodal approach that may include surgery, chemotherapy, and radiotherapy [5–7].

Case Presentation

A 43-year-old male with an ECOG performance status 2 presented with progressive dyspnea, dysphagia, and hoarseness of voice for eight months. His symptoms worsened, resulting in acute airway compromise for which a tracheostomy was done on 11-05-2025.

Direct laryngoscopy revealed a vascularized lesion involving the vallecula, epiglottis, base of tongue, and supraglottic region. The vocal cords were not visualized. Contrast-enhanced CT and MRI of the neck demonstrated a large transglottic mass (4.1 × 6.5 × 5.1 cm) with erosion of the left thyroid cartilage and extralaryngeal extension into the parapharyngeal and submandibular spaces. Bilateral cervical lymphadenopathy was present (largest 15 mm, level IIA). A solitary 5 mm subpleural lung nodule was indeterminate.

Histopathology and immunohistochemistry confirmed synovial sarcoma, with tumor cells positive for TLE1 and a high Ki-67 proliferative index. Based on clinical and radiological findings, the disease was staged as IV-A (cT4a N2a M0). The patient received nine cycles of Adriamycin, Ifosfamide, and Mesna (AIM regimen), followed by definitive intensity-modulated radiotherapy (IMRT) to 66 Gy in 33 fractions. Post-treatment imaging demonstrated stable disease without evidence of progression.

Discussion

Primary laryngeal synovial sarcoma is exceedingly rare, with only isolated reports in the literature [1–3,8,9]. Unlike squamous carcinoma, it exhibits a greater tendency for hematogenous spread, particularly to the lungs, while lymphatic dissemination is less common [10]. Surgical resection with negative margins remains the standard of care [6,8]; however, in cases with locally advanced disease or anatomical constraints, multimodality therapy becomes essential [5,7,11].Synovial sarcoma demonstrates relative chemosensitivity to ifosfamide- and doxorubicin-based

regimens [12]. Radiotherapy plays a pivotal role in improving local control, especially in unresectable tumors [5,13]. This case underscores the diagnostic challenges and highlights the importance of integrating systemic therapy with advanced radiotherapy techniques for achieving disease stability in rare, advanced presentations of laryngeal synovial sarcoma.

Effect of Tumor Stage and Molecular Subtype on 5-Year Overall Survival in Breast Cancer: Single-Centre Cohort

By Dr. Abdul Samee

Abstract:

Background: Stage and molecular subtype are key prognostic factors in breast cancer, yet 5-year outcomes from low- and middle-income settings are rarely reported. We describe a single-centre cohort indexed at diagnosis, focusing on stage and intrinsic subtype with 5-year overall survival as the primary outcome.

Methods: Retrospective single-centre cohort; biopsy date was set as time-zero. The primary cohort was Stage I–III (curative intent); Stage IV was excluded. Subtypes were divided according to their ER/PR/HER2 status. TNM staging was used to compare overall survival of stage I–II versus stage III. Data cut-off: 12 September 2025. We summarised survival with Kaplan–Meier curves and compared groups with log-rank tests. Adjusted effects were estimated using Cox regression with age and grade as covariables. This interim analysis reports overall survival estimates, with full curves and adjusted models to be shown at presentation.

Results: We analysed 79 patients (median age 46 years). Five-year overall survival was 65%. By stage, overall survival was 82% for Stage I–II and 35% for Stage III. By subtype, overall survival was 74% for HR+/HER2−, 68% for triple-negative, 50% for HER2-positive, and 27% for unknown. These patterns were preserved after adjustment for age and grade.

Conclusion: In this interim single-centre analysis of curative-intent disease, overall survival separated clearly by stage and showed meaningful differences by subtype. Updated survival curves and adjusted estimates will be presented to inform local quality-improvement and future prospective work.

Effect of Tumor Stage and Molecular Subtype on 5-Year Overall Survival in Breast Cancer: Single-Centre Cohort

By Dr. Jannat Asif

Abstract:

Background: Stage and molecular subtype are key prognostic factors in breast cancer, yet 5-year outcomes from low- and middle-income settings are rarely reported. We describe a single-centre cohort indexed at diagnosis, focusing on stage and intrinsic subtype with 5-year overall survival as the primary outcome.

Methods: Retrospective single-centre cohort; biopsy date was set as time-zero. The primary cohort was Stage I–III (curative intent); Stage IV was excluded. Subtypes were divided according to their ER/PR/HER2 status. TNM staging was used to compare overall survival of stage I–II versus stage III. Data cut-off: 12 September 2025. We summarized survival with Kaplan–Meier curves and compared groups with log-rank tests. Adjusted effects were estimated using Cox regression with age and grade as covariables. This interim analysis reports overall survival estimates, with full curves and adjusted models to be shown at presentation.

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Conclusion: In this interim single-centre analysis of curative-intent disease, overall survival separated clearly by stage and showed meaningful differences by subtype. Updated survival curves and adjusted estimates will be presented to inform local quality-improvement and future prospective work.

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ENDOCRINE DYSFUNCTION AFTER CRANIOSPINAL IRRADIATION IN PEDIATRIC MEDULLOBLASTOMA

A Systematic Review and Meta-Analysis

S. Siddique, R.N Maken, A. Farooq, A. Shami

INMOL HOSPITAL LAHORE

INTRODUCTION

Craniospinal irradiation (CSI) is essential in treating pediatric medulloblastoma but is associated with significant long-term endocrine toxicity. Understanding pooled incidence rates of these dysfunctions helps with prognostication, risk stratification, and survivorship planning.

OBJECTIVE

To determine the pooled prevalence of major endocrine dysfunctions—growth hormone deficiency, hypothyroidism, adrenal insufficiency, and gonadal dysfunction—after CSI in pediatric medulloblastoma patients, and to evaluate differences by radiotherapy modality.

INFORMATION SOURCES

- Primary: PubMed
- Additional: Google Scholar, manual reference screening

STUDY SELECTION

- Two reviewers independently screened titles, abstracts, and full texts.
- Disagreements resolved by discussion.
- Final inclusion list cross-verified with extracted data

RISK OF BIAS ASSESSMENT

Qualitative assessment focusing on:
Study design and completeness of reporting
Endocrine evaluation methods

DATA EXTRACTION

Extracted variables:

- Study design and Sample size
- Patient age
- Radiation modality (photon, proton, mixed)
- Follow-up duration
- Endocrine outcomes (GHD, hypothyroidism, adrenal insufficiency, gonadal dysfunction)

SEARCH STRATEGY

Structured PubMed search using terms: “medulloblastoma,” “craniospinal irradiation,” “endocrine dysfunction,” “growth hormone deficiency,” “hypothyroidism,” “adrenal insufficiency,” “gonadal dysfunction.”
English-language studies only.

ELIGIBILITY CRITERIA

- Pediatric patients (<18 years)
- Histologically confirmed medulloblastoma
- Treated with craniospinal irradiation
- Reported ⩾1 endocrine outcome (GHD, hypothyroidism, adrenal insufficiency, or gonadal dysfunction)

- **Exclusions**: mixed histologies without separate data, adult cohorts, lack of endocrine follow-up.

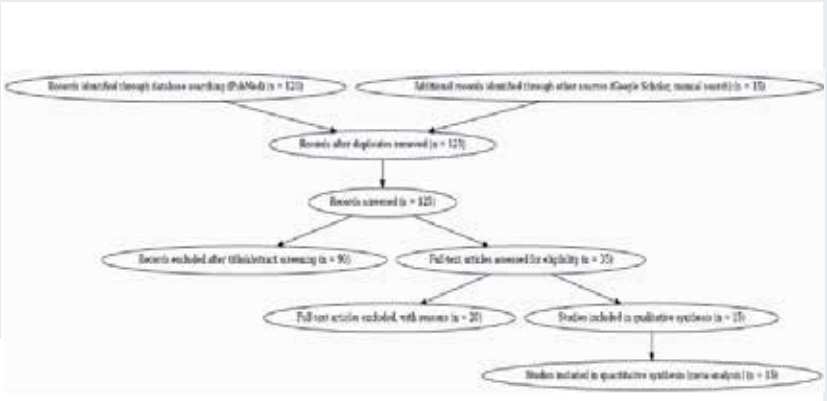

Fig 1. PRISMA SCREENING DIAGRAM

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STATISTICAL ANALYSIS

- Pooled prevalence calculated using random-effects models
- Separate meta-analyses for each endocrine outcome
- Subgroup analyses: proton vs photon vs mixed CSI
- Heterogeneity assessed using I^2 statistic
- No funnel plots due to limited studies

RESULTS

- Included Studies
- 15 studies
- Total patients: 888
- Pooled Prevalence
- Growth Hormone Deficiency (GHD): 55%
- Hypothyroidism: 41%
- Adrenal Insufficiency: 13%
- Gonadal Dysfunction: 13%
- Radiation Modality Findings
- Proton therapy associated with lower rates of hypothyroidism and gonadal dysfunction vs photon CSI.

CONCLUSIONS

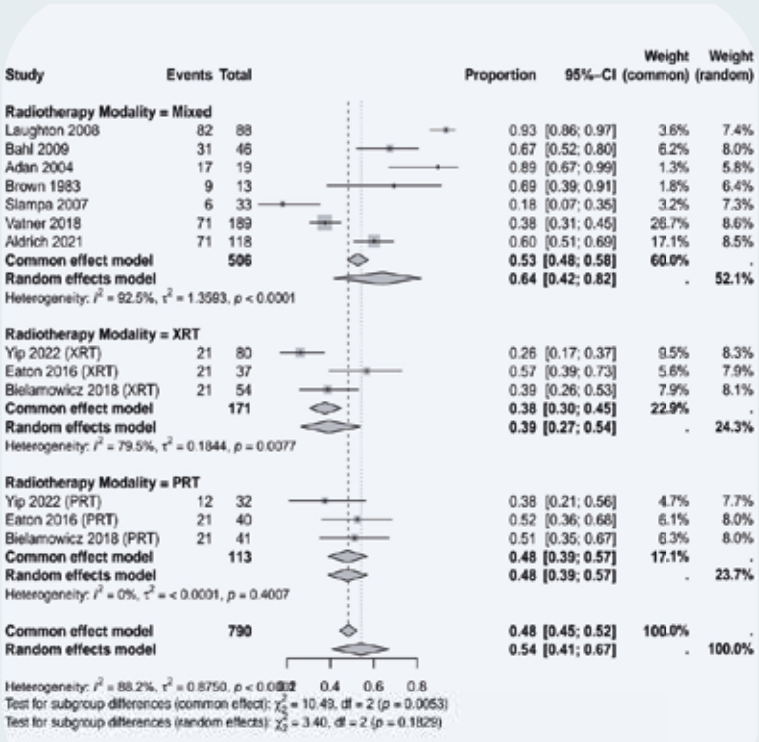
- Endocrine dysfunction is common after CSI in pediatric medulloblastoma survivors, especially GHD and hypothyroidism.
- Proton therapy may reduce certain endocrine toxicities relative to photon CSI.
- Long-term structured endocrine surveillance is essential.
- Radiation modality selection plays a key role in minimizing late effects.

CLINICAL IMPLICATIONS

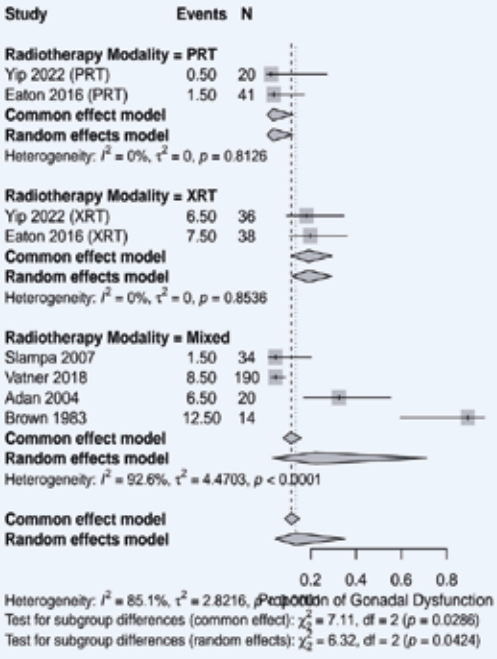
- Consider proton CSI when feasible to reduce endocrine risks.
- Survivorship programs should include standardized endocrine testing.
- Families should receive anticipatory guidance about long-term hormonal complications

CHARTS AND PLOTS

GROWTH HORMONE DEFICIENCY FOREST PLOT



GONDAL DYSFUNCTION FOREST PLOT



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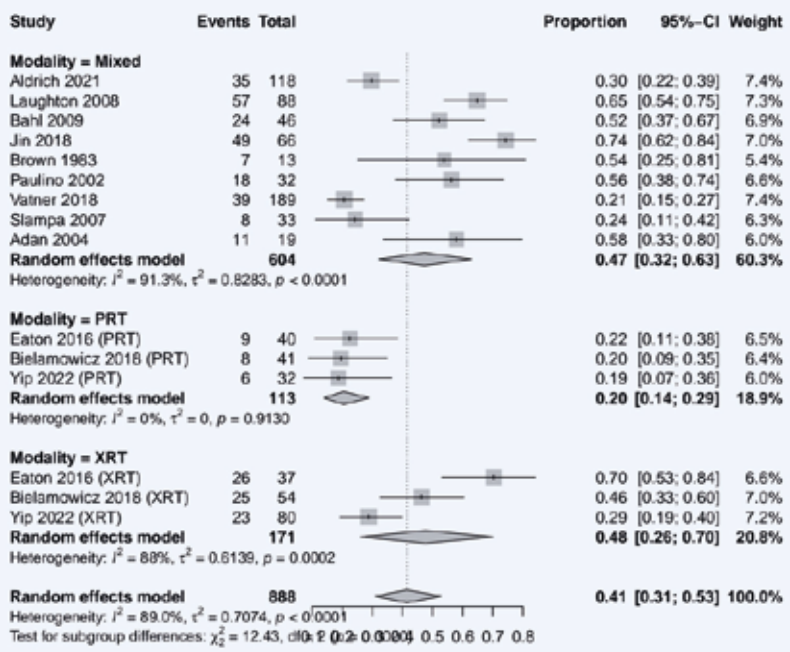
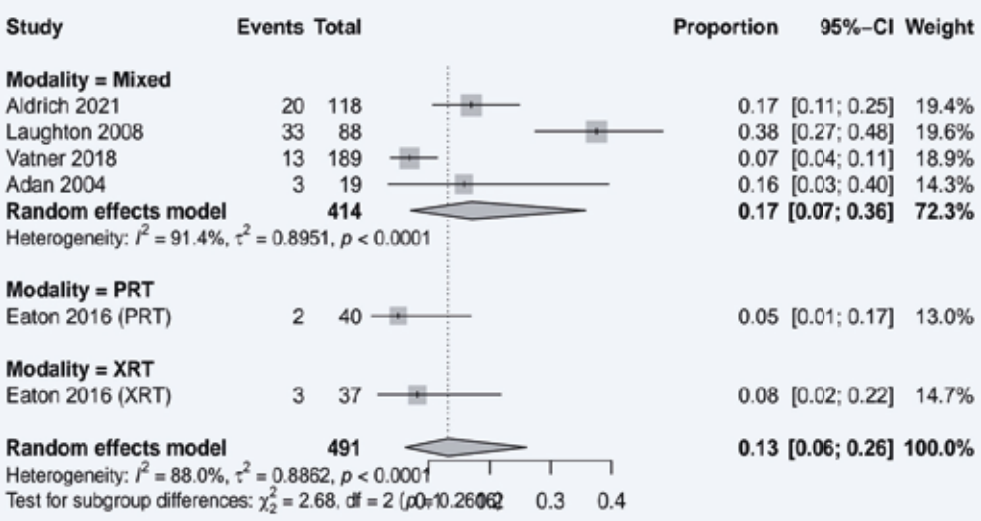
HYPOTHYROIDISM POOLED INCIDENCE



ADRENAL INSUFFICIENCY INCIDENCE



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WOMEN FOR ONCOLOGY

Impact of a Scientific Workshop on Knowledge Gained: Safe and Effective Portacath Access Techniques.

By Dr. Aiman Majid

Abstract:

Background

Port-a-Caths are essential for patients requiring long-term intravenous therapies, but their safe and effective use demands specialized knowledge and skills. Despite their widespread utilization, many healthcare professionals lack formal training in Port-a-Cath access and care, increasing the risk of complications.

Objective

This study evaluated the impact of a structured scientific workshop on healthcare professionals' knowledge regarding safe and effective Port-a-Cath access techniques.

Methods

A non-randomized comparative study was conducted at Liaquat National Hospital, Karachi, involving 22 healthcare professionals from oncology and nursing backgrounds. Participants completed standardized pre- and post-workshop assessments measuring knowledge of Port-a-Cath indications, insertion techniques, maintenance, and complication management. The workshop combined didactic lectures, demonstrations, and hands-on simulation exercises. Statistical analysis using paired t-tests assessed changes in knowledge scores.

Results

Participants (mean age 34.6 ± 6.4 years; 64% female) showed significant improvement in knowledge scores post-workshop. Participants' mean overall knowledge score increased significantly from 12.40 ± 2.13 pre-workshop to 19.63 ± 1.91 post-workshop ($p < 0.001$). Statistically significant improvements were observed across all domains, including understanding of indications (mean score increase from 3.41 to 4.73), insertion techniques (3.00 to 4.50), and awareness of complications (3.00 to 4.45). The majority (95%) had no prior formal training on Port-a-Cath, underscoring the educational gap. Participant feedback was overwhelmingly positive, with 72% rating the workshop as excellent.

Conclusion

A dedicated scientific workshop significantly enhanced both theoretical and practical knowledge of Port-a-Cath access among healthcare professionals. Structured, hands-on training programs are vital for improving clinical competence, reducing complications, and ensuring optimal patient care. Integration of such educational interventions into routine clinical training and nursing curricula is recommended to address existing knowledge gaps and promote patient safety.

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ROLE OF TRANSVAGINAL ULTRASOUND IN DETECTION OF ENDOMETRIAL ABNORMALITIES IN BREAST CANCER PATIENTS UNDER TAMOXIFEN THERAPY

Dr.BushraSabeen, Dr.JavaidMehboob, Dr.AdnanHashmi, Dr.Asghar H Asghar
KARACHI INSTITUTE OF RADIOTHERAPY AND NUCLEAR MEDICINE (KIRAN)

Background: Tamoxifen is a selective estrogen receptor modulator (SERM) that is widely used in the treatment breast cancer patients those who are estrogen progesterone receptor positive. Most studies have found that the increased relative risk of developing endometrial cancer for women taking tamoxifen is two to three times higher than that of an age-matched population.

Keywords: Breast Cancer, Endometrium, Endometrial Changes, Tamoxifen, Ultrasound.

INTRODUCTION

Aim of study: The aim of the study is to evaluate the role and efficacy of transvaginal ultrasound in detection of endometrial changes in breast cancer patients under tamoxifen therapy in correlation with histopathological results of endometrial biopsies. **Study type and sample size:** This is a cross-sectional retrospective study which was conducted in department of radiology KIRAN Hospital Karachi over a period of one year from May 23 to April 24 in total 50 patients. *Inclusion criteria*: Histologically confirmed hormone receptor-positive breast cancer on tamoxifen with a dose of 20mg/day for a period ranging from 6 month up to 5 years were included All patients were Post-menopausal women or tamoxifen induced menopausal patients. *Exclusion criteria:* Breast cancer patients not under hormonal therapy, virgin patients, patient on tamoxifen with duration of < 6 months.

Material and methods:in our study Real-time ultrasound was performed using GE Logic S-8 ultrasound machine with the vaginal transducer (5–10 MHz).A look by transabdominal US with full bladder is taken before starting transvaginal scan because it had a large scale of view to assess the overall appearance of pelvic viscera. TVS examination include full detailed study of uterus(size, axis, endometrium thickness, cystic changes in myometrium), cervix and cervical canal, ovaries, any adnexal abnormality and fluid in cul-de-sac.
For the examination technique, the whole procedure was explained to the patient, and written consent was taken. Patients with endometrium of more than 10-mm thickness were scanned repeatedly every 3 months. we analyzed the data from previous scans and current scan and correlate it with the results of histopathology. Clinical and ultrasound data were compared with the final histological diagnosis of the endometrium, which was obtained by D&C or hysterectomy specimen.

RESULTS

Results: A total of 50 patients were evaluated in our study. Their age ranged from 40 to 55 years old; their mean age was 47.5 years. Twenty patients (40%) were with positive family history of breast cancer. All patients done surgical treatment, received chemo/radiotherapy and hormonal treatment (tamoxifen) duration of treatment over a period of 6 months to 5 years. Twenty-two patients (44%) had found normal regular endometrium on follow up scans, and twenty-eight patients (56%) had abnormal u/s appearance with different types of pathology (Graph 1). Out of 28 patients: 24 patients (85.7%) presented with endometrial abnormality and 4 patients (14.3%) showing adnexal pathology (simple ovarian cyst/ hemorrhagic cyst). The twenty-four patients with endometrial abnormality underwent D&C and results were as follows: 14% endometrial hyperplasia, 10% endometrial atrophy, 7% endometrial polyp and 4% endometrial carcinoma (see graph 2).
Association between duration of tamoxifen therapy (Table 1) and presence of pathology in TVS were also evaluated and revealed that patients with period of treatment with tamoxifen ranging from 6 months up to 5 years had no side effects from it. While patients with period of tamoxifen treatment ranging from 7 months up to 5 years had side effects from it. In our study, we detected that there is a significant risk of pre-malignant and malignant lesions of endometrium in patients on long-term tamoxifen use. So, we recommend that all patients on long-term tamoxifen use should be annually screened for endometrial pathology.

DISCUSSION

Discussion: Ultrasound is the first-line imaging modality for evaluation of the uterus and ovarian diseases. Ultrasound is sensitive, but not specific for evaluating endometrial abnormalities. The normal postmenopausal endometrium appears as a single echogenic line and should not exceed 5 mm as a bilayer thickness. Most women undergoing tamoxifen treatment (Table 2) have a thicker endometrium compared with women not on tamoxifen (9–13 mm versus 4.0–5.4 mm). Regardless of the cutoff value for detecting endometrial abnormalities, the most common endometrial transvaginal US pattern seen in women treated with tamoxifen is a thickened endometrium with cystic spaces described as a 'Swiss cheese' pattern followed by thickened echogenic homogenous endometrium.

Graph 1 showing percentage of normal endometrium, endometrial pathology & adexal pathology

Duration of Tamoxifen therapy	No. of patient (n=50)
6 months-1 year	29
>1-2 years	6
>2-3 years	8
>3-4years	4
>4-5years	3

Table 1: Distribution of pt. according to duration of tamoxifen therapy.

Endometrial thickness(mm)	No. of patient (n=50)
Up to 5mm	30
5.1 to 10mm	15
10.1 to 15mm	2
15.1 to 20mm	1
>20 mm	2

Table-2: Distribution of pt. according to endometrial thickness.

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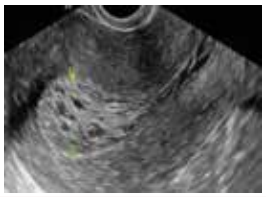


Figure 1: TVUS sagittal view showing endometrial hyperplasia

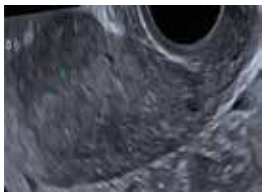
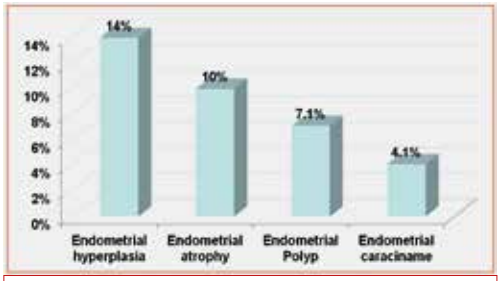


Figure 2: TVUS sagittal view showing endometrial carcinoma



Graph 2 showing results of endometrial pathology

CONCLUSIONS

Conclusions: It was found in our study that transvaginal ultrasonography is a sensitive and rather specific method to evaluate the endometrial changes, but often this modality does not provide the physician with sufficient diagnostic information. So we need endometrial biopsies in those patients with positive TVUS findings due to higher sensitivities, specificities, positive and negative predictive values for evaluating breast cancer patients taking tamoxifen. Such a screening procedure is important in an attempt to detect endometrial cancers earlier as those patients worry a great deal about developing a second cancer.

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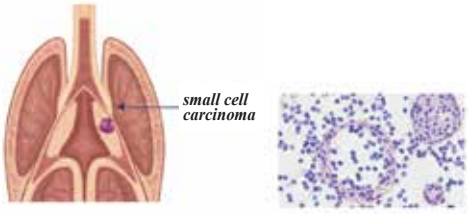
Primary Small Cell Carcinoma:

"Primary laryngeal small cell carcinoma is an exceptionally rare and aggressive malignancy, often associated with early systemic spread. This case highlights that, although uncommon, localized disease can present with preserved vocal cord mobility and minimal symptoms such as hoarseness. Accurate diagnosis relies on histopathology supported by immunohistochemistry. Given the high risk of occult metastasis, systemic chemotherapy remains essential even in localized cases. Combined modality treatment with radiotherapy and chemotherapy allows effective disease control while preserving laryngeal function. Early recognition and organ-preserving strategies should therefore be the cornerstone of management."



Dosimetric Analysis Of Ultra-hypofractionated Radiotherapy In Early –stage Breast Cancer: Clinical Implementation Of The Fast-forward Protocol

By Dr. Mahwish Akhter

Abstract:

INTRODUCTION

The FAST-Forward trial has reshaped adjuvant radiotherapy

for early-stage breast cancer by demonstrating the non-inferiority of an ultra-hypofractionated regimen—26 Gy in 5 fractions over 1 week—compared to the widely used 3-week regimen of 40 Gy in 15 fractions. This approach offers significant logistical advantages, including reduced treatment time, improved patient convenience, and potential cost savings. However, its rapid adoption requires careful evaluation of dosimetric safety, especially in varied clinical settings. Our study presents initial institutional experience with this regimen, emphasizing the importance of meticulous planning to ensure compliance with organ-at-risk (OAR) constraints and safe integration into routine practice.

METHOD

We retrospectively analyzed 16 patients with early-stage breast cancer treated post-lumpectomy or post-mastectomy using either 3D conformal radiotherapy (3D-CRT) or intensity-modulated radiotherapy (IMRT). Nodal irradiation was excluded. Treatment plans were assessed for planning target volume (PTV) coverage and doses to critical structures. Key dosimetric parameters included:

- PTV V95% ≥ 95%
- Heart (left-sided): V7 < 5%, 1.5 Gy < 30%
- Ipsilateral lung: V8 < 15%
- Contralateral breast: Maximum dose < 3 Gy

Dose-volume histograms (DVHs) were analyzed to verify compliance with FAST-Forward criteria.

RESULTS

All treatment plans achieved adequate PTV coverage, with V95% > 95%. Mean heart dose (V7) was 3.02%, and ipsilateral lung dose (V8) averaged 13.08%, both within acceptable limits. The maximum dose to the contralateral breast remained below 3 Gy in all cases. However, the secondary heart constraint—1.5 Gy < 30%—was not consistently met in IMRT plans, indicating a potential area for optimization.

LIMITATIONS

This study did not incorporate Deep Inspiration Breath Hold (DIBH), which may have improved heart sparing, particularly in left-sided cases. Additionally, the small sample size and retrospective nature limit generalizability, though findings align with published data.

CONCLUSION

Ultra-hypofractionated radiotherapy using 26 Gy in 5 fractions demonstrates acceptable dosimetric profiles in early-stage breast cancer patients treated post-lumpectomy or post-mastectomy. With careful planning and adherence to protocol-defined constraints, this regimen can be safely implemented, supporting its continued use in clinical practice.

Breast Density Patterns on Screening Mammography Among Asymptomatic Women in Gilgit-Baltistan: A Cross-Sectional Study from GINOR Cancer Hospital Gilgit (October 2025)

By Dr. Asima Zaman, Dr. Zeeshan Ghias Khan, Dr. Farzana

Abstract:

Background

Breast density plays a crucial role in mammographic sensitivity and overall screening performance. Despite Gilgit-Baltistan's distinct demographic, lifestyle, and ethnic characteristics, there is no prior published data on breast density distribution in this region. GINOR Cancer Hospital Gilgit began structured screening services in 2025, allowing assessment of local breast density trends and their relationship with age and menstrual status.

Objective

To determine the distribution of ACR BI-RADS breast density categories among asymptomatic women aged ≥35 years undergoing screening mammography at GINOR Cancer Hospital Gilgit in September and October 2025, and to evaluate associations between breast density, age, and menstrual status.

Methods

A cross-sectional study was conducted at GINOR Cancer Hospital Gilgit, including 150 asymptomatic women aged 35–75 years undergoing screening mammography in September and October 2025. Breast density was categorized based on ACR BI-RADS 5th Edition (A–D). Menstrual status was recorded as premenopausal, perimenopausal, or postmenopausal. Age distribution and associations with density patterns were analyzed descriptively.

Results

A total of 150 women were included (mean age 51.5 ± 12.9 years, range 35–75).

Breast Density Distribution (n = 150):

Category A: 37 (24.6%), Category B: 53 (35.3%), Category C: 40 (26.6%)Category D: 20 (13.3%)

Overall, 60 patients (40%) had dense breasts (C + D).

Menstrual Status Distribution:

- Premenopausal: 51 (34%)
- Perimenopausal: 27 (18%)
- Postmenopausal: 72 (48%)

Associations:
Premenopausal women showed a higher proportion of dense breasts (C–D) compared to postmenopausal women. Postmenopausal women predominantly exhibited fatty or low-density breasts (A–B). Younger women (35–49 years) had a clearly higher percentage of dense breast categories than women aged ≥50.
Conclusion
This initial breast screening dataset from GINOR Cancer Hospital Gilgit demonstrates that 40% of asymptomatic women have dense breasts, with density strongly associated with younger age and premenopausal status. The proportion of dense breasts in this Gilgit-Baltistan cohort is consistent with trends seen in Asian populations. These findings highlight the importance of adjunct ultrasound, awareness regarding dense breast implications, and development of risk-adapted screening pathways for women in the region.

Spatially Fractionated Grid Radiotherapy: Experiences At Inmol Hospital

By Dr. Wajeeha Anjum

Abstract:

Objective:
Spatially Fractionated Radiotherapy (SFRT) is known for its highly potent immunomodulated response that contributes to its highly effective outcomes. This makes SFRT one of the few promising treatment options for conquering tumors, especially in locally advance cases in palliative setting for symptomatic controls. It used a novel and practical volumetric modulated arc therapy (VMAT) planning approach for grid therapy
This study aims to report our early experiences of using SFGRT for patients with various cancers in our hospital
Methods and Materials:
Dose is prescribed to 1.5-cm diameter spherical contours placed throughout the gross tumor volume (GTV). Placement of spheres is variable, but they must maintain at least a 2cm (center to center) separation, and the edge of any sphere must be at least 1 cm from any organ at risk (OAR). Three concentric ring structures are used during optimization to confine the highest doses to the center of the spheres and maximize dose sparing between them. A dose of 20 GY is planned and delivered to each sphere while keeping the dose to the rest of CTV upto 10 GY. The end result is alternating regions of high and low dose throughout the GTV and minimal dose to OARs. High-intensity flattening filter-free (FFF) modes are used to efficiently deliver the plans, and entire treatments typically take around 35 minutes.
Results:
A total of 4 patients with various cancer types were treated using SFGRT, with a median age of 47.5 years old males ,2 cases of sarcoma,1 case of mediatinal lymphoma and 1 case of chordoma. The approach is illustrated with 4 examples treated at our institution. Patient #1 had a 2203-cm3 mediastinal mass and was prescribed 20 Gray (Gy) to 24 spherical regions within the GTV. Patient #2 had a 3680-cm3 chordoma and was prescribed 20 GY to spherical regions within the GTV .Patient #3 was case of chondrosarcoma 1555cm3 of thigh and patient #4 soft tissue sarcoma of gluteal region 2740cm3. All patients received additional consolidative radiation approximately 1 week after the initial VMAT grid treatment. Each patient experienced marked reduction in tumor size and symptomatic relief without treatment-related complications. All cases were palliative intent aimed at pain relief, bleeding control, or bulky mass reduction.
Conclusions:
SFRT shows promising results in terms of tumor response, especially for bulky tumor. Proper utilization of SFRT can improve tumor response. Additionally, no significant toxicities were found in all of our patients. As many centers offer VMAT treatments, the approach is widely accessible and can be readily implemented once appropriate patient selection and delivery processes are established.

Paediatric Medulloblastoma with Postoperative Complications and an Incidental Optic Pathway Glioma: A Case Report

By Dr. Fatima Mahmood

Abstract:

We report the case of a 14-year-old boy diagnosed with a posterior fossa medulloblastoma who exhibited progressive neurological symptoms. Preoperative MRI revealed a large, well-defined lesion centered at the fourth ventricle with both superior and inferior extensions. Surgical resection confirmed WHO Grade IV medulloblastoma on histopathology. Postoperatively, the patient developed complications, and follow-up imaging revealed a residual lesion as well as a new, incidental optic chiasmal mass consistent with an optic pathway glioma. The patient was planned for craniospinal irradiation (CSI) using 36 Gy in 20 fractions with concurrent vincristine chemotherapy, and a 10-fraction boost (18 Gy) to both medulloblastoma and optic glioma. This case highlights the importance of vigilant postoperative imaging, recognition of secondary pathologies, and a multidisciplinary treatment approach in pediatric neuro-oncology.

Introduction

Central nervous system (CNS) tumors have the second-highest frequency of pathogenic germline mutations among pediatric cancers. Among CNS tumors, medulloblastomas show the second highest mutation rate, with pathogenic variants identified in 13.5% of cases [1]. Medulloblastoma is the most common malignant pediatric brain tumor, typically presenting at a median age of 7 years, with a male predominance \[2]. These tumors often obstruct cerebrospinal fluid (CSF) flow, resulting in increased intracranial pressure and symptoms such as morning headaches, vomiting, and ataxia \[3].

Optic pathway gliomas (OPGs) are low-grade tumors involving the precortical visual pathways and account for 2–5% of pediatric CNS tumors \[4]. They may occur sporadically or in association with neurofibromatosis type 1 (NF1) \[5]. OPGs display variable growth patterns, making management complex and typically guided by the degree and progression of visual impairment rather than size alone \[6].

Discussion:

The co-occurrence of medulloblastoma and optic nerve glioma in a pediatric patient represents an exceptionally rare clinical scenario, with few cases reported in the literature (7). Both of these central nervous system (CNS) tumors are well-characterized individually in pediatric oncology; however, their synchronous or metachronous presentation in the same patient raises important considerations regarding diagnosis, treatment planning, and long-term outcomes.

Medulloblastoma (MB) is the most common malignant CNS tumor in children, comprising 15–20% of all pediatric CNS neoplasms and 64% of pediatric embryonal tumors (8,9). Clinical symptoms typically include intracranial hypertension and posterior fossa mass effect, manifesting as headache, nausea, ataxia, and visual disturbances (10). Histologically, MB is classified into four subtypes: classic (68–80%), desmoplastic/nodular (7%), MB with extensive nodularity (3%), and large cell/anaplastic (10–22%), the latter associated with a more aggressive course (11). In this case, the patient presented with classic symptoms of a posterior fossa tumor, including gait instability, left-sided weakness, dysarthria, and headaches. MRI revealed a large lesion centered in the fourth ventricle with superior and inferior extension, consistent with typical medulloblastoma radiological patterns.

In contrast, optic pathway gliomas are typically low-grade astrocytomas, often pilocytic, and frequently associated with neurofibromatosis type 1 (NF1) (12). However, this patient did not exhibit clinical stigmata of NF1, suggesting a sporadic optic glioma. A new optic chiasmal lesion identified on follow-up imaging coincided with the patient's progressive visual decline. While optic gliomas have been sporadically reported as secondary CNS neoplasms, the timing in this case suggests a coincidental, rather than treatment-induced, etiology.

In 1977, G. R. Bhangui reported the case of multiple primary brain tumors in a 12-year-old girl, including medulloblastoma, optic nerve glioma, ganglioglioma, and pilocytic astrocytoma (7). Another case describes the synchronous occurrence of glioblastoma and medulloblastoma in a 5-year-old boy with suspected cancer predisposition syndrome (13). To our knowledge, this is the second documented case of both medulloblastoma and optic nerve glioma occurring simultaneously in the pediatric population.

While no direct causal relationship between optic nerve gliomas and medulloblastomas has been definitively established, recent studies suggest that aberrant Sonic Hedgehog (Shh) signaling may be implicated in both entities (14, 15). The SHH signaling pathway plays a critical role in neural development, acting as a mitogen for precursor cell populations in the brain, retina, optic stalk, and cerebellum (16). Dysregulation of this pathway, particularly in cerebellar granule neuron precursors, is known to drive the development of the Shh-subtype of medulloblastoma (17). Growing evidence also implicates this pathway in the pathogenesis of other CNS tumors, including gliomas (18,19). MDT and vigilant approach is warranted.

Oral Topic Presentation

By Dr. Kanwal Awan

Abstract:

Introduction

As we are in the era of newer therapies, so my presentation will focus on the latest targeted/immunotherapies in the Upper Gastrointestinal Tumors

Content

I will briefly discuss regarding upcoming & new FDA approved targeted agents & their Mechanism of actions.

I will discuss regarding Her2/neu target therapies, Anti VEGFR antibodies, Anti PD1 antibodies, NTRK fusion proteins & Claudin 18.2 target therapies.

I will discuss new clinical trials that lead to approval of these drugs.

Trial results & drug activity.

Discussion & Conclusion

Now there's an era of upcoming newer agents, target therapies & immunotherapies, and these are new rays of hope for our terminal cancer patients.

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Estimation of Rectal and Bladder Dose in CA Cervix Patients Treated with Volume-modulated Arc Therapy (VMAT) and Image Guided Brachytherapy (IGBT)

Sana Naeem, Safia Zahid, Rub Nawaz Maken, Amira Shami,

Abstract

Objective:
The study aimed to calculate the total dose given by VMAT and IGBT to the cervical tumor, D2cc bladder and D2cc rectum using EQD2 ratio

Study Design:
Descriptive case series.

Place and duration of study:
Institute of Nuclear Medicine and Oncology (INMOL) Lahore, from 15th May to 30th December 2024

Methodology

Sample size of 30 was calculated with 95% confidence level and accepting 5% margin of error. . CA cervix Patients with stage 1B3-IVA C who were treated with VMAT 45GY in 25 fractions with concurrent cisplatin and image guided Brachytherapy 7gy x 4 insertions were included in the study. Summation of EBRT and BT doses was performed by calculation of biologically equivalent dose in 2 Gy per (EQD2) by linear quadratic model using alpha/beta ratio of 10gy for CTVHR and 3Gy for OARs. The treatment including both EBRT and BT was completed in 56 days

Results

Mean age of patients was 53.97 +/- 9.20 years. Most frequent stage was IIB(16.7%) followed by stage III B (13.3%) and stage IV (10.0%). The mean dose to tumor by VMAT was 45.73Gy +/-1.22 and mean dose to tumor by IGABT was 45.98Gy +/- 0.80.The mean of total dose given to tumor was 91.72 Gy +/- 1.39. The mean dose received by 2cc bladder and rectum was 86.46 Gy+/- 3.30 and 76.98 Gy +/- 3.16 respectively.

Conclusion

The mean dose received by tumor, bladder and rectum was 91.72 Gy, 86.46 Gy and 76.98 Gy similar to the embrace studies which delivered 90 Gy dose to 90% of the clinical target volume. Image-guided adaptive brachytherapy(IGABT) with computer tomography (CT) guidance using three-dimensional (3D) planning increase the target-coverage conformity allow dose escalation and decrease doses to organs-at-risk (OARs).

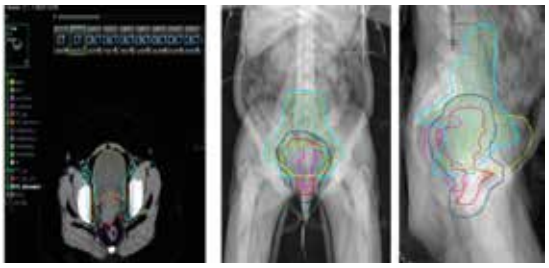


Figure 1: ca cervix Delineation

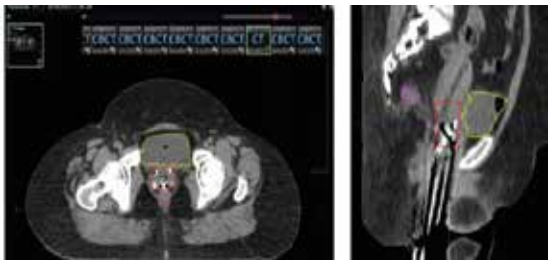
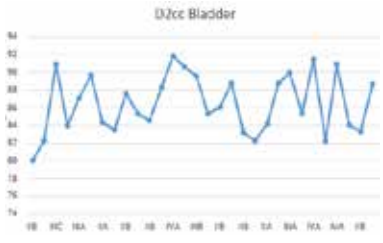


Figure 2: ICBT with interstitial needles

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
EBRT_Dose	30	43.64	47.70	45.7340	1.22225
BT_Dose	30	43.68	47.44	45.9873	.80036
Total_Dose	30	89.40	94.52	91.7213	1.39984
D2cc_Bladder	30	80.06	91.84	86.4693	3.30222
D2cc_Rectum	30	72.14	84.56	76.9873	3.16877
Valid N (listwise)	30				



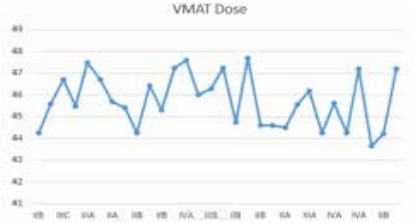


Figure 3: Dose coverage for VMAT

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"Hepatocellular Carcinoma Unveiled by Brain metastasis: An Unreported Case"

By Dr. Qurat. Ul. Ainn Hashmi

Abstract:

Introduction: Hepatocellular carcinoma (HCC) is one of most common malignancies in the world and a major cause of cancer-related mortality globally. In Pakistan, according to GLOBOCAN 2022, HCC new cases were 3.3%, while death rate was 5%. Common sites of metastasis include the lungs, bones and lymph nodes, while metastasis to brain is exceptionally uncommon, occurring in less than 1 % of cases. When cerebral metastasis is the first manifestation, diagnosis can be delayed because neurological symptoms are often attributed to primary intracranial tumors. Early recognition of such atypical presentations is essential for appropriate multidisciplinary management. This report describes a unique case of 60-year-old female in whom metastatic brain disease led to the discovery of an undiagnosed HCC.

Case: A 60-years old female with no prior history of liver disease, hepatitis B, or hepatitis C infection presented with complaints of severe headache, nausea, vomiting and vertigo. Neurological examination was unremarkable. Magnetic resonance imaging (MRI) of the brain showed well defined lobulated mass lesion of 56mmx32.3mm x 52mm along right occipital region causing underlying bone erosion with producing mild mass effect on cerebellar hemisphere. A biopsy was suggested, which revealed metastatic carcinoma with immunohistochemical staining positive for HepPar-1 and Glycipan-3 and negative for CK7 and CK20, confirming HCC. Further evaluation with contrast-enhanced computed tomography (CT) of the abdomen demonstrated 8x7 cm mass in liver with arterial enhancement and venous washout, typical of HCC. Serum Alpha-protein level (AFP) level was 1210 ng/mL and PIVKA II was 2225 ng/mL .The patient was discussed in multidisciplinary tumor board and planned for palliative whole brain radiotherapy 30 Gy/10 fractions followed by Tablet Sorafenib as a systemic therapy. The symptoms improved significantly with palliative radiotherapy, and corticosteroids. The patient's overall performance remained stable with supportive and palliative therapy.

Discussion: Our case had HCC with normal liver function tests. The absence of chronic liver disease even with hepatitis C in this patient further obscured the diagnosis. This case emphasizes the importance of considering HCC in the differential diagnosis of intracranial lesions particularly in the regions with high prevalence of viral hepatitis like Pakistan. Although prognosis remains poor, early multidisciplinary intervention combining radiotherapy, targeted therapy, and palliative care can improve quality of life. Reporting such rare cases enhances awareness among clinicians and supports earlier recognition of atypical disease patterns.

Impact of Neuro-Oncological Rehabilitation on Functional Independence in Glioma Patients Receiving Radiotherapy ± Chemotherapy

By Dr. Inshall Nadeem, Dr. Alina Atif Khan

Abstract:

Introduction:

This study aimed to evaluate the impact of a structured neuro-oncological rehabilitation program on functional independence and performance status among glioma patients receiving radiotherapy ± chemotherapy. The primary focus was to assess the change in Eastern Cooperative Oncology Group (ECOG) performance scores, Functional Independence Measure (FIM), and Berg Balance Scale (BBS) outcomes between patients who received comprehensive rehabilitation with standard care and those managed with standard care only.

Methods:

This is a retrospective cohort study conducted at Cyberknife and TomoTherapy Unit, Jinnah Postgraduate Medical Centre (JPMC), Karachi, from September 2022 to September 2025. A total of 127 patients with histopathologically and radiologically confirmed gliomas were included and divided into an experimental group (n = 63) receiving neuro-oncological rehabilitation along with standard oncological care and a control group (n = 64) receiving standard oncological care only. The multidisciplinary rehabilitation program comprised individualized physical therapy, occupational therapy, psycho-oncological, and neuropsychological support tailored to each patient's needs. Functional outcomes were evaluated using ECOG, FIM, and BBS scores at admission and discharge. Statistical analyses included the Wilcoxon Signed-Rank Test for within-group comparisons and the Mann–Whitney U test for between-group differences, with a significance level of $p < 0.05$.

Results:

Males predominated in both groups (experimental: 71.4%; control: 62.5%). The most frequent diagnosis was glioma

(experimental: 60.9%; control: 45.3%), and nearly half of all participants presented with WHO Grade 4 tumours, confirming baseline comparability. At admission, most patients in the experimental group had ECOG scores of 2–3, indicating moderate to severe limitation. Following rehabilitation, 74.6% achieved ECOG 0 and 25.4% ECOG 1, demonstrating substantial functional recovery ($Z = -6.775$, $p < 0.001$). The control group showed modest improvement ($Z = -2.642$, $p = 0.008$), with the majority remaining at ECOG 1–2. Between-group comparison revealed a significant difference in ECOG change ($p < 0.001$), favouring the rehabilitation group. Functional Independence Measure (FIM) scores increased significantly in the experimental group (mean 88.95 → 96.08, $Z = -6.782$, $p < 0.001$) versus minimal change in controls ($p = 0.214$). Similarly, Berg Balance Scale (BBS) scores improved markedly (mean 41.84 → 44.92, $Z = -6.593$, $p < 0.001$) compared with negligible gains in the control group ($p = 0.153$). These findings confirm notable improvements in functional independence and balance outcomes following neuro-oncological rehabilitation.

Conclusion:

Neuro-oncological rehabilitation is an effective adjunct to oncological treatment, significantly improving functional independence, balance, and performance status among glioma patients undergoing radiotherapy ± chemotherapy. These findings underscore the importance of integrating structured rehabilitation programs into neuro-oncology care pathways to optimize recovery and quality of life.

Radiation Dose to LAD Artery And Left Ventricular Structures in Left -sided Breast Cancer Patients Undergoing IMRT : An institutional based Dosimetry study

By Dr. Hafsa Rais

Abstract:

Background: This study evaluated incidental radiation dose to the left anterior descending artery(LAD) and left ventricle as organ at risk (OARs) in left sided breast cancer patients who received adjuvant radiotherapy with Intensity modulated radition therapy (IMRT) treatment plan.RT-associated cardiac changes are more common in left-sided breast cancer.

Materials and Methods: Twenty-four mastectomy patients who previously treated with IMRT were analyzed retrospectively. LV and LAD , not initially contuored as OARs ,were delineated on the same simulation CTs for those patients whose treatment was previously completed with IMRT plans . New intensity modulated radiation therapy (IMRT) plans were generated,maintaining original parameters. Planning target volume (PTV), homogeneity index (HI) , conformity index(CI) ,monitor unit(MU) values, and doses of OARs compared using wilcoxon signed-rank test ($p<0.05$).

Results:

There were no clinically significant differences in PTV40 coverage (D98, D50, and D2) between the non-optimized and optimized plans. Optimization significantly reduced cardiac substructure doses. The mean LAD dose decreased from 27.8 Gy to 24.0 Gy ($p = 0.016$), and maximum LAD dose decreased from 42.6 Gy to 37.4 Gy ($p = 0.016$). For the LV, the mean dose was reduced from 13.3 Gy to 11.7 Gy ($p = 0.016$), and maximum dose from 42.3 Gy to 37.9 Gy ($p = 0.016$). Overall, optimization yielded a 12–14% dose reduction for the LAD and 10–12% for the LV, without compromising target coverage.

Conclusion:

In left-sided breast radiotherapy, contouring LAD and LV as OARs provides significant dose reductions of about 10–14% without compromising target coverage. Left-sided RT patients had higher cardiac morbidity, mainly ischemic heart disease (Myocardial infarction and angina), with a 0.4% excess MI risk versus right-sided RT. LAD damage contributes to both non-radiation and radiation-induced MI. RTinduced cardiac injury appears decades later, requiring long follow-up .

Breast Cancer Cases Seen In Student-facilitated, Public sector Multidisciplinary Tumor Boards of Karachi: An Overview

By Dr. Areesha Mansoor

Abstract:

Introduction: Noticing the paucity of site-specific tumor boards in the public-sector healthcare setups in Pakistan, the novel idea of student-led tumor board facilitation was introduced by Tumor Board Establishment Facilitation Forum (TEFF). Since its formation in 2018, TEFF has established 5 boards in Civil Hospital Karachi(CHK) and 4 Tumor Boards in Jinnah Postgraduate Medical Centre (JPMC). This abstract means to

depict the findings of the cases discussed in our breast tumor boards (BTB).

Methods: This retrospective study presents the medical record generated by TEFF breast tumor boards from June, 2022 to September, 2024. Patient demographics, clinical characteristics and tumor board decisions were recorded and analyzed. Patient records were recorded in safe, encrypted storage devices and were handled primarily by the principal investigators. A total of 39 breast cancer cases were studied. 3 of these cases were removed from the study as the complete data necessary for analysis was not present, hence data of 36 cases was analysed for this paper.

Results: Of the 36 cases analyzed, 24 cases were discussed in BTB of CHK and 12 were from JPMC. All of the BTB held in JPMC were in-person meetings while 3 of the breast cancer cases from CHK were discussed in hybrid meetings, and 21 cases were discussed in virtual meetings. The mean age of patients presenting in our boards was 53.9 years. 55.6%(20) of the patients presenting in our boards were aged between 40-59 years, followed by those aged 60 or greater at 27.8%(10). 16.7%(6) were aged younger than 39 years. The majority of our patients (58.3%) suffered from invasive ductal carcinoma, 11%(4) and 5.6%(2) suffered from invasive lobular carcinoma and ductal carcinoma in situ, respectively. There were 17 cases of triple negative disease, 9 of luminal type A, 5 of luminal type B and 5 of HER2/nue positive disease. 15 patients presented with early stage breast cancer, 14 patients were diagnosed with locally advanced disease, and 7 patients suffered from metastases. 30.5%(11) of the cases discussed were advised follow-up after additional investigations while 69.4% of the cases were concluded with recommendations of definitive management plans. No significant relationship could be established between the type of tumor board and BTB decision($P>0.05$).

Conclusion:
TEFF was established in order to bridge the tumor board deficit in Pakistan. With these results it can be seen that student-facilitated tumor boards are emerging as an effective solution to this challenge as BTBs in both CHK and JPMC are being run smoothly. Similar conceptualization may also help us to improve patient follow-up, establish a national cancer registry and pave the way for further advancement of the oncological set-up in Pakistan.

Grossly Elevated Ca-125 Level in Benign Ovarian Tumor: A Case Report

By Dr. Jannat Asif

Abstract:
Our patient presented to us with features commonly associated with epithelial ovarian malignancy. History revealed that patient had secondary amenorrhea, hirsutism and increased body mass index (BMI). On examination, she had a huge palpable abdominal mass along with gross ascites. Suspicious features were observed on CT scan of abdomen and pelvis i.e. complex ovarian cyst, abdominopelvic ascites along with omental stranding. Ca-125 was significantly elevated. Considering these features, patient was operated. Total abdominal hysterectomy, bilateral salpingo-oophorectomy and infracolic omentectomy was done. Histopathology turned out to be benign i.e. steroid cell tumor of ovary. Soon after surgery, Ca-125 was reduced to normal value. Pre-operative hormone levels should have been done to get a hint of this secretory (benign) ovarian tumor.

Keywords:
Sex cord gonadal stromal tumor, Hyperandrogenism, Immunohistochemistry, Case Report

Source of Funding:
This case report has not received any specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Competing Interest:
The authors declare that they have no competing interests.

Informed Consent:
Patient has given written informed consent for publication of this case report and figures attached in it.

Clinical Outcomes of Multisession Stereotactic Radiosurgery for Pituitary Adenomas: An Institutional Experience with Long-Term Follow-Up

By Dr. Zainab Rafat

Abstract:
Introduction
Pituitary adenomas are common benign intracranial neoplasms

that can cause significant morbidity through hormonal dysfunction or optic apparatus compression. While microsurgical resection remains the primary treatment, residual or recurrent disease is common, particularly in tumors invading the cavernous sinus or parasellar regions. Stereotactic radiosurgery (SRS) provides a minimally invasive alternative with proven tumor control; however, single-fraction SRS near the optic chiasm carries a risk of visual compromise. Hypofractionated or multisession SRS offers a safer approach, maintaining efficacy while minimizing optic toxicity. This study presents the institutional outcomes of patients with pituitary adenomas treated with multisession SRS at the Neurospinal and Cancer Care Institute (NCCI), Karachi, emphasizing long-term efficacy, toxicity, and visual outcomes.

Methods

A retrospective review was conducted on 113 patients with pituitary adenomas (81 males, 32 females) treated with multisession SRS over 7 years. Treatments were delivered on an Elekta Synergy-S linear accelerator using a 3 mm micro-multileaf collimator and cone-beam CT guidance. The prescribed dose ranged from 20–25 Gy in five fractions, delivered to an isodose line of 80–85%. Patients underwent MRI and endocrinological assessment at 3 and 6 months, then biannually. Visual fields were assessed by perimetry before and after treatment. Data were analyzed using SPSS v29, with survival estimated via the Kaplan–Meier method.

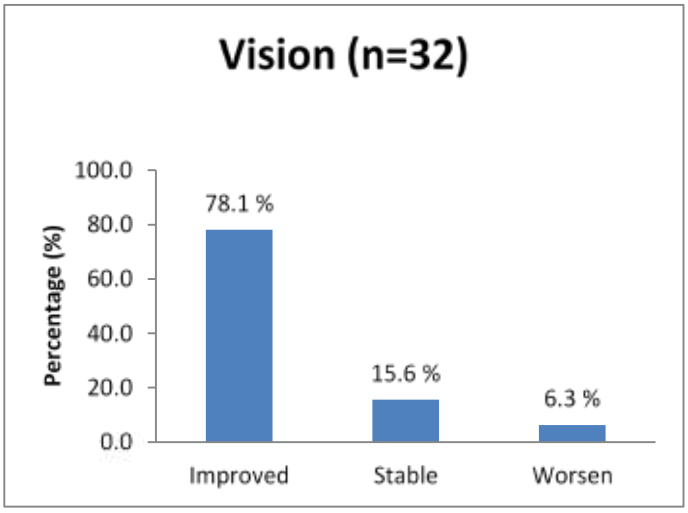
Results

The mean age was 43.2 ± 11.5 years. Most (71.7%) had non-functioning adenomas, while 28.3% were hormone-secreting. Tumor volume reduction occurred in 65%, stability in 28%, and progression in 7%. Visual improvement was documented in 42%, stability in 56%, and deterioration in only 2%. Endocrinological normalization was achieved in 38% of functioning adenomas. Acute toxicity was minimal, with no cases of radiation-induced optic neuropathy or pituitary apoplexy. The 5-year overall survival was 86%, with a mean survival of 3.5 years (95% CI: 3.12–3.85). Local control exceeded 90% at 5 years, aligning with international data.

Conclusion

Multisession SRS offers excellent tumor control and visual preservation for pituitary adenomas, including lesions near the optic apparatus. The regimen is safe, effective, and well-tolerated, providing a valuable alternative to repeat surgery or single-fraction SRS. These outcomes support fractionated SRS as a standard, low-toxicity option for complex or recurrent adenomas.

Visual outcomes on perimetry post treatment.



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Outcomes Of Patients With Unresectable Oral Cavity Cancers ,treated With Definitive Concurrent Chemoradiotherapy A 15-Years Single Institution Experience

By Dr. Khurram Shehzad

Abstract:

Objective

The optimal management of inoperable oral cavity squamous cell carcinoma (OC- SCC) remains largely unknown. Especially where surgical management is not a feasible option. It is reasonable to consider definitive concurrent chemoradiotherapy (CCRT) in such cases as non surgical curative option.

The aim of this study was to review 15-year experience at our institution in treating unresectable oral cavity cancer patients with definitive CCRT with or without induction chemotherapy.

Methods

This was retrospective cohort study, the Head and Neck cancer database at our institution was used to identify patients with primary OC-SCC locally advanced, treated with definitive CCRT between January 2009 and December 2023. The local control (LC), regional control (RC), distant control (DC) and overall survival (OS) were calculated by the Kaplan-Meier method. Multivariable analysis using Cox proportional hazards regression used to identify predictors of survival outcomes. All reported p-value < 0.05 considered statistically significant.

Results

31 patients with locally-advanced OC-SCC were treated with definitive CCRT. Non-operative management was due to surgical unresectability 61.3%, Surgery refused 32.3% and medical inoperability 6.5%. The majority of the patients were in advanced stage 67.7% and N2c stage 48.4%. The predominant stage was IVA 77.4%. The commonest primary site was oral tongue 64.5%. Induction chemotherapy was administered to 77.4% of them, primarily with Docetaxel, Cisplatin and 5-FU regimen (TPF) 50%. Post-induction chemotherapy response evaluation revealed a partial response in 81% while progressive disease in 19%. Cisplatin was used as concurrent agent in 60.7% and the radiotherapy was delivered at mean total radiation dose of 67Gy (60-70 Gy).The median follow up was 25 months (9-90 months), while the median survival time was approximately 25.6 months. The 2-year (LC), (RC), (DC) and (OS) were 19%, 50%, 66%, and 50% respectively. Performance status, T4b staging, IVB stage, local and regional failure significantly impacted survival outcomes ($p < 0.01$). Feeding tube placement was required in 38.7% of patients, and only 9.7% underwent salvage surgery.

Conclusion

This study highlights poor survival outcomes and high failure rates in patients with unresectable OC-SCC treated with definitive CCRT, emphasizing the aggressive nature of the disease and the challenges in achieving durable local control with non-surgical approaches.

Correlation of Metabolic Response Assessed by PET-CT Metrics With Survival in Locally Advanced Nasopharyngeal Carcinoma

By Dr. Khurram Shehzad

Abstract:

Objectives/Purpose: Locally advanced Nasopharyngeal carcinoma (LA-NPC) is the most common presentation of NPC in Saudi Arabia and many countries including East Asia and North Africa. There is a great need for prognostic factors in LA-NPC due to limited value of TMN staging system. This study aimed to evaluate the prognostic value of 18F-FDG PET scans following chemotherapy of locally advanced NPC.

Materials/Methods: Using a cohort of 107 LA-NPC patients recruited for a clinical trial with a different aim, patients had PET scan two weeks after the completion of the two cycle of induction chemotherapy, and before definitive radiotherapy. The PET scan was measured by the maximum Standardized update volume (SUVmax), Metabolic Tumor Volume MTV, or total lesion glycolysis (TLG). Correlation was assessed using Cox proportional hazard regression analysis for continuous and ordinal variables and significance of separation in Kaplan-Meier survival curves were measured using log-rank test.

Results: There was no significant correlation between PET scan of the primary tumor after chemotherapy whether measured by SUVmax, MTV or TLG. However, there was significant correlation between PET scan of the involved lymph nodes after chemotherapy measured as TLG and relapse-free survival (RFS, p=0.008), metastasis-free survival

(MFS, p=0.010) but not with overall survival (OS, p=0.08). Similarly, PET-CT metrics measured by SUVmax in the involved lymph nodes after definitive chemoradiotherapy correlated significantly with RFS (p<0.001) but not with MFS (p=0.07) or OS (p=0.33). A Clinician Assessed PET Response (CA PET), which was considered the response to be "complete" if SUVmax was < 4, "Partial" if SUVmax was >4 and a "progressed tumor" if SUV surpassed SUV at diagnosis and if there is new lesions) was also assessed. Indeed, CA PET highly correlated with DFS (p<0.001), MFS (p<0.001) and OS (p<0.001),

Conclusions: Our findings support the use of PET-CT after chemotherapy as a valuable early prognostic marker for risk stratification in locally advanced NPC, potentially guiding therapeutic decisions and improving personalized treatment strategies. Our clinician assessed PET response which consider PET scan after before and after therapy outperformed interval specific PET measurements. More work is still warranted to optimize the use PET in diagnosis and therapy monitoring of LA-NPC.

Lymphopenia During Radiotherapy in Nasopharyngeal Cancer: Identifying Patients at Risk and Its Effect on Survival

By Dr. Khurram Shehzad

Abstract:

Introduction

Radiation-induced lymphopenia (RIL) has been identified as a prognostically adverse factor in several cancers. The impact of this condition on head and neck cancers, particularly nasopharyngeal carcinoma (NPC) is not well-defined.

This retrospective analysis was done to evaluate the incidence and severity of RIL in patients with nasopharyngeal carcinoma (NPC) undergoing definitive radiotherapy. Also to identify patient, clinical, and treatment-related factors associated with lymphopenia (Grades 3-4) during radiotherapy, and to explore the relationship between RIL and outcomes in terms of overall survival (OS), recurrence-free survival (RFS) and distant metastasis-free survival (MFS).

Methods

Records of 107 patients between 2012 and 2018 at our institution were reviewed.

All patients had induction chemotherapy followed by concurrent chemoradiotherapy using tomotherapy, with a total dose of 70 Gy delivered in 33 fractions.

Absolute lymphocyte counts were collected at three time points: pre-treatment, weekly during treatment, and 12 weeks post-treatment.

Patient-related, tumor-related, and treatment-related characteristics, as well as clinical outcomes and lymphocyte counts during radiotherapy, were recorded.

Descriptive statistics were used to summarize categorical variables. The severity of lymphopenia was classified according to CTCAE v4.0, and patients were grouped into those with mild lymphopenia (Grades 0-2) and severe lymphopenia (Grades 3-4).

Relationships between lymphopenia severity (Grades 0-2 vs. Grades 3-4) and clinical variables were examined using appropriate statistical tests. Survival outcomes (OS, RFS, MFS) were analyzed using Kaplan-Meier curves and compared with log-rank tests. Cox proportional hazards models were used to identify independent predictors of survival, with p-values < 0.05 considered significant.

Results

There was a statistically significant difference in lymphopenia severity based on sex (p = 0.029). All female patients developed severe lymphopenia (G3-G4), while 84% of males also experienced severe lymphopenia, with 16% having mild lymphopenia (G0-G2).

A significant association was also found between N stage and lymphopenia severity (p = 0.049).

Patients with severe lymphopenia had consistently lower lymphocyte counts compared to those with mild lymphopenia. This difference was significant from baseline (p < 0.001) and persisted through treatment and follow-up (p < 0.001 at most time points).

Conclusion

Lymphopenia severity did not significantly affect overall survival (OS), recurrence-free survival (RFS), or metastasis-free survival (MFS).

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Association of Serum Alpha-Fetoprotein (AFP) Levels with Hepatocellular Carcinoma in Accordance with Stage of the Disease: A Cross-Sectional Study from Northern Pakistan

By Dr. Kanwal Awan

Abstract:

Introduction:

Hepatocellular carcinoma (HCC) is one of the leading causes of cancer-related mortality worldwide, commonly associated with chronic hepatitis B (HBV) and hepatitis C virus (HCV) infection. Serum alpha-fetoprotein (AFP) has long been used as a biomarker for diagnosis and prognosis. However, its correlation with disease stage remains variable across populations.

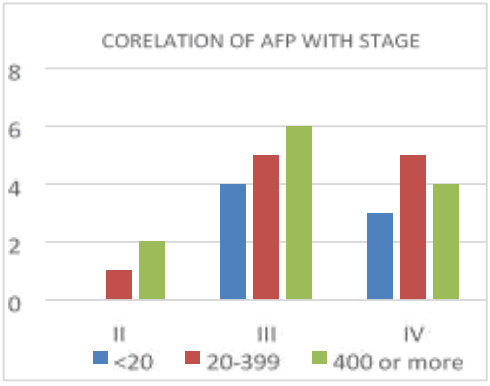
Methods:

A retrospective analysis was conducted on 60 patients with HCC. Demographic data, etiology (HBV/HCV), clinical stage, serum AFP levels, and Child-Pugh classification were recorded. Patients were stratified according to HCC stage. Serum AFP levels were analyzed for correlation with disease stage and liver function (Child Pugh).

Results:

A random sample of 60 patients are considered for this study who presented at Atomic Energy Cancer Hospital (AECH), NORI with the diagnosis of hepatocellular carcinoma from January 2020 till December 2024.

- Gender Percentage: Male 48% & Female 52%
- Age of Patients: Average age of patients was 61 years
- HCV & HBV Positive: HCV 96.6% & HBV 3.3%
- Child Pugh Status: A 34%, B 43% & C 23%
- Stage of the disease: Stage II 10%, Stage III 50% & Stage IV 40%
- AFP Levels: <20 23%, 20-399 37%, 400 or More 40%
- AFP Raised Level: Stage II 10% , Stage III 50% & Stage IV 40%



Conclusion:

Serum AFP levels show a positive association with advancing HCC stage, with significantly higher values observed in Stage III disease. However, considerable overlap exists between Stage III and IV, indicating that AFP alone may not reliably distinguish between advanced stages. Combination of AFP levels with clinical staging and Child-Pugh classification improves prognostic assessment.

Giant Paratesticular Dedifferentiated Liposarcoma With p16 and MDM2 Overexpression: Diagnostic and Management Insight From a Rare Case

By Dr. Shoaib Hanif

Abstract:

Background:

Paratesticular liposarcoma (PLS) is a rare malignancy, with giant forms (>10 cm) being exceptionally uncommon. Due to its rarity, diagnosis is often delayed, and management strategies remain non-standardized.

Case Presentation:

We report a 59-year-old male presenting with a progressively enlarging, painless right scrotal swelling over three months. Imaging with computed tomography revealed a large heterogeneous soft-tissue mass (10.5×11×15 cm) involving the right testis, initially suspected to be a teratoma. Surgical resection with right orchiectomy was performed. Gross examination revealed a multinodular tan-white paratesticular mass (15×14×13 cm). Histopathology showed areas of well-differentiated liposarcoma transitioning to dedifferentiated components with atypical spindle cells and frequent mitoses. Immunohistochemistry demonstrated strong positivity for p16 and MDM2, confirming dedifferentiated liposarcoma (FNCLCC grade II). Postoperative MRI at three months showed no residual or recurrent disease, only a postoperative seroma. The patient remains under close surveillance.

Conclusion:

Giant dedifferentiated paratesticular liposarcoma is an exceedingly rare entity that may clinically mimic benign scrotal conditions. Accurate diagnosis depends on histopathological and immunohistochemical evaluation, particularly p16 and MDM2 overexpression. Complete surgical excision with negative margins remains the mainstay

of treatment, while the role of adjuvant therapy remains uncertain. Long-term follow-up is essential due to the risk of local recurrence and metastasis.

Keywords:
Paratesticular liposarcoma, Dedifferentiated liposarcoma, p16, MDM2, Soft tissue sarcoma, Scrotal mass

Early radiological response patterns in non-metastatic anal canal squamous cell carcinoma: An institutional experience at AECH-NORI, Islamabad

By Dr. Zoya Ahmed

Abstract:

Introduction: Anal canal squamous cell carcinoma (SCC) is a rare malignancy, accounting for approximately 2–4% of all gastrointestinal cancers globally. In Pakistan, epidemiological data remain sparse, and regional treatment outcomes are underreported. Concurrent chemoradiotherapy (CCRT) is the standard of care for non-metastatic disease, offering organ preservation and curative potential. Factors such as HPV status may influence response, yet their predictive value in South Asian populations remains unclear.

Objective: To evaluate early radiological response to concurrent chemoradiotherapy (CCRT) in patients with anal canal squamous cell carcinoma, and to explore the association of HPV status and induction chemotherapy with this outcome.

Methodology: A retrospective analysis was conducted on 35 patients diagnosed with anal canal SCC between January 2023 and June 2025. All patients received CCRT using either intensity-modulated radiotherapy (IMRT) or volumetric modulated arc therapy (VMAT). Radiotherapy doses ranged from 50 Gy to 54 Gy, adjusted according to tumor size and nodal involvement. Induction chemotherapy was administered to 25 patients, while 10 patients did not receive it due to contraindications. Chemotherapy regimens included Mitomycin-C combined with Capecitabine or 5-FU, XELOX, Cisplatin/5-FU and Cape/Mitomycin. HPV status was documented for all patients. Radiological response was evaluated three months post-treatment using RECIST criteria.

Results: Among the 35 patients, complete response (CR) was observed in 5 patients (15%), partial response (PR) in 21 (60%), stable disease (SD) in 5 (15%), and progressive disease (PD) in 4 (10%). Among HPV-positive patients (n=22), CR was observed in 5 (22.7%), PR in 14 (63.6%), SD in 2 (9.1%), and progression in 1 (4.5%). In HPV-negative patients (n=8), CR occurred in 1 (12.5%), PR in 4 (50%), SD in 2 (25%), and PD in 1 (12.5%). Patients with unknown HPV status demonstrated favorable outcomes, with CR in 1(20%), PR in 3(60%), and SD in 1(20%). Chemotherapy omission was associated with reduced response rates and increased progression. Patients receiving Mitomycin-C and Capecitabine showed the most favorable outcomes.

Conclusion: This analysis underscores the prognostic significance of HPV status and the inclusion of chemotherapy in predicting early treatment response in anal canal squamous cell carcinoma (SCC), particularly within resource-limited settings. The omission of chemotherapy correlated with poorer outcomes. HPV positivity emerged as a potential biomarker for favorable response, suggesting its utility in stratifying treatment intensity. Further prospective studies are needed to validate these findings and guide treatment stratification.

High-Dose-Rate Superficial Brachytherapy after Surgical Excision for the Prevention of Keloid Recurrence

By Dr. Khadija Afzal

Abstract:

Background:

Keloids are benign dermal tumours with high recurrence rates after surgical excision alone. Adjuvant radiotherapy, including high dose rate brachytherapy has shown promising results in reducing recurrence, but optimal dosage and fractionation schedules remain a subject of investigation. This study was conducted to assess the efficacy and safety of postoperative high-dose-rate (HDR) brachytherapy in a cohort of patients.

Material and Methods:

The study was conducted on 24 patients (20 females and 4 males) with an average age of 29.5 years from Jan, 2024 to Jun, 2025. In total, 30 keloids - as six patients had two keloids - were treated with complete surgical excision (keloidectomy) followed by superficial surface mould HDR brachytherapy using Iridium -192 sourcce and a custom-fabricated applicator of embedded catheters. The customised applicator was placed on the skin to match the area of surgical wound. The majority of keloids were located on the External Ear i.e. pinna (10) and ear lobe (11), followed by on Chest (8) and neck (1). The treatment plan was made using Oncentra software on acquired CT dataset. A total dose of 10 Gy in 1 fraction for ear lobe and

18gy in 3 fractions (6 Gy per fraction) to lesions in other areas was delivered within 24 hours of surgery. The primary endpoint was local control (recurrence-free survival), and secondary endpoints included cosmetic outcomes and treatment-related toxicities (scored via CTCAE criteria). Based on treatment timing the follow up duration in the study ranged from 6 to 23 months.

Results:

With a median follow-up of about 13 months, there were no recurrences reported. Cosmetic outcomes were rated as excellent or good in 79% of patients treated. The only side effect observed was Grade 1 acute radiation dermatitis in 54% patients, while no Grade 3 or higher acute or late toxicity was observed.

Conclusion:

Our institutional experience suggests that the adjuvant brachytherapy regimens (10Gy single fraction for earlobe and 18Gy/3fractions elsewhere) lead to excellent short to midterm local control with minimal toxicity.

Fig. Customized applicator being used to treat the neck keloid

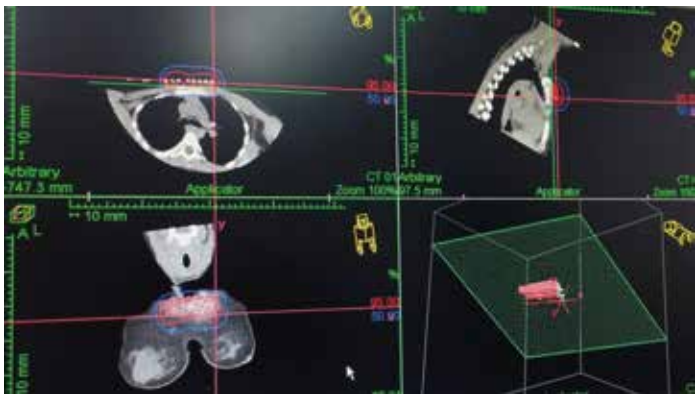


Fig. Treatment plan for the superficial HDR brachytherapy

Impact of Radiotherapy Machine Downtime on Patient Outcomes and Workflow Efficiency

By Dr. Mohtasham Shaikh

Abstract:

Background

Radiotherapy remains one of the most critical components of modern cancer management, relying on accurate and continuous dose delivery over a planned course of treatment. However, in many hospitals—particularly in resource-limited environments—unplanned interruptions often occur due to equipment malfunction, maintenance delays, or electricity issues. These disruptions not only compromise treatment quality but also contribute to emotional distress among patients and additional workload for healthcare professionals.

Objective

The purpose of this study was to examine how radiotherapy machine downtime affects patient treatment schedules, tumor control outcomes, and psychological well-being. The study also aimed to assess the impact on technologists' workflow, stress levels, and overall service delivery.

Methods

Data were collected from patients who experienced delays caused by machine breakdowns, along with responses from radiotherapy technologists working in a public-sector hospital. Key parameters included duration of treatment interruption, tumor location, prescribed radiation dose, and patient-reported anxiety levels. A cross-sectional survey among technologists evaluated machine failure frequency, backlog management, and communication challenges. Literature findings were reviewed to compare the local impact with broader evidence.

Results

Frequent downtime resulted in treatment delays ranging from 1 to 10 days. Interruptions had a noticeable negative effect on treatment outcomes, particularly in cancers of the head and neck, cervix, and breast, where continuous fractionation is crucial. Extended gaps were linked to reduced tumor control probability and higher risk of tumor regrowth. Patients frequently reported anxiety and fear of disease progression during delays.

From the technologists' viewpoint, machine downtime led to heavy workloads once treatments resumed, difficulties in rescheduling patients, and increased emotional stress. Communication gaps and patient dissatisfaction were also observed.

Conclusion
Radiotherapy machine downtime has significant implications for both clinical outcomes and workflow efficiency. Consistent preventive maintenance, reliable technical support, and effective communication between staff and patients are essential to reduce treatment gaps. Establishing backup systems and clear contingency plans can improve operational stability and support better patient care in low-resource radiotherapy centers.

Keywords:
Radiotherapy, Machine downtime, Treatment interruption, Workflow management, Tumor control, Patient anxiety, Technologist stress, Low-resource settings.

Cancer burden in the Northern Pakistan: Emerging trends, Demographics and challenges in the Oncology Care.

By Dr. Paras Abbas Ghandalo

Abstract:

Background:
Cancer has become a growing health concern in Pakistan, and the situation in Gilgit-Baltistan (GB) is particularly challenging. The region's mountainous geography, limited healthcare infrastructure, and scattered population make timely diagnosis and treatment very difficult. Although there are no regional cancer registries or large-scale studies from GB, data from our hospital provide valuable insight into the types of cancers being seen and the challenges faced by both patients and healthcare providers.

Objective:
To present our hospital's experience in assessing the cancer burden in Gilgit-Baltistan, identify the most common malignancies and demographic trends, and discuss the major challenges and ongoing efforts in delivering effective oncology care within the region's limited resource setting.

Methods:
A retrospective review of our hospital's cancer data was analyzed cases by type, gender, age, and stage at diagnosis. These findings were supplemented by clinical observations and experience from daily oncology practice in GB.

Findings:
Our hospital data indicate that breast, gastrointestinal (GI), and lung cancers are the three most common malignancies seen in Gilgit-Baltistan. Breast cancer remains the leading cancer among women, most often detected at advanced stages due to limited awareness about early warning signs such as breast lumps, nipple discharge, or changes in breast shape or skin texture. Cultural barriers and lack of education further delay medical consultation.

Gastrointestinal cancers, particularly colorectal and gastric, are increasingly reported among both men and women. This trend may be related to dietary changes, low fiber intake, and limited knowledge about key symptoms like persistent abdominal pain, changes in bowel habits, or unexplained weight loss.

Lung cancer continues to be the most frequent malignancy among men, commonly associated with tobacco use, exposure to wood smoke, and delayed recognition of symptoms such as chronic cough, breathlessness, or chest pain. In addition, prostate cancer, skin malignancies, and lymphomas are also observed with notable frequency. There are also rare presentations of cancers, including uncommon soft-tissue tumors, reflecting the diverse but under-documented cancer landscape of the region.

Most patients present between 35 and 55 years of age, and the majority are diagnosed at advanced stages (III or IV). Late presentation is largely due to low awareness of cancer symptoms, long travel distances, and limited diagnostic facilities. These factors together highlight the urgent need for community education and early detection efforts in Gilgit-Baltistan.

Conclusion:
Our hospital's experience reflects both the seriousness of the cancer problem in Gilgit-Baltistan and the determination of local healthcare providers working under challenging conditions. Despite limited resources and difficult geography, our team has taken a proactive approach, organizing community awareness sessions, early detection activities, and outreach programs aimed at improving understanding of cancer symptoms and encouraging timely medical consultation. These initiatives have already shown positive results and demonstrate that meaningful progress is possible even in remote, resource-constrained regions. Sustained investment in diagnostic facilities, awareness campaigns, and community-based cancer education will be essential to curb the growing cancer burden and improve outcomes for patients in Gilgit-Baltistan.

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Rare presentation of spinal cord compression secondary to extramedullary hematopoiesis in a patient with sickle cell disease

By Dr. Syeda Sara Tajammul

Abstract:

Introduction

Extramedullary haematopoiesis (EMH) is the abnormal formation of blood cells outside the bone marrow, occurring as a compensatory response to insufficient or increased destruction the blood cell, such as in haemolytic disorders like sickle cell disease (SCD). In SCD, sickled red cells cause haemolysis and chronic anemia, prompting EMH. Spinal cord compression (SCC) due to epidural EMH is an exceptionally rare but serious complication, presenting with back pain, neurological deficits, and potential paralysis. Prompt diagnosis, best achieved with MRI spine is critical to prevent irreversible damage. Management typically includes red cell transfusions, radiotherapy, surgery, and systemic treatments (steroids, hydroxyurea). Radiotherapy is particularly effective due to the radiosensitive nature of hematopoietic tissue, offering good outcomes with minimal toxicity.

Case Discussion

A 43-year-old man with homozygous sickle cell anemia (Hb SS) complicated by extramedullary haematopoiesis (EMH) and cirrhosis from sickle cell hepatopathy developed progressive weakness, constipation, and urinary retention. MRI revealed multiple extradural lesions from D9–L1 causing spinal cord compression (Figure 1), consistent with EMH. Due to contraindications for transfusion (chronic liver disease, iron overload) and inoperability, he was treated with palliative radiotherapy to a dose of 18 Gy in 10 fractions by VMAT technique (Figure 2). He exhibited clinical improvement in bladder and bowel function but continued to have trouble walking. MRI scan performed post-radiotherapy at 3 months showed stable disease with a slight reduction in the size, enhancement, and mass effect of the extradural spinal lesions in the lower spine. He remained under the care of the clinical haematology team for ongoing management of sickle cell disease but unfortunately, he could not survive and expired after 6 months due to the sickle cell disease related complications.

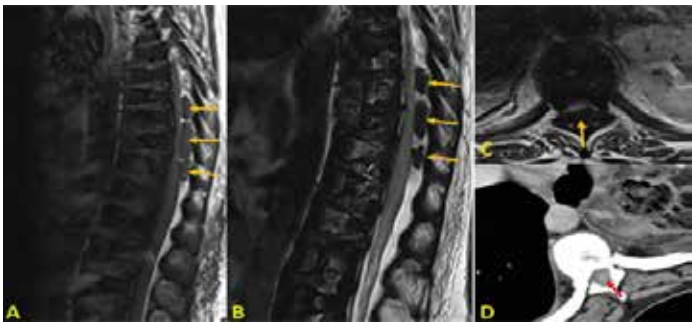

Figure 1: T1 and T2W sagittal and T2W axial images (A, B, C, D) of dorsal spine shows multiple well defined posterior extradural lesions (yellow arrows) within the spinal canal extending from T9 to L1 vertebral levels. These lesions causing significant compression of the spinal cord at T9 to L1 levels from posteriorly

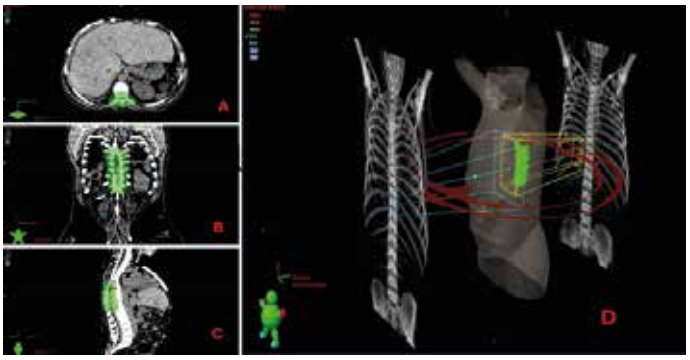

Figure 2: Radiotherapy treatment planning axial, coronal and sagittal CT -images showing targets and radiation dose clouds at 95% isodose level (A, B, C). 3-D representation of room eye view of the target and beam geometry by VMAT technique. (D)

Conclusion

The optimal treatment for spinal cord compression due to extramedullary haematopoiesis (EMH) in sickle cell disease remains unclear, as current knowledge is largely extrapolated from other hematologic disorders like thalassemia. Further research focused on this context is needed. Low-dose radiotherapy appears to be an effective option, and multidisciplinary collaboration is crucial to improving management and outcomes.

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Assessment of Exclusive Hypo-fractionated Post-Mastectomy Radiation in Patients with Locally Advanced Breast Cancer

By Dr. Hiba Siddiqui

Abstract:

Introduction:

Breast cancer has a relatively low α/β ratio, estimated around 3–4 Gy. This suggests a heightened sensitivity to larger fraction sizes, thereby providing a strong radiobiological rationale for hypo-fractionation. The objective of this study is to evaluate whether a hypo-fractionated regimen of 43.5 Gy in 15 fractions (2.9 Gy/Fr) is clinically and dosimetrically equivalent to the conventional regimen of 50 Gy in 25 fractions, based on the α/β ratio of 4 Gy.

Methodology:

This is a retrospective study including locally advanced breast cancer patients treated between 2022 and 2025 at our institution. Inclusion criteria were age > 18 years, who had undergone mastectomy and had primary breast carcinoma stage T2–4 or N1-N2 disease. Patients with incomplete treatment records or follow-up data were excluded from the analysis.

Results:

A total of 45 locally advanced breast cancer patients were included in the analysis. The mean age was 55.5 years. The majority had stage II-B disease (55.5%), followed by stage III (44.4%). The 3D CRT technique was used in 30 patients (65.2%). The mean heart dose was 6.0 Gy. The ipsilateral mean lung dose was 13.6 Gy, and the ipsilateral lung V20 was 27.6%. After radiation, 26 patients (56.5%) developed grade 2 dermatitis. No cases of radiation pneumonitis were observed at the 6-week follow-up.

Conclusion:

The use of the post-mastectomy radiotherapy regimen of 43.5 Gy in 15 fractions was well tolerated, with acceptable toxicity and dosimetric parameters. These findings suggest that exclusive hypofractionation may serve as a safe and effective alternative to conventional fractionation in post-mastectomy breast cancer patients, particularly in settings where treatment efficiency and resource optimization are essential.

Determination Of The Mean Dose Of Thyroid in 3dcrt Of Breast Cancer

By Dr. Jasim Muzaffar

Abstract:

INTRODUCTION:

Breast cancer is the most commonly diagnosed malignancy among women in Western countries and accounts for over 25% of cancers diagnosed in women worldwide[1]. Approximately one in eight women has a lifetime risk of developing this malignancy. It accounts for 7% of all cancer-related deaths and 15% of female cancerrelated deaths[2]. The majority of cases are sporadic, with only about 5% attributable to known genetic mutations[3],. Breast cancer remains a major cause of morbidity and mortality across numerous developing nations, including Pakistan. An analysis of six major Pakistani cancer registries revealed that breast cancer was the most common malignancy, accounting for 21.4% of all cancer cases and 38.8% of female cases5. Breast cancer typically presents as a palpable lump. With early screening and mammography subclinical disease can be detected earlier. Earlier diagnosis has led to better outcomes and more treatment choices for breast cancer. In recent years, management has changed significantly, with treatment options such as surgery, chemotherapy, radiotherapy, and hormonal therapy selected according to the Tumour, Node, Metastasis (TNM) stage6. Historically, radical mastectomy with axillary lymph node dissection was the standard treatment, but it has been largely replaced by breast-conserving strategies like wide local excision with sentinel lymph node biopsy and adjuvant radiotherapy, which provide equivalent survival and minimize morbidity7,8.

The thyroid gland is highly sensitive to ionising radiation, which can cause a range of dysfunctions, with risk increasing with dose. Radiation-induced thyroid disorders include hypothyroidism, thyroiditis, Graves' disease, adenomas, multinodular goitre, and malignant transformation9. High-dose irradiation, whether external or internal, is strongly linked to hypothyroidism and, less commonly, Graves' hyperthyroidism10. Adjacent organs such as the heart, lungs, contralateral breast, brachial plexus, thyroid, spinal cord, skin, and oesophagus are frequently exposed to ionizing radiation during breast cancer radiation therapy11. Previous meta-analyses have identified the prevalence of hypothyroidism in patients receiving breast radiotherapy.

A systematic review of five studies involving 478 patients reported a significant post-treatment rise in TSH, hypothyroidism being the most common dysfunction, highlighting the need to recognise the thyroid as an OAR in breast cancer radiotherapy12. Another meta-analysis of 20 cohort studies found that breast cancer survivors had a significantly higher risk of hypothyroidism than those without breast cancer13. These findings highlight the importance of including the thyroid as an OAR in radiotherapy planning and post-treatment monitoring to minimise long-term complications.

Modern radiotherapy techniques reduce risks with more individualised and less toxic treatments. Threedimensional conformal radiotherapy (3DCRT) is widely used, offering improved dose conformity and better sparing of normal tissues compared to earlier methods. It remains standard for hypofractionated whole breast irradiation and post-mastectomy chest wall treatment14.

Pakistan's radiotherapy infrastructure is limited despite a high patient load. Most centres rely on 3DCRT. National dosimetric data are lacking, and no formal thyroid protection guidelines exist for breast radiotherapy. This study aimed to quantify the mean thyroid dose during 3DCRT in non-metastatic breast cancer patients, with the goal of reducing radiation-induced thyroid dysfunction and contributing baseline national data to international literature.

METHODS

This study was conducted over a six-month period (July 2024 to January 2025) at the Department of Radiotherapy, Institute of Nuclear Medicine and Oncology (INMOL) Hospital, Lahore, following approval of the study synopsis by the institutional review board. A descriptive cross-sectional design was used, and participants were recruited via non-probability consecutive sampling. Patients were eligible to be enrolled if they had non-metastatic breast cancer defined as disease confined to the breast and/or axillary lymph nodes without evidence of distant metastasis; histopathological confirmation of invasive ductal carcinoma (IDC), invasive lobular carcinoma (ILC), or ductal carcinoma in situ (DCIS); and an Eastern Cooperative Oncology Group (ECOG) performance status of 1 or 2. Exclusion criteria included previous radiotherapy to the head or neck, known thyroid disorders, age over 70 years, history of other malignancies, or refusal to participate.

All participants provided written informed consent and underwent a comprehensive baseline evaluation, which included a detailed clinical history, physical examination, complete blood count, liver and renal function tests, histological tumour biopsy, and radiological staging with contrast-enhanced computed tomography (CT) of the chest, abdomen, and pelvis, as well as whole-body bone scintigraphy. For the purposes of this study, non-metastatic breast cancer was consistently defined as malignancy limited to the breast and/or axillary lymph nodes, with no evidence of distant spread.

3DCRT planning for breast cancer was conducted using a systematic and standardised approach. Patients were positioned supine on a breast board with both arms raised above the head. A planning CT scan was done, extending from the lower jaw to below the diaphragm, to visualise target areas and adjacent organs including the thyroid gland. These images were then imported into the treatment planning system (TPS). Clinical target volumes (CTVs) were calculated for the breast, chest wall, and regional lymph nodes by the TPS. Planning target volumes (PTV) were created by adding a margin to accommodate potential setup uncertainties. OARs, including the thyroid gland, were carefully contoured to monitor and limit radiation exposure. Treatment plans were developed using 3DCRT techniques with tangential and oblique photon beams of 6 MV arranged to adequately cover the PTV while minimising dose to the thyroid, heart, lungs, and contralateral breast. Dose homogeneity was improved by advanced techniques such as field-in-field modulation. The minimum, maximum, and mean thyroid doses were derived from the dose-volume histograms (DVHs) generated by the TPS. The primary dosimetric endpoint was the mean thyroid dose, defined as the mean radiation dose absorbed by the entire thyroid gland. Secondary endpoints included minimum and maximum thyroid doses and referred to the extremes of radiation dose received by any part of the thyroid gland during treatment. These were also derived from the DVH. All treatment plans were reviewed by a multidisciplinary team, and quality assurance checks were conducted prior to the initiation of radiotherapy.

Data were analysed using SPSS version 23.0. Normally distributed quantitative variables such as age and thyroid doses were reported as means with standard deviations, while categorical variables including TNM stage and histological subtype were summarised as frequencies and percentages.

To test for significant association between the mean thyroid dose and normally distributed continuous variables, Pearson's correlation coefficient was used. To test for significant association between the mean thyroid dose and categorical variables, independent samples t-test or ANOVA were employed, as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 32 breast cancer patients were included in the study. The mean age was 55.75 ± 7.48 years. More patients had left-sided (n=17, 53.1%) tumour. The most common histology was invasive ductal carcinoma (n=21, 65.6%) and the most frequently noted TNM stage was IIIA (n=12, 37.5%). 17 (53.1%) patients had ECOG status 1. Mean thyroid volume was 10.01 ± 1.66 cc, suggesting a relatively narrow distribution in anatomical variation across patients. Mean thyroid dose was not found to be significantly associated with age (p=0.31) or thyroid volume (p=0.47). Similarly, significant associations were not found between mean thyroid dose and tumour laterality, TNM stage, histology or ECOG status. Baseline characteristics of the study population are presented in Table I. The analysis of thyroid dose distribution demonstrated that the mean thyroid dose ranged from 22.57 to 29.02 Gy with an average of 25.62 ± 1.62 Gy. The minimum thyroid dose ranged from 2.10 to 9.87 Gy while the maximum thyroid dose exhibited a broader distribution, ranging from 43.05 to 61.11 Gy. Thyroid dose distribution data are presented in Table II.

DISCUSSION

In radiation therapy, OARs refer to healthy tissues and critical structures located near a tumour target that may receive significant radiation exposure during treatment. These organs can develop acute or chronic complications if the dose of the radiation exceeds to levels beyond their tolerance limits. The primary goal of treatment planning is to deliver a therapeutic dose to the tumour while minimizing radiation to OARs, thereby reducing the risk of side effects. Radiation therapy for breast cancer, the thyroid gland is increasingly recognized as an OAR. During breast cancer radiotherapy, the thyroid gland frequently receives substantial scatter radiation due to its anatomical proximity to treatment fields. While 3DCRT has significantly enhanced dose optimisation by allowing more precise targeting of tumour volumes while sparing surrounding normal tissues, specific dose constraints for the thyroid gland remain less well defined, unlike the heart or lungs, for which evidence-based dose thresholds are well established and routinely integrated into treatment planning protocols to minimise toxicity. This gap reflects both a historical under-recognition of the thyroid as a radiosensitive organ in breast cancer radiotherapy and a lack of robust clinical data correlating dose-response relationships with long-term thyroid dysfunction. Consequently, there is a pressing need to standardise thyroid dose constraints in radiotherapy planning to reduce the incidence of radiation-induced hypothyroidism and related sequelae. Estimates from clinical and epidemiological studies indicate that the threshold mean dose of thyroid for radiation-induced hypothyroidism in adults is approximately 26 Gy when delivered in a fractionated schedule. Given the high radiosensitivity of the thyroid and the established threshold for radiation-induced dysfunction, commonly cited in the range of 26–30 Gy, there is increasing recognition of the gland's vulnerability during breast cancer treatment. This estimate arises primarily from head and neck cancer radiotherapy cohorts, where hypothyroidism is a common sequel and it is based on dose–response analyses derived from cohorts undergoing external beam radiotherapy for head and neck malignancies15,16. This value reflects the mean radiation dose to the thyroid associated with a significant increase in the incidence of clinical hypothyroidism.

The present study investigated thyroid radiation exposure in breast cancer patients receiving 3DCRT and demonstrated that the thyroid gland is subject to significant incidental irradiation. This observation reinforces growing concerns regarding the thyroid as an under-recognised OAR during regional irradiation. In our study, the mean thyroid dose was 25.62 (± 1.62 Gy). These levels approach the established 26 Gy threshold known to be associated with radiation-induced hypothyroidism in adults making these levels clinically significant. Our findings are in alignment with various previous studies. In a retrospective analysis Johansen et al. examined thyroid dose distributions in breast cancer patients receiving CT-planned loco-regional radiotherapy at the Norwegian Radium Hospital[17]. Although their reported median thyroid dose (approximately 30 Gy) exceeded the mean dose observed in our study, both studies highlight the substantial unintentional thyroid exposure with standard 3DCRT. Interestingly, Johansen et al. found no significant differences in dose-volume parameters between patients who did and did not develop hypothyroidism; however, they did identify smaller thyroid volume as a risk factor for post-treatment thyroid dysfunction. In contrast, we did not observe a statistically significant association between thyroid volume and mean thyroid dose. This discrepancy may be due to differences in

patient demographics, contouring practices, or sample size. It is also notable that in the Norwegian study, the thyroid was not routinely contoured during initial treatment planning, potentially introducing inaccuracies in retrospective dose estimation.

Thyroid radiation doses in patients treated with 3DCRT versus tomotherapy for breast cancer were compared using a comparative dosimetric analysis [8]. The average mean thyroid dose seen with 3DCRT (28.83 Gy) was considerably greater than the average mean thyroid dose seen with tomography (19.59 Gy), demonstrating that thyroid exposure could be reduced with the use tomogrpahy. Although the study's limited sample size and lack of long-term thyroid function follow-up preclude drawing firm conclusions, their results imply that modern radiation methods like tomotherapy may provide greater thyroid sparing. In our study, we saw lower average mean thyroid dose from 3DCRT (25.62 Gy) vs. this reference study (28.83 Gy), however both trials showed radiation exposure levels close to or beyond 26 Gy, the threshold for hypothyroidism. Significant association between thyroid volume and radiation exposure was not found in either study, implying that factors beyond anatomical variation contribute to thyroid dose heterogeneity.

Similarly, a larger prospective dosimetric study conducted at a tertiary care centre in South India assessed thyroid radiation doses in 131 breast cancer patients receiving 3DCRT following mastectomy or breastconserving surgery[1]. The median mean thyroid dose in that cohort was 20.68 Gy, substantially lower than the average mean thyroid dose seen in our population. In addition, the estimated median thyroid volume in that cohort was 7.4 cc while the mean thyroid volume in our patients was 10.01 cc. This could account for the higher average mean thyroid dose observed in our study. The authors advocated that in light of the higher background prevalence of hypothyroidism in the Indian population, routine thyroid contouring and long-term endocrine surveillance should be conducted in patients undergoing 3DCRT for breast cancer. This recommendation is important because subclinical thyroid dysfunction may remain undetected in the absence of targeted monitoring.

A study investigating thyroid radiation exposure in breast cancer patients receiving post-operative 3DCRT involved retrospective dosimetric analysis of 122 patients all of whom received standard fractionation regimens. CT-based planning with 2 - 5 mm slice thickness was utilised, and the thyroid gland was contoured to assess volume and dose distribution. The results indicated substantial incidental thyroid irradiation, with an average mean dose of thyroid of 22.5 Gy. Importantly, 44% of patients exhibited mean thyroid doses exceeding 26 Gy, a level associated with an elevated risk of hypothyroidism. By contrast, our patients had a slightly higher average mean dose of thyroid (25.62 Gy). In the two studies, mean maximum thyroid doses were similar (54.54 Gy in our studygh and 46.5 Gy in this reference study). Additionally, thyroid volumes in our cohort were lower (mean=10.01 cc) than those reported by Akin et al. (mean=16.7 cc). Taken together, the converging evidence from both studies reinforces the need for considering the thyroid as an OAR for breast radiotherapy, and for incorporating thyroid dose constraints into breast radiotherapy planning protocols. Overall our study findings are consistent with the data reported in the literature which strongly supports inclusion of thyroid as an OAR for breast radiotherapy and routine thyroid monitoring in clinical follow-up protocols.

The principal limitations of our study include its single-centre nature and modest sample size, both of which may constrain the generalizability of the findings. Furthermore, the analysis focused exclusively on dosimetric endpoints, with no prospective follow-up to assess the clinical consequences of thyroid exposure. The lack of thyroid function testing precludes any correlation between radiation dose and biochemical or symptomatic hypothyroidism. These limitations are consistent with challenges reported in similar dosimetric studies, highlighting the need for longitudinal data to better characterise the long-term endocrine impact of regional radiotherapy in breast cancer.

CONCLUSION

Our study findings concur with the growing body of evidence that the thyroid gland is subject to clinically relevant radiation exposure during 3DCRT for breast cancer and should be routinely contoured as an OAR. Additionally, our data supports incorporation of thyroid dose constraints into breast radiotherapy planning protocols. Further research integrating both dosimetric and functional thyroid assessment are needed to guide optimisation of radiotherapy protocols.

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Coexisting Pediatric High-Grade Glioma and T-Cell Lymphoblastic Lymphoma: A Rare Dual Malignancy

By Dr. Ali Haider khan

Abstract:

Introduction:

Pediatric high-grade gliomas are aggressive brain tumors with a generally poor outlook, even when treated with surgery, radiotherapy, and chemotherapy. The occurrence of a high-grade glioma alongside a blood cancer such as T-cell lymphoblastic lymphoma is extremely rare. Reporting such cases is important to help doctors understand how best to diagnose and manage these rare situations.

To date, only a single comparable case has been documented — a seven-year-old with synchronous T-cell lymphoblastic lymphoma and CNS High Grade Glioma without prior irradiation underscoring the extreme rarity of this coexistence and the importance of reporting additional cases to expand the knowledge base and guide management. [1]

Keywords: Pediatric high-grade glioma, T-cell lymphoblastic lymphoma, synchronous malignancy, dual primary cancer, case report

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Case Presentation:

A 10-year-old girl came to us with a two-and-a-half-month history of severe, persistent headaches that did not improve with painkillers. She also had episodes of vomiting. An MRI of the brain showed a large mass (5.5 × 6.2 × 4.2 cm) in the right temporal lobe with swelling and early signs of herniation. She underwent urgent right temporoparietal craniotomy in April 2025, with near-total removal of the tumor. The biopsy confirmed a WHO grade 4 high-grade glioma with a high Ki-67 index.

She was given adjuvant conformal radiotherapy (54 Gy in 30 fractions), which was completed on 7th August 2025. About two weeks later, she developed a firm, mildly tender swelling on the left side of her chest wall measuring about 5 cm. A biopsy confirmed T-cell lymphoblastic lymphoma. She was referred to a tertiary pediatric oncology center for chemotherapy for lymphoma while continuing maintenance temozolomide (100 mg, Days 1–5 every 28 days, 12 cycles planned) for the brain tumor.

Discussion:

Having two different primary cancers at the same time in a child who has not had prior treatment is extremely rare. This situation raises the possibility of an underlying cancer-predisposition syndrome such as Li-Fraumeni syndrome or mismatch repair deficiency, although it might also be coincidental. Treating both cancers together is challenging — treatment must be carefully balanced to control both diseases while avoiding excessive toxicity. Close follow-up with regular imaging and systemic evaluation is important to monitor for new cancers or relapses.

Conclusion:

We report a very rare case of a child with both a high-grade brain tumor and T-cell lymphoblastic lymphoma. This case highlights the need for early diagnosis, prompt tissue confirmation, and close coordination between neurosurgeons, oncologists, and radiation specialists to give the best possible outcome for such complex cases.

Effect of Tumor Stage and Molecular Subtype on 5-Year Overall Survival in Breast Cancer: Single-Centre Cohort

By Dr. Mohammad Abdullah Sahi

Abstract:

Background: Stage and molecular subtype are key prognostic factors in breast cancer, yet 5-year outcomes from low- and middle-income settings are rarely reported. We describe a single-centre cohort indexed at diagnosis, focusing on stage and intrinsic subtype with 5-year overall survival as the primary outcome.

Methods: Retrospective single-centre cohort; biopsy date was set as time-zero. The primary cohort was Stage I–III (curative intent); Stage IV was excluded. Subtypes were divided according to their ER/PR/HER2 status. TNM staging was used to compare overall survival of stage I–II versus stage III. Data cut-off: 12 September 2025. We summarised survival with Kaplan–Meier curves and compared groups with log-rank tests. Adjusted effects were estimated using Cox regression with age and grade as covariables. This interim analysis reports overall survival estimates, with full curves and adjusted models to be shown at presentation.

Results: We analysed 79 patients (median age 46 years). Five-year overall survival was 65%. By stage, overall survival was 82% for Stage I–II and 35% for Stage III. By subtype, overall survival was 74% for HR+/HER2−, 68% for

triple-negative, 50% for HER2-positive, and 27% for unknown. These patterns were preserved after adjustment for age and grade.

Conclusion: In this interim single-centre analysis of curative-intent disease, overall survival separated clearly by stage and showed meaningful differences by subtype. Updated survival curves and adjusted estimates will be presented to inform local quality-improvement and future prospective work.

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RADIATION TECHNOLOGISTS

Conventional vs MR-Linac Workflow: A Radiation Therapist's Perspective

By Dr. Hafsa Zameer

Abstract:

Background:

The integration of magnetic resonance imaging with linear accelerator technology (MR-Linac) has transformed radiotherapy practice by enabling superior soft-tissue visualization and online adaptive planning. Compared with conventional Linac systems, which rely on CT-based simulation and cone-beam CT (CBCT) for setup verification, the MR-Linac allows real-time imaging and plan modification based on daily anatomical changes. This evolution has significantly influenced the workflow and clinical responsibilities of radiation therapists.

Objective:

To compare the conventional Linac and MR-Linac workflows from a radiation therapist's perspective, highlighting differences in imaging, treatment adaptation, and professional responsibilities.

Method:

A descriptive workflow comparison was conducted, outlining each treatment phase—from simulation to treatment delivery. Key differences were analyzed regarding image acquisition, patient positioning, plan verification, adaptation, and quality assurance.

Results:

Conventional Linac workflows follow an offline planning process with fixed treatment plans and limited daily variation. MR-Linac workflows incorporate daily MR imaging, online contour review, adaptive plan optimization, and real-time motion monitoring. These steps increase treatment time but enhance target precision and organ-at-risk sparing. Radiation therapists have expanded roles in MR image assessment, adaptive decision support, MR safety, and patient communication.

Conclusions:

The MR-Linac introduces a dynamic, adaptive workflow that elevates treatment precision and expands the radiation therapist's role. As frontline professionals, therapists are integral to the success of MR-guided adaptive radiotherapy, requiring ongoing training, multidisciplinary collaboration, and workflow refinement to ensure safe and efficient clinical implementation.

Paediatric Radiotherapy solutions in low resource settings: A case study in Zimbabwe's context

By Dr. Laverne Rufaro Hamadziripi-Sober

Abstract:

CLINICAL DATA

A four-year-old female patient presented with a posterior fossa tumour with a year history of postprandial vomiting, headaches, partial vision loss and inability to walk. A biopsy revealed it to be classic medulloblastoma. A VP shunt was inserted and mass excision was performed to debulk the tumour.

IMAGING AND PATHOLOGY

Post craniotomy, an MRI and CT scan revealed a residual tumour measuring (1.6x 3.2 x 2.0) cm with no leptomeningeal or spinal drop lesions. The patient was then referred for chemo-radiotherapy. A CT scan was done for treatment planning. The patient was positioned supine using a vacuum bag, headrest, and beam-directional shell for immobilization, ensuring precision during treatment. Whole-body images were obtained with 5mm slices from vault of the skull to the bottom of the sacrum, with 3mm slices throughout the primary tumour.

CLINICAL COURSE

3D-Conformal radiotherapy commenced one month post-surgery and included craniospinal irradiation using 2 parallel opposed cranial fields and one direct posterior field to the spine (23.4 Gy in 13 fractions) followed by a posterior fossa boost (30.6 Gy in 17 fractions), totalling 54 Gy. Treatment employed multi-leaf collimators and weekly field feathering to optimize dose distribution and minimize toxicity. Dexamethasone was used to cater for vasogenic oedema. The patient was able to complete treatment without severe late effects and with a single interruption. Reactions noted were erythema, vasogenic oedema and fatigue, these resolved post treatment and the patient since regained the ability to walk

DISCUSSION

The patient showed significant clinical improvement, including regaining ability to walk, indicating effective tumour control, neurological recovery and reduced treatment-toxicity. This case shows the importance of timely, precise radiotherapy and

supportive care in achieving favourable outcomes in low-resource countries when treating paediatric brain tumours

Real-Time MRI-Guided Tumor Tracking in Radiotherapy: Early Clinical Experience with MR-Linac in DUHS.

By Dr. Muhammad Uzair Memon

Abstract:

Background:

Tumor motion during radiotherapy compromises precision and normal tissue sparing. Magnetic Resonance Linear Accelerator (MR-Linac) systems combine MRI with radiation delivery, enabling real-time visualization and adaptive planning.

Objective:

To evaluate the feasibility and clinical benefits of real-time MRI-guided tumor tracking using MR-Linac in Pakistan.

Methods:

From October 2024 to May 2025, 40 patients with lung, prostate, breast, and pelvic tumors were treated using MR-Linac at Dow University of Health Sciences Karachi. Continuous MRI monitored target motion during beam delivery. Online plan adaptation was performed when displacement exceeded defined thresholds. Setup time, motion magnitude, adaptation frequency, and acute toxicity were analyzed.

Results:

Real-time MRI provided continuous visualization in all patients. Mean intrafraction displacement was 3.2 mm, allowing accurate gating and reduced margins. Adaptive planning was applied in 35% of fractions, reducing dose to nearby organs. All treatments were completed without major interruptions, and no ≥Grade 2 acute toxicities were observed.

Conclusion:

MR-Linac enabled precise real-time tumor tracking and adaptive planning, improving treatment accuracy and safety. This represents one of the first clinical experiences of MRI-guided radiotherapy in Pakistan, demonstrating its feasibility and clinical value.

Keywords: MR-Linac, MRI-guided radiotherapy, adaptive therapy, real-time tracking, Pakistan

Emerging Advances Shaping the Future of Radiotherapy: AI Integration, Adaptive Imaging, and Particle-Based Precision

By Mr. Asif Rauf, Dr. Khalid Iqbal, Mr. Khurram Khan

Abstract:

Introduction

Radiotherapy is entering a new era shaped by the integration of artificial intelligence (AI), adaptive imaging, and precision particle delivery, fundamentally advancing its role in personalized oncology. These innovations aim to overcome limitations of conventional static planning by enhancing accuracy, biological relevance, and real-time adaptability.

Methods

This review synthesizes emerging technological developments in adaptive radiotherapy (ART), image-guided systems, and proton/heavy-ion therapy through critical evaluation of recent literature. Key focus areas include AI-enabled segmentation, dose prediction and online plan adaptation; MR-LINAC and PET-LINAC–based functional imaging for biologically guided dose modulation; and particle therapy innovations such as AI-assisted range prediction, Monte Carlo dose computation, and LET-optimized planning. Additional modalities such as FLASH radiotherapy, spatially fractionated techniques, theranostics, and radioimmunotherapy are also examined. The review consolidates these developments to provide a comprehensive reference for clinicians, trainees, and researchers.

Results

AI-driven ART demonstrated improved target conformity, reduced margins, and decreased normal tissue toxicity across multiple clinical applications. Advanced IGRT platforms enhanced real-time tumor visualization and supported biologically adaptive dose delivery. Proton and heavy-ion therapies demonstrated substantial gains in dose localization and treatment robustness through integration of AI-assisted optimization techniques. Emerging modalities showed strong potential to further enhance therapeutic precision by combining imaging, radiobiology, and machine learning innovations.

Conclusion

Collectively, these developments highlight a major paradigm shift toward intelligent, adaptive, and data-centric radiotherapy. The convergence of physics, engineering, biology, and informatics is accelerating the transition to highly

personalized cancer treatment. Although these technologies remain at varying stages of clinical adoption and validation, their combined progress is poised to redefine the therapeutic boundaries and clinical capabilities of radiation oncology in the coming decade.

Impact of Radiotherapy Machine Downtime on Patient Outcomes and Workflow Efficiency

By Dr. Mohtasham Shaikh Ud-din

Abstract:

Background

Radiotherapy remains one of the most critical components of modern cancer management, relying on accurate and continuous dose delivery over a planned course of treatment. However, in many hospitals—particularly in resource-limited environments—unplanned interruptions often occur due to equipment malfunction, maintenance delays, or electricity issues. These disruptions not only compromise treatment quality but also contribute to emotional distress among patients and additional workload for healthcare professionals.

Objective

The purpose of this study was to examine how radiotherapy machine downtime affects patient treatment schedules, tumor control outcomes, and psychological well-being. The study also aimed to assess the impact on technologists' workflow, stress levels, and overall service delivery.

Methods

Data were collected from patients who experienced delays caused by machine breakdowns, along with responses from radiotherapy technologists working in a public-sector hospital. Key parameters included duration of treatment interruption, tumor location, prescribed radiation dose, and patient-reported anxiety levels. A cross-sectional survey among technologists evaluated machine failure frequency, backlog management, and communication challenges. Literature findings were reviewed to compare the local impact with broader evidence.

Results

Frequent downtime resulted in treatment delays ranging from 1 to 10 days. Interruptions had a noticeable negative effect on treatment outcomes, particularly in cancers of the head and neck, cervix, and breast, where continuous fractionation is crucial. Extended gaps were linked to reduced tumor control probability and higher risk of tumor regrowth. Patients frequently reported anxiety and fear of disease progression during delays.

From the technologists' viewpoint, machine downtime led to heavy workloads once treatments resumed, difficulties in rescheduling patients, and increased emotional stress. Communication gaps and patient dissatisfaction were also observed.

Conclusion

Radiotherapy machine downtime has significant implications for both clinical outcomes and workflow efficiency. Consistent preventive maintenance, reliable technical support, and effective communication between staff and patients are essential to reduce treatment gaps. Establishing backup systems and clear contingency plans can improve operational stability and support better patient care in low-resource radiotherapy centers.

Keywords:

Radiotherapy, Machine downtime, Treatment interruption, Workflow management, Tumor control, Patient anxiety, Technologist stress, Low-resource settings.

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MEDICAL PHYSICS

The Role of Artificial Intelligence in Radiation Therapy: Enhancing Precision and Efficiency

By Kashif Mahmood (Medical Physicist)

Abstract:

The integration of Artificial Intelligence (AI) in radiation therapy is transforming cancer treatment by enhancing precision, efficiency, and patient outcomes. AI-driven solutions optimize various stages of treatment, from contouring and planning to quality assurance and adaptive therapy. This paper explores the current applications of AI in radiation oncology, its benefits, limitations, and future potential.

Introduction: Radiation therapy plays a crucial role in cancer treatment, requiring high precision to maximize tumor control while minimizing damage to healthy tissues. The complexity of treatment planning and delivery presents challenges that AI can help address. This paper examines AI's impact on key areas of radiation therapy.

AI in Imaging and Contouring: AI-powered image segmentation and auto-contouring streamline target delineation, reducing inter-observer variability and saving time. Deep learning models have demonstrated accuracy comparable to expert clinicians, ensuring consistency in defining target volumes and organs at risk (OARs).

AI in Treatment Planning: Machine learning algorithms facilitate automated treatment planning by optimizing dose distribution, beam arrangements, and adaptive planning. AI-driven systems can analyze vast datasets to propose optimal plans, reducing planning time while maintaining treatment quality.

AI in Quality Assurance and Workflow Optimization: AI enhances quality assurance (QA) by detecting anomalies in treatment plans and machine performance. Predictive analytics and real-time monitoring improve treatment safety, reducing the likelihood of errors. Workflow automation also optimizes resource utilization, improving patient throughput.

Challenges and Ethical Considerations: Despite its advantages, AI implementation in radiation therapy faces challenges such as data privacy concerns, interpretability of AI models, and the need for regulatory approval. Human oversight remains essential to validate AI-driven decisions.

Future Prospects: With continued advancements, AI has the potential to drive personalized radiation therapy by integrating multi-modal data for precision treatment. AI-assisted real-time adaptive radiotherapy and predictive outcome modeling could revolutionize cancer care.

Conclusion: AI is reshaping radiation therapy by enhancing accuracy, efficiency, and patient safety. While challenges exist, its integration into clinical practice is steadily progressing, promising improved outcomes and streamlined workflows. Collaboration between AI experts, medical physicists, and clinicians is key to unlocking AI's full potential in radiation oncology.

Keywords: Artificial Intelligence, Radiation Therapy, Machine Learning, Treatment Planning, Adaptive Radiotherapy, Quality Assurance

By Muhammad Anas (Medical Physicist)

Abstract:

SPECT/CT Gamma cameras play a pivotal role in nuclear medicine by detecting gamma radiation emitted by radiopharmaceuticals injected in the human body. Traditional SPECT/CT gamma cameras use NaI (TI), scintillation crystals and photomultiplier tubes; while these technologies are effective, they do have some downsides when it comes to energy resolution and other effective parameters. On the other hand, Cadmium Zinc Telluride (CZT) detectors are solid-state devices that provide better spatial resolution, energy resolution, and are more compact due to their ability to convert energy directly and their pixelated design.

This thesis discusses the acceptance testing and commissioning process based on CZT technology. I carried out a thorough set of acceptance tests—including uniformity, spatial resolution, energy resolution, and sensitivity—and other acceptance tests according to standardized protocols. All the tests produced excellent results, confirming that the system is ready for clinical use. Furthermore, we conducted a comparative imaging study between a traditional scintillation SPCT/CT gamma camera and the CZT SPEC/T system for image optimization. By measuring the contrast-to-noise ratio (CNR) as a quantitative metric, the CZT camera clearly outperformed its conventional counterpart.

Another key element of this study was optimizing scan time through time reduction software. This approach kept image quality intact while significantly decreasing acquisition time

through reconstruction, which improves both patient comfort and departmental efficiency. In summary, this work underscores the clinical benefits of CZT technology and reinforces its potential for integration into contemporary nuclear medicine imaging practices.

Dosimetric Comparison of Eclipse and Monaco Clinical Treatment Planning System for CSI Using VMAT Technique

By Usman Maqsood (Medical Physicist)

Abstract:

Introduction: Treatment planning of craniospinal irradiation (CSI) is a challenging task due to its large, irregular treatment volume and proximity to critical structures known as organs at risk (OARs). This study is focused on the dosimetric comparison of treatment plans generated by the two most commonly employed treatment planning system (TPS) Eclipse planning system and the Monaco planning system using the volumetric modulated arc therapy (VMAT) technique. The objective is to assess the effectiveness and efficiency of treatment plans generated by two different TPS, incorporating two distinct algorithms for calculations.

Methods: Treatment planning was performed on the Eclipse treatment planning system (version 15.6) employing an Anisotropic Analytical Algorithm (AAA) and on the Monaco treatment planning system (version 6.1.2.0) incorporating the Monte Carlo (MC) algorithm. Treatment plans on both treatment planning systems were generated by using the auto feathering technique with no junction shift and multiple arcs. For comparison of target volumes dosimetric parameters indices has been chosen such as 1) Homogeneity index 2) Conformity index and 3) Monitor Units and for doses to OARs maximum and mean dose has been analyzed.

Results: The result, demonstrated, revealed a slight dosimetric difference in the obtained dosimetric indices. Both treatment planning systems showed acceptable target volume coverage of 95% for all treatment plans. Maximum dose to target volumes or Hot spots is also acceptable for all treatment plans. In this study, HI values for all treatment plans are acceptable, but comparatively, Monaco showed a better homogeneity for all patients' treatment plans. CI values for all treatment plans for both systems are satisfactory. However, again comparatively, Monaco shows better conformity for all treatment plans. Monitor units are the only indices in this study that show a significant difference in all treatment plans for all six patients. Eclipse shows much lower MUs (Average 1500) than Monaco (Average 2600). It is due to the different algorithms that work behind Eclipse and Monaco. Monaco utilizes the Monte Carlo (MC) algorithm, which is more complex and advance as compare to Eclipse which utilize, Anisotropic Analytical Algorithm (AAA).

Conclusion: A deep assessment of all six patient treatment plans demonstrated that both TPS achieved clinically acceptable results regarding target volume coverage and doses received by each patient. Assessment of dosimetric indices revealed slight yet notable differences. Treatment plans generated in Monaco TPS demonstrated better quality regarding homogeneity and conformity. Eclipse also shows satisfactory treatment plan quality, but Monaco exhibits a marginal edge. A significant difference was observed in monitor units (MUs), as Monaco demanded considerably higher MUs than Eclipse. This significant difference is due to each TPS's two distinct dose calculation algorithms.

Optimized Three-Dimensional Conformal Radiotherapy: Approaching Intensity-Modulated Radiotherapy Precision in Glioblastoma

By Sunnia Shafiq (Medical Physicist)

Abstract:

Objective:This study aimed to determine whether an optimized Three-Dimensional Conformal Radiotherapy (3D-CRT) technique could achieve dosimetric outcomes comparable to Intensity-Modulated Radiotherapy (IMRT) in patients with grade IV glioblastoma.

Materials and Methods: Treatment plans of 127 patients with grade IV glioblastoma, treated between January 2020 and September 2025, were retrospectively analyzed. Each case was planned using both 3D-CRT and IMRT techniques. The 3D-CRT plans incorporated three to five fields with dynamic wedges and field-in-field modulation, while IMRT utilized seven fields with equidistant beam angles. Planning objectives required that 97% of the prescribed dose cover 98% of the Planning Target Volume (PTV). Dosimetric parameters, including homogeneity index (HI), conformity index (CI), and organ-at-risk (OAR) doses, were compared.

Results: Target coverage was comparable between both

techniques. IMRT demonstrated superior dose homogeneity (HI: 0.053 vs. 0.097) and conformity (CI: 1.187 vs. 1.663) compared to 3D-CRT. It provided enhanced sparing of normal brain tissue and nearby organs, except for the contralateral eye. However, IMRT required longer delivery times and higher monitor units (MUs). Optimized 3D-CRT resulted in slightly increased low-dose exposure to normal brain regions.

Conclusion: While IMRT remains superior in conformity, homogeneity, and OAR protection, optimized 3D-CRT can approximate its performance for tumors away from critical structures. This approach may serve as a feasible alternative in resource-limited settings where advanced modulation techniques are unavailable.

Patient Specific Quality Assurance For IMRT & VMAT Treatment Plans Using 3D Patient QA Measurement Device

By Khadija Ozair (Medical Physicist)

Abstract:

With the continuous advancement of radiotherapy techniques such as IntensityModulated Radiation Therapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT), ensuring accurate and precise dose delivery remains a key factor in achieving optimal clinical outcomes. This study aims to evaluate the accuracy and reliability of the Dolphin®-Compass 3D dosimetry system for patient-specific quality assurance (PSQA) in prostate cancer treatment plans. Ten prostate cases will be selected and verified using the Dolphin® Phantom mounted on the Versa-HD Linear Accelerator. IMRT and VMAT plans will be generated in the Monaco® Treatment Planning System (version 6.1.3) utilizing 6 MV photon beams. The Compass® software will perform a comprehensive 3D gamma evaluation to compare measured and calculated dose distributions. It is anticipated that the results will demonstrate excellent gamma pass rates and a strong correlation between measured and planned doses. The outcomes of this study are expected to validate the effectiveness of the Dolphin®-Compass system as a robust, efficient, and accurate QA tool, ensuring both geometric and dosimetric precision before patient treatment. Ultimately, this work will highlight the importance of advanced 3D PSQA systems in enhancing treatment safety and maintaining the high standards required for modern radiotherapy practice.

Keywords:

IMRT, VMAT, PSQA, Dolphin® Phantom, 3D Dosimetry, Prostate Cancer

Development and Preliminary Evaluation of a Cost-Effective Modular Motion-Simulating QA Phantom for Assessing Dose Delivery Accuracy in External Beam Radiotherapy

By Najam Haider (Medical Physicist)

Abstract:

Introduction: Patient and organ motion during radiotherapy can lead to discrepancies between planned and delivered dose distributions, particularly in sites affected by respiratory motion. Commercial motion phantoms are often expensive and limited to specific systems, restricting their use in routine QA. To address this limitation, a costeffective, modular motion-simulating QA phantom was developed using locally available materials to quantify the dosimetric impact of motion under controlled conditions.

Methodology: A phantom was fabricated using stacked acrylic slabs mounted on a programmable motorized platform capable of linear displacements of up to ±10 mm with adjustable frequency to simulate patient-like motion. Dose measurements were performed on an Elekta Versa HD linear accelerator using a Farmer-type ionization chamber under both static and dynamic setups. Chamber readings were compared to treatment planning system (TPS) calculated doses to evaluate motion-induced deviations. Reproducibility and baseline consistency were verified through repeated measurements.

Results: Preliminary measurements demonstrated measurable dose reductions in dynamic setups compared to static conditions, with differences ranging between 3–6% in high-dose-gradient regions for motion amplitudes of ±10 mm. The phantom motion was mechanically stable with reproducibility within ±1 mm per cycle. The observed trends were consistent with previous studies, which reported 3–7% dose variations under similar motion amplitudes. Static baseline readings showed variation within 1%, validating setup accuracy and chamber stability.

Conclusion: The developed phantom provides a simple, reproducible, and cost-effective platform for evaluating the dosimetric effects of motion in external beam radiotherapy. The system demonstrated good agreement with literature-reported data and offers practical applicability for routine QA and training. The design can be further adapted for integration with respiratory gating or adaptive planning verifications, supporting advanced motion management validation in clinical environments.

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Dosimetric Evaluation of Daily Adaptive Radiotherapy Using MR-Linac: A Step toward Precision Treatment

By Suneel Kumar (Medical Physicist)

Abstract:

Magnetic Resonance-guided Linear Accelerators (MR-Linac) have revolutionized radiotherapy by enabling real-time soft tissue visualization and daily adaptive planning. Adaptive radiotherapy performed on the daily magnetic resonance imaging (MRI) is an option to improve the treatment quality. In the adapt-to-shape or adapt-to-plan workflow of 1.5-T MR-Linac, the contours of structures are adjust on the basis of patient daily MRI, and the adapted plan is recalculate. This study investigates the dosimetric impact of daily adaptation in MR-guided radiotherapy across a range of tumor sites, focusing on target coverage, organ-at-risk (OAR) sparing, and margin reduction. Compared to conventional non-adaptive plan

Introduction:

The roles of image guidance, adaptive planning, and magnetic resonance imaging (MRI) in radiation therapy have been increasing over the last two decades. Most recently, magnetic resonance (MR)–guided radiation therapy (MRgRT) has provided the opportunity for fractional online adaptive radiotherapy (ART) for patients undergoing radiation therapy. The hybrid RT machines, combining a MR scanner with a RT delivery system, enable soft tissue contrast daily MRI to visualize all anatomical changes during the course of radiotherapy, subsequently, the adaptive planning taking into account changes in target/OAR shape and position can be performed.

Materials and methods:

Thirty patients with tumors located in the abdomen and pelvis underwent daily MR-guided adaptive radiotherapy on a 1.5T MR-Linac system. For each treatment fraction (totaling 450 fractions), an adaptive plan was generated based on daily MRI anatomy and compared with the original non-adaptive reference plan. Dosimetric parameters assessed included planning target volume (PTV) coverage (D95), maximum and mean doses to organs-at-risk (OARs), conformity index (CI), and homogeneity index (HI). Statistical analysis was performed to determine the significance of dosimetric improvements with daily adaptation.

Results:

Daily adaptive plans demonstrated a significant improvement in PTV coverage, with mean D95 increasing by 3.6% compared to non-adaptive plans. OAR doses, particularly to the bladder, rectum, and small bowel, were reduced by an average of 12–18%. Plan conformity improved with the mean CI increasing from 0.71 in non-adaptive plans to 0.82 in adaptive plans, while homogeneity was maintained across all plans. The ability to reduce PTV margins by up to 30% without compromising coverage was noted, highlighting the precision afforded by real-time adaptation.

Conclusion:

The dosimetric evaluation confirms that MR-Linac–based daily adaptive radiotherapy significantly enhances target coverage and spares normal tissues by accounting for daily anatomical variations. This approach supports more precise, personalized radiotherapy, reducing the risk of toxicity and potentially improving clinical outcomes. MR-guided adaptive radiotherapy represents a promising advancement in precision oncology.

Evaluation of Planned and Delivered Dose Discrepancies Using PreciseART in Head and Neck Patients treated on Tomotherapy

By Umer Farooq (Medical Physicist)

Abstract:

A retrospective study is being conducted on head and neck cancer patients using PreciseART, an adaptive radiotherapy tool. The planned doses from the initial treatment plan will be compared with the accumulated and daily delivered doses derived from image registration. Key dosimetric parameters, including D95 and Dmean for target volumes (PTV, CTV) and Dmax, Dmean for OARs (spinal cord, parotid glands, brainstem, etc.), will be evaluated. Statistical analysis will be performed to identify correlations with parameters affecting dose distribution. The study will provide insights into the effects of anatomical changes, daily setup variations, and weight changes on daily dosimetry. The analysis will also aim to predict the number of fractions that can be delivered on the same simulation CT before re-simulation is required in buccal mucosa and nasopharyngeal cases.

Keywords: PreciseART, Tomotherapy, Head and Neck Cancer, Adaptive Radiotherapy

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Evaluation of PSQA results for VMAT plans against AAPM TG-307 criteria at Aga Khan University Hospital

By Labiqua Shayyan (Medical Physicist)

Abstract:

Introduction:

Patient-Specific Quality Assurance (PSQA) plays a crucial role in ensuring accurate dose delivery in radiotherapy, particularly for advanced techniques like Volumetric Modulated Arc Therapy (VMAT). At Aga Khan University Hospital, PSQA is performed for every patient before treatment to maintain precision, accuracy, and patient safety. This study aims to evaluate PSQA results of VMAT treatment plans across different anatomical sites and assess their compliance with the tolerance limits recommended by the AAPM Task Group Report 307.

Methods:

An analysis will be conducted on 100 volumetric modulated arc therapy (VMAT) treatment plans, comprising cases from four anatomical sites: Head and Neck, Breast, Pelvis, and Breast/Chest Wall, with 25 cases selected from each category. Patient-specific quality assurance (PSQA) will be performed using electronic portal imaging devices (EPIDs). The measured dose distributions will be compared with the planned dose distributions using gamma analysis with criteria of 3% dose difference and 2 mm distance-to-agreement. A passing threshold of 95% will be applied, as recommended by the AAPM TG-307.

Results:

It is expected that most VMAT PSQA results will fall within the tolerance limits recommended by AAPM TG-307. Head and Neck and Pelvic plans may show slightly lower gamma pass rates due to higher modulation complexity, whereas Breast and Chest Wall cases are expected to show excellent agreement. These findings are expected to highlight the accuracy and reliability of QA practices at Aga Khan University Hospital.

Conclusion:

Preliminary expectations suggest that the PSQA outcomes for VMAT plans at Aga Khan University Hospital will comply with AAPM TG-307 criteria, reflecting effective quality assurance procedures and accurate dose delivery. Once the full analysis is completed, the results will help establish local QA benchmarks and support continuous improvement in treatment quality and patient safety.

A Low-Cost, In-House Fabricated Phantom for Routine Ultrasound Quality Assurance.

By Zohaib and Waleed Khan (Medical Physicist)

Abstract:

Introduction: This work describes the development and initial validation of a low-cost, in-house quality assurance (QA) phantom for diagnostic ultrasound systems. The phantom was constructed using water filled container, within which a precise grid of nylon wires was embedded. This design allows for the systematic assessment of spatial resolution—differentiated into axial and lateral components—and geometric measurement accuracy.

Purpose: To fabricate and evaluate a cost-effective, In house quality assurance (QA) phantom for the routine testing of ultrasound probe performance, specifically targeting spatial resolution and geometric accuracy.

Material and Methods: A cost-effective ultrasound quality assurance (QA) phantom was developed using a water-filled container with nylon wires arranged in a precise grid pattern. The phantom was evaluated using ultrasound probe on a clinical ultrasound system. Spatial resolution was quantified from the axial and lateral dimensions of point spread functions generated by the wire targets. Geometric accuracy was verified by comparing known physical separations with ultrasound-measured distances. The proposed water-based phantom provides a simple, reproducible, and low-cost alternative for assessing ultrasound system resolution and geometric accuracy in routine QA testing.

Result: The phantom produced high-contrast and well-defined images of the nylon wire targets. Quantitative analysis demonstrated distinct spatial resolution values, with axial resolution measured up to 0.5 mm and lateral resolution slightly lower, as expected. Geometric measurements obtained using the ultrasound system's calipers exhibited excellent accuracy, with a mean deviation of less than 1% from the known physical wire separations.

Conclusion: The water-based nylon wire phantom demonstrated satisfactory performance for evaluating ultrasound spatial resolution and geometric accuracy. Its simple construction, low cost, and reproducibility make it a practical alternative to commercial QA phantoms for routine system quality assurance and training applications.

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THE IMPACT OF BODY CONTOUR AND IMMOBILIZATION DEVICE MODELING ON SKIN AND PTV DOSE IN VMAT PLANS USING ACUROS XB ALGORITHM

By Hassan Ahmed Siddiqui (Medical Physicist)

Abstract:

INTRODUCTION: In modern radiotherapy era immobilization devices are essential for accurate treatment administration, but they also produce attenuation if came in the path of radiation beam. This retrospective study assessed the dosimetric effects of immobilization devices on the skin and tumour using Acuros XB algorithm.

METHOD: Group of Head and Neck patients were selected who have been treated using volumetric modulated arc therapy technique. The body was then re-contoured including all immobilization device (i.e. thermoplastic mask, thermoplastic cushion, neck rest), baseplates and Exact IGRT couch top. The skin structure was defined around the PTV with 3mm margins (1mm extending outside and 2mm extending inside the actual body) to evaluate the skin dose with both normal and extended body contour. The original plan was then recalculated on the extended body contour without re-optimization. The dosimetric impact was evaluated by comparing key dose-volume histogram metrics for PTV (D95%, D105%, D107%) and skin structure (V40,V50,V60).

RESULTS: Significant dosimetric changes were observed. The presence of immobilization devices acted as a bolus, increasing maximum skin dose while compromising the PTV coverage. Significant discrepancies occurred when the immobilization devices were omitted from the model during calculation, leading to an underestimation of skin dose and miscalculation of PTV coverage. This demonstrate that precise modelling of both patient anatomy and treatment hardware is essential for accurate dose calculation with the Acuros XB algorithm.

CONCLUSION: This retrospective study demonstrates that immobilization devices in head and neck radiotherapy have a significant dosimetric impact, acting as an unintended bolus. When these devices and the treatment couch are not included in the dose calculation model using the Acuros XB algorithm, it results in a critical underestimation of skin dose and a miscalculation of PTV coverage. Therefore, for accurate and clinically reliable dose calculations, it is essential to precisely model all setup devices, including immobilization devices, within the treatment planning system.

Dosimetric and Radiobiological Analysis of Early-Stage Breast Radiotherapy Using 3D-CRT, IMRT, VMAT, Hybrid-VMAT, and Hybrid-IMRT Techniques

By Ayesha Asghar (Medical Physicist)

Abstract:

OBJECTIVE:

The objective of this study is to compare and evaluate the dosimetric and radiobiological performance of five radiotherapy techniques — Three-Dimensional Conformal Radiotherapy (3D-CRT), Intensity-Modulated Radiotherapy (IMRT), Volumetric Modulated Arc Therapy (VMAT), Hybrid-IMRT, and Hybrid-VMAT — in the treatment of early-stage breast cancer following breast-conserving surgery. The analysis focused on assessing target coverage, dose homogeneity, conformity, organ-at-risk (OAR) sparing, and radiobiological parameters such as Tumor Control Probability (TCP) and Normal Tissue Complication Probability (NTCP) to identify the most effective and clinically balanced treatment technique.

Methodology:

A total of 15 patients with early-stage breast cancer were retrospectively selected. For each patient, five distinct treatment plans were generated: 3D-CRT, IMRT, VMAT, Hybrid-IMRT, and Hybrid-VMAT.

All plans were created on the same planning CT data using the same dose calculation algorithm used in Eclipse and 6 MV photon beams in the same Treatment Planning System. The prescribed dose was 4256 cGy in 16 fractions to the Planning Target Volume (PTV), ensuring at least 95% of PTV received ≥ 95% of the prescribed dose.

Planning definitions:

- 3D-CRT: Conventional tangential fields field-in-field optimization.
- IMRT: Seven static fields optimized inversely to improve dose uniformity.
- VMAT: Four arcs have used, avoiding contralateral structures.
- Hybrid-IMRT: 60% dose from 3D tangents + 40% IMRT optimization.
- Hybrid-VMAT: 60% dose from tangential fields + 40% VMAT modulation.

Evaluation parameters:

- Target metrics: Dmean, D95, Homogeneity Index (HI), Conformity Index (CI).
- OAR metrics: Heart Dmean, Heart V25Gy, Ipsilateral Lung V20Gy & V5Gy, Contralateral Breast Dmean,

RESULTS:
All five planning techniques achieved acceptable PTV coverage with D95 ≥ 95% of the prescribed dose.
However, significant differences were observed among techniques in dose conformity, homogeneity, and OAR sparing.

- Target volume:
  - IMRT, VMAT, and hybrid techniques showed superior conformity compared with 3D-CRT.
  - The best homogeneity was achieved with Hybrid-IMRT.
  - 3D-CRT demonstrated the least conformity and most heterogeneous dose distribution.
- Organs at risk (OARs):
  - Heart: Mean heart dose are reduced in H-IMRT
  - Ipsilateral lung: V20Gy was above the dose constraints in 3D-CRT, while achieving more in H-IMRT.
  - Contralateral breast: Lowest mean dose was observed in Hybrid-IMRT plans.

CONCLUSIONS:
All five techniques provided clinically acceptable plans for early-stage breast radiotherapy.
However, Hybrid-IMRT demonstrated the best balance between target conformity, dose homogeneity, and OAR sparing.

- 3D-CRT remains simple and efficient but delivers higher cardiac and pulmonary doses.
- IMRT and VMAT provide improved conformity but may increase low-dose exposure and MU.
- Hybrid-IMRT is identified as the optimal approach, combining the dosimetric advantages of IMRT with the delivery efficiency of 3D-CRT, resulting in enhanced heart and lung protection without compromising tumor control.

Patient Specific Quality Assurance For IMRT & VMAT Treatment Plans Using 3D Patient QA Measurement Device

By Khadija Ozair (Medical Physicist)

Abstract:
Introduction: This study evaluates the accuracy of IMRT and VMAT delivery in prostate cancer patients using the advanced Dolphin® Phantom system. The 3D gamma analysis ensures the geometric and dosimetric precision of treatment plans before clinical application. The Dolphin-Compass dosimetry system was tested across various treatment fields, MLC configurations, and complex radiotherapy setups. It demonstrates strong potential as a reliable tool for patient-specific quality assurance in modern radiotherapy techniques. Technological advances in PSQA devices like the Dolphin® system enhance radiation safety and contribute to improved patient outcomes.
Methodology: A retrospective analysis of 10 prostate cancer cases was conducted to assess treatment delivery accuracy. Offline treatment monitoring employed the Dolphin® Phantom affixed to the Versa-HD Linear Accelerator head. Intensitymodulated radiation therapy (IMRT) & Volumetric Modulated Radiation Treatment (VMAT) plans, utilizing 6 MV photon beams & different beam angles, were orchestrated using the Monaco® Treatment Planning System (version 6.1.3). The Compass®, 3D volumetric gamma analysis software, facilitated comparing planned and measured doses.
Result: This study assessed ten patient-specific IMRT and VMAT QA plans using the Dolphin® phantom. Fluence maps from the Treatment Planning System were compared with measured data using 3%/3mm gamma analysis. All plans achieved over 95% pass rates, confirming excellent agreement between planned and delivered doses. Deviations remained within ±1%, demonstrating high accuracy and reliability. Overall, the Dolphin® phantom proved to be an effective QA tool for precise and safe dose delivery.
Conclusion: A careful examination of 10 prostate IMRT and VMAT cases were analyzed to evaluate the Dolphin®-Compass dosimetry system's ability to replicate 3D dose distributions on patient CT scans. Using VersaHD LINAC beam data, the system demonstrated high reliability and precision in ensuring agreement between planned and delivered doses. Overall, the Dolphin®-Compass system proved to be an effective tool for enhancing patient-specific quality assurance in modern radiation therapy.

Dosimetric Comparison of 5-, 7-, and 9-Field SIB-IMRT Plans in Prostate Cancer Using 100% Isodose-Based Target Evaluation

By Rida Malik (Medical Physicist)

Abstract:
Objective
To compare the dosimetric performance of 5-, 7-, and 9-field Simultaneous Integrated Boost (SIB) Intensity-Modulated Radiotherapy (IMRT) plans for prostate cancer using an institutional protocol in which both PTV68 (68 Gy) and PTV45 (45 Gy) are fully covered by their 100% isodose lines, while 96–98% of the CTV is encompassed by the 100% isodose, with focus on rectum and rectoprostatic interface sparing.
Methods
Ten prostate cancer patients treated at the Sindh Institute of

Urology and Transplantation (SIUT) were retrospectively planned using SIB-IMRT (68 Gy/45 Gy in 25 fractions). Three IMRT plans per patient were created using 5-, 7-, and 9-field beam arrangements. All plans were normalized to ensure full prescription coverage of PTVs and ≥96% CTV inclusion within the 100% isodose. Dose-volume parameters, conformity index (CI), homogeneity index (HI), and organ-at-risk (OAR) doses were analyzed. Daily CBCT verification confirmed treatment reproducibility.

Results

All plans achieved acceptable coverage per SIUT criteria. The 7-field configuration demonstrated the most balanced performance with optimal target coverage and OAR protection. Mean CTV coverage was 97.2 ± 0.6%. CI averaged 1.09 (5-field), 1.05 (7-field), and 1.03 (9-field), while HI improved from 0.12 → 0.09 → 0.08 across increasing field numbers. The 7-field plan achieved lowest rectal and bladder doses (rectal V60 < 20%, bladder V65 < 25%) with moderate delivery efficiency (~820 MUs).

Conclusion

Prostate SIB-IMRT using 100% isodose-based evaluation ensures precise target coverage with excellent rectoprostatic sparing. The 7-field technique offers the optimal balance between conformity (CI ≈ 1.05), homogeneity (HI ≈ 0.09), and treatment efficiency, aligning with 2026 radiotherapy standards emphasizing precision, reproducibility, and reduced toxicity.

Impact of Standardized Bowel Preparation on Dosimetric Outcomes and Treatment Reproducibility in Prostate SIB-IMRT (68 Gy/45 Gy in 25 Fractions)

By Sabeen Zafar (Medical Physicist)

Abstract:

Objective

To evaluate the impact of a standardized bowel preparation protocol on dosimetric outcomes and treatment reproducibility in prostate cancer patients treated with Simultaneous Integrated Boost (SIB) Intensity-Modulated Radiotherapy (IMRT), prescribing 68 Gy to the prostate (PTV68) and 45 Gy to pelvic lymph nodes (PTV45) in 25 fractions.

Methods

Ten prostate cancer patients were planned and treated with SIB-IMRT at the Sindh Institute of Urology and Transplantation (SIUT). A standardized bowel preparation protocol—comprising dietary modification, mild laxatives, and daily consistency checks—was implemented before CT simulation and maintained during treatment. IMRT plans prescribed 68 Gy to PTV68 and 45 Gy to PTV45. Dose-volume histogram (DVH) parameters for targets and organs-at-risk (OARs)—rectum, bladder, and femoral heads—were analyzed. Interfractional variations were assessed using daily CBCT to evaluate rectal volume consistency and target position reproducibility.

Results

Patients with good compliance to bowel preparation demonstrated improved rectal consistency and reduced interfractional variation. Mean rectal volume variation decreased by 28%, while rectal V60 and V50 were reduced by 4.2% and 6.5%, respectively. Target coverage remained stable (CTV ≥ 97% coverage by 100% isodose), and dose conformity improved (CI = 1.04 ± 0.03 vs. 1.08 ± 0.05 without preparation). Reproducibility of target localization improved by an average of 2.5 mm in the anterior–posterior direction.

Conclusion

Standardized bowel preparation in prostate SIB-IMRT (68 Gy/45 Gy in 25 fractions) significantly enhances rectal consistency, reduces dose to the rectum, and improves treatment reproducibility. Routine implementation of such protocols can improve dosimetric quality and may reduce gastrointestinal toxicity, supporting a reproducible and patient-safe radiotherapy workflow.

Dosimetric Comparison between VMAT Plans of Fast-rotating O-ring LINAC having DL-MLCs and a C-arm LINAC for Nasopharyngeal Carcinoma and Prostate SBRT

By Ahmad Ali (Medical Physicist)

Abstract:

This retrospective study makes a dosimetric comparison of volumetric modulated arc therapy (VMAT) treatment plans for two treatment machines: Halcyon, which is a commonly used modern O-ring linac with dual-stacked MLCs having reduced leakage and daily CBCT guided fast treatment delivery versus the traditional Clinac iX, which is a C-arm linac being used for over forty years.

A total of 40 patients—10 with nasopharyngeal carcinoma (NPCa) and 30 with prostate cancer (PCa)—were included in this study. The NPCa patients received 69.96 Gy to the high-risk planning target volume (PTV-HR) and 60 Gy to the intermediate-risk PTV (PTV-IR) in 33 fractions (Fr) using a simultaneous integrated boost technique. Three groups of PCa patients with 10 patients in each group comprised prostate with nodes (70 Gy in 28 Fr), prostate only (60 Gy in 20 Fr), and prostate only (36.25 Gy in 5 Fr) using stereotactic body radiotherapy (SBRT) technique.

VMAT plans were generated for both machines using two-and-a-half arcs for NPCa and two arcs for PCa following the same dose constraints. Plans were evaluated based on conformity index (CI), homogeneity index (HI), target coverage factor (TCF), and organ at risk (OAR) doses.

Results indicated that Halcyon and Clinac iX achieved comparable values of CI (1.47, 1.41) and HI (0.067, 0.065) for PTV-HR and TCF (1.00, 1.00) for PTV-IR and similar OAR doses in NPCa patients. For prostate with nodes, CI (1.20, 1.22) and HI (0.075, 0.065) for PTV HR and with TCF (1.00, 1.00) for PTV-IR for both machines and prostate-only groups also showed comparable results regarding both target coverage and OAR sparing. Independent sample T-test results for all patient groups indicate no significant dosimetric differences (P-value >> 0.05) between both machines supporting patient shift without fallback planning in case of a machine malfunction.

Establishing Quality Assurance Program for Pakistan`s First MR-Linac

By Shahzaib Naeem (Medical Physicist)

Abstract:

Background:

The installation of Pakistan's first 1.5 Tesla MR-Linac marks a major leap in precision radiation oncology, integrating high-field magnetic resonance imaging with a 7 MV linear accelerator for real-time, image-guided adaptive radiotherapy. This hybrid technology enables unparalleled visualization of soft tissue and on-table plan adaptation but also introduces complex quality assurance (QA) challenges unique to the magnetic environment.

Objective:

To present the framework and implementation of QA procedures for Pakistan's first MR-Linac, aligned with international standards and adapted to local infrastructure, resources, and clinical workflow.

Methodology:

The QA Program is based on evidence based recommendation (Vendor and Literature) and international standards (AAPM and IAEA guidelines). The tests include Safety interlocks, mechanical checks, dosimetry, Imaging Performance and adaptive workflow vitrification as well as Patient Specific QA. A discussion is also included on the effect of magnetic field and lack of field and SSD visualization.

Results and Conclusion:

Initital commissioning and QA demonstrated beam output Stability of less than 0.5% variation. Geometric Accuracy of 0.5 mm and Gamma Pass rates of 3% 3mm. Routine QA frequency and parameters were developed and refined.

However QA for an MR Linac Exists beyond conventional machine checks. It demands integrated assessment of Lianc, MR and the adaption. The integrated structure ensures safe, reproducible treatment delivery and it sets a foundation for advanced image based adaption techniques in Pakistan.

Dosimetric Comparison of 5-, 7-, and 9-Field SIB-IMRT Plans in Prostate Cancer Using 100% Isodose-Based Target Evaluation

By Sabeen Zafar (Medical Physicist)

Abstract:

Objective

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Methods

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AI-Powered Smart Oncology Safety Integration Theranostic Framework: A Unified Paradigm for I-131 Patient Management

By Mrs.Uzma Ilyas (Medical Physicist)

Abstract:

In the evolving landscape of nuclear oncology, precision, safety, and holistic care must converge. This work introduces an AI-powered theranostic integration framework that seamlessly unites MIRD-based personalised dosimetry, dynamic AI-driven patient release modelling, and radiation-safe healing garden design for I-131 therapy.

Leveraging the Medical Internal Radiation Dose (MIRD) formalism, patient-specific absorbed doses are computed for target tissues and organs at risk (OARs), enabling optimised therapeutic activity while minimising radiation-induced toxicity. An AI engine processes real-time inputs—total effective dose equivalent (TEDE), residual neck activity, occupancy factors, and socioeconomic variables—to predict safe discharge thresholds, reducing isolation duration without compromising public or caregiver exposure (≤5 mSv).

Complementing clinical precision is a physics-informed healing garden engineered with low-scatter radiation zoning and strategic shielding layouts. Therapeutic flora, air-purifying plants, and ambient avian acoustics create a recovery environment that supports psychological resilience during radio-iodine isolation.

This tripartite system transcends the limitations of fixed-activity protocols by delivering dual-validated (MIRD + AI-TEDE), patient centered outcomes:

enhanced tumor control, reduced non-target toxicity, shorter hospital stays, and improved emotional well-being. It redefines the role of the medical physicist as a system architect—bridging computational dosimetry, artificial intelligence, and environmental physics to forge safe, smart, and compassionate oncology care ecosystems.

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Geant4 Based Dosimetry for Patients with extended Temporomandibular Joint Implant

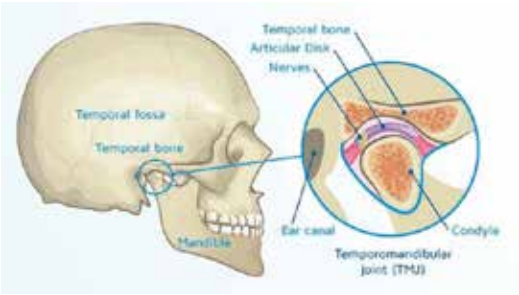
Zain ul Abidin[1], Syed Abdul Haseeb Ahmad[2], Asrar Ahmad[1], Iftikhar Ahmad[2]
[1]Pakistan Institute of Engineering and Applied Sciences (PIEAS), Islamabad
[2]Institute of Radiotherapy and Nuclear Medicine (IRNUM), Peshawar

Abstract

This study investigates dosimetric perturbations induced by titanium and stainless steel TMJ implants during external beam radiotherapy, addressing critical treatment planning considerations for patients with metallic implants. Using Geant4 Monte Carlo Simulations, we quantified relative dose distributions across field sizes (5×5, 10×10, 15×15 and 20×20 cm²) in tumor tissue and all surrounding OARs of TMJ: lymph nodes, salivary glands, pituitary gland, brain, spinal cord, thyroid, and thymus, etc. Titanium exhibited field-size dependent behavior with maximum dose reduction of -1.3% at 5×5 cm² fields that progressively diminished with larger field dimensions, while stainless steel demonstrated superior dosimetric stability (±0.2% across all configurations). Both materials produced modest depth-dose enhancement of 1-2% throughout the therapeutic range (5-25 cm) with minimal impact on mean energy deposition (<0.02% variation). All observed perturbations remained within clinically manageable tolerances, providing quantitative evidence for the radio therapeutic safety of both implant materials when appropriate treatment planning considerations are applied.

Introduction

- The temporomandibular joint (TMJ) is a bilateral synovial articulation connecting the mandibular condyle to the temporal bone's glenoid fossa.



Anatomy of Temporomandibular Joint

- TMJ replacement (TMJR) is indicated for end-stage pathologies including severe osteoarthritis with dimensional collapse, Types III-IV ankylosis, post-traumatic deformities.
- Radiotherapy in patients with TMJR prostheses introduces unique dosimetric challenges due to the interaction between radiation beam and high-density implant materials.
- Different TMJR prostheses materials, such as titanium and stainless steel, can cause dose perturbations, potentially leading to inaccurate dose delivery to both the target area and surrounding healthy tissues.

Objectives

- To evaluate the dose perturbations induced by metallic implants of titanium and stainless steel using ICRP145 Human Phantom of the Geant4 Monte Carlo simulation toolkit.
- To examine the clinical implications of implant-related dose perturbations, focusing on their potential impact on tumor control, treatment toxicity and overall patient outcomes.
- To study the behavior of all OARs and dummy tumor(inserted), present in H&N region affected in 5×5, 10×10, 15×15 and 20×20 cm² field sizes.

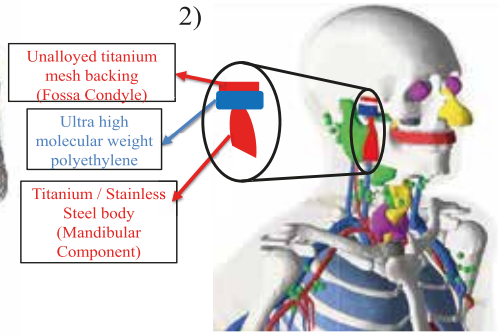
Methods and Materials

- Geant4 ICRP-145 voxel human phantom was used to simulate realistic anatomical geometry of the head and neck region.
- A standard TMJ implant model (Ti/SS) and a dummy tumor (inserted beside implant) was designed and positioned at the anatomical mandibular condyle site.
- A 6 MV photon beam was simulated at 100 cm SAD to evaluate dose perturbations in and around the implant region.

1)

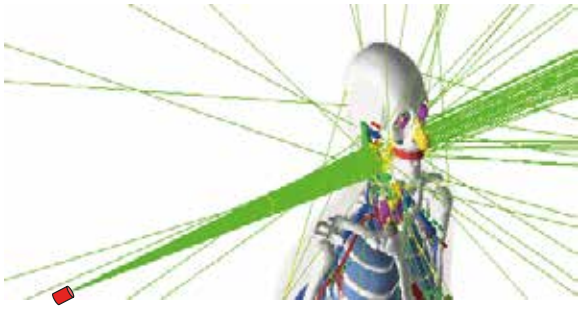
1) Geant4 - ICRP 145 Human Computational Phantom.

2)



2) Construction of standard category(F_0M_0) metallic implant and tumor (beside implant) and it's anatomical location on "ICRP145_HumanPhantoms".

3)



3) Simulation setup where a 6 MV cone beam is placed at 100 cm SAD from the tumor isocentre.

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Results

1. Dose Perturbations in Extra-thoracic Airways

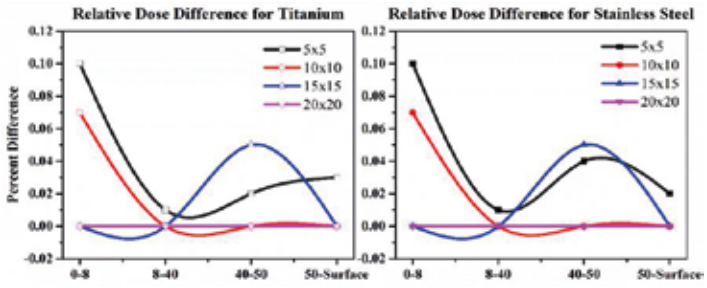

Fig 1: Relative dose differences in extra thoracic region in the presence of titanium (left) and stainless steel (right) implants across four field sizes (5×5, 10×10, 15×15, and 20×20 cm²).

2. Dose Perturbations in Right Eye

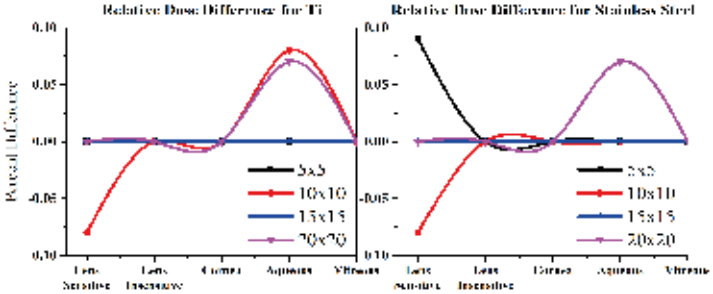

Fig 2: Relative dose differences in right eye in the presence of titanium (left) and stainless steel (right) implants across four field sizes (5×5, 10×10, 15×15, and 20×20 cm²).

3. Dose Perturbations in Left Eye

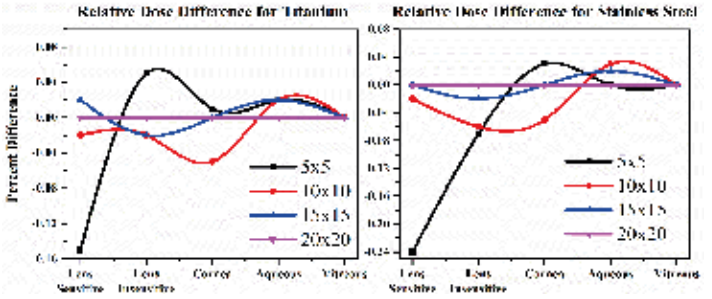

Fig 3: Relative dose differences in left eye in the presence of titanium (left) and stainless steel (right) implants across four field sizes (5×5, 10×10, 15×15, and 20×20 cm²).

4. Dose Perturbations in Oral Mucosa and Mandible

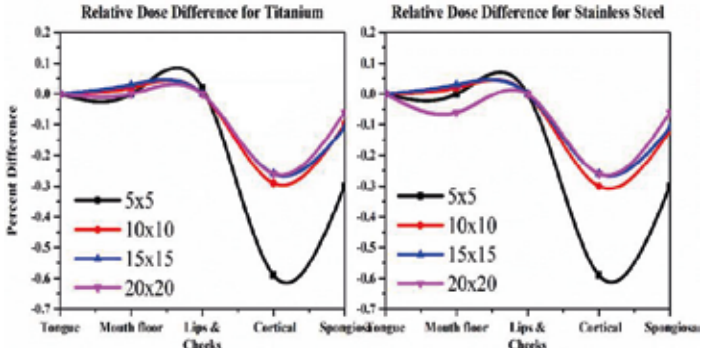

Fig 4: Relative dose differences in oral mucosa & mandibular in the presence of titanium (left) and stainless steel (right) implants across four field sizes (5×5, 10×10, 15×15, and 20×20 cm²).

5. Dose Perturbations in Tumor

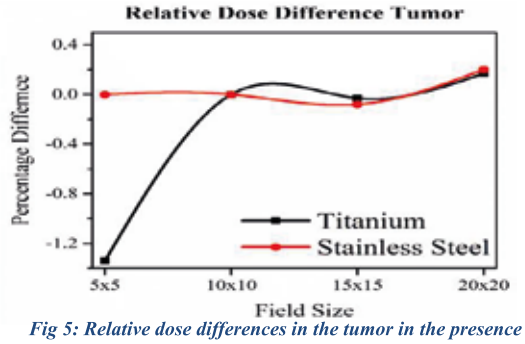

Fig 5: Relative dose differences in the tumor in the presence of titanium (black) and stainless steel (red) implants across four field sizes (5×5, 10×10, 15×15, and 20×20 cm²).

6. Relative PDD Analysis

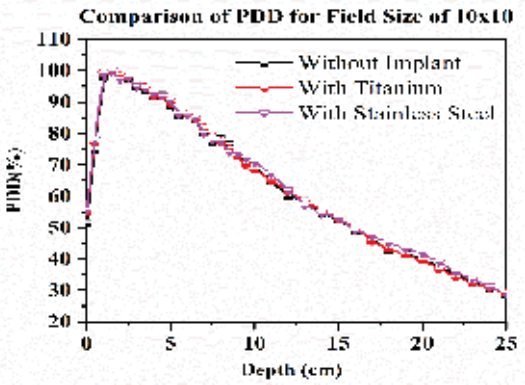

Fig 6: PDD curves for a field size of 10x10 comparing the effect of titanium and stainless steel with the profile in absence of implant

Discussion

- Titanium implants showed field-dependent dose variations (−1.3% at 5×5 cm² to slight increases at larger fields) due to atomic number-related scatter effects, while stainless steel maintained stable dose perturbations (±0.2%) across all field sizes.
- Dense tissues shows more enhance dose perturbations as compared to soft tissues.
- Both materials produced consistent dose perturbations of 1–2% as verified from the PDD curves.
- Material-specific dose perturbations are predictable and within acceptable limits for both titanium and stainless steel, confirming compatibility with current radiotherapy protocols without compromising dosimetric accuracy or patient safety.

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Acknowledgment of Industry Collaboration

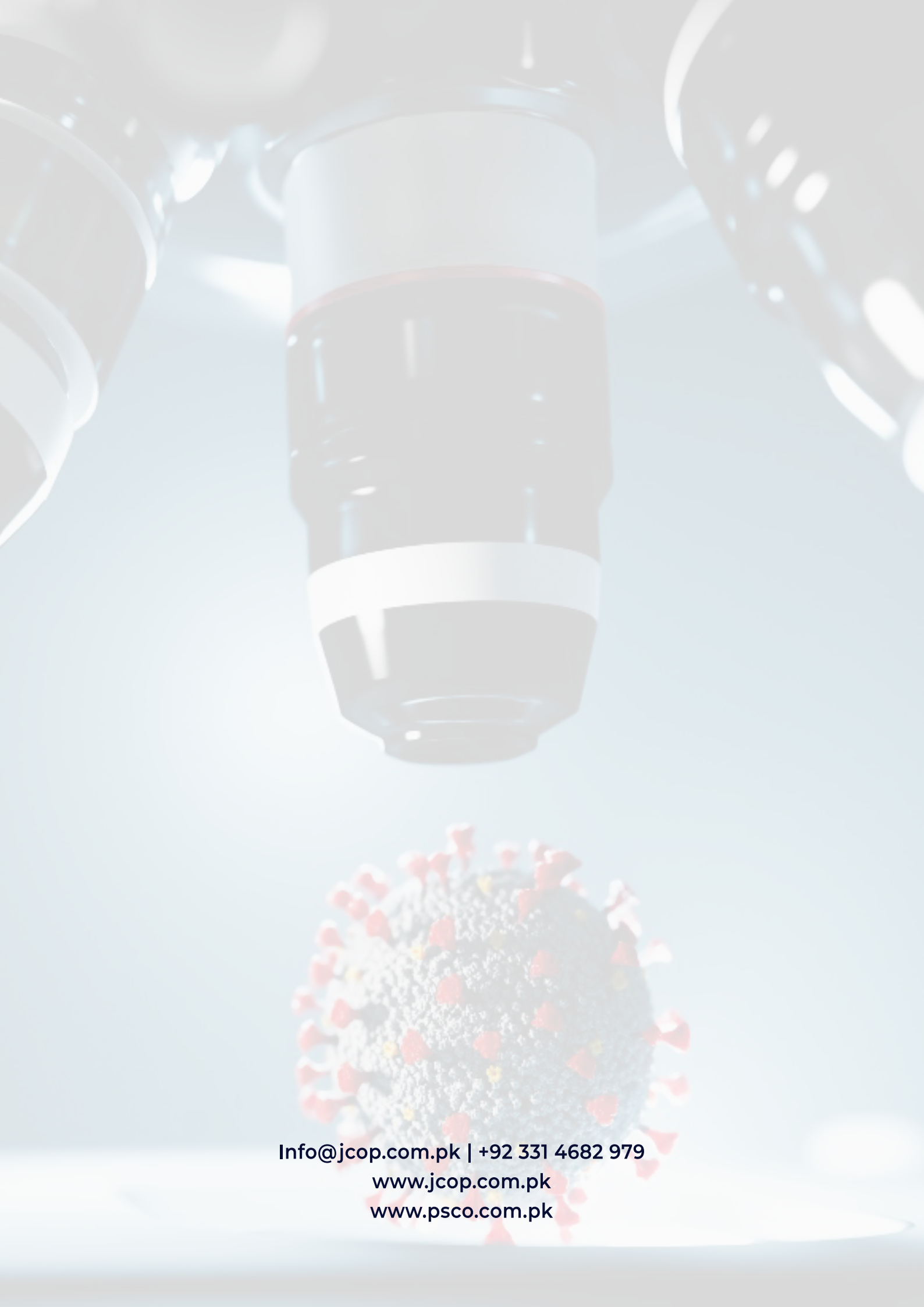
The successful conduct of ONCO 2026 – the 27th Annual Cancer Congress of the Pakistan Society of Clinical Oncology (PSCO) was supported through responsible and structured collaboration with the healthcare industry, in alignment with the scientific and educational objectives of the congress.

A total of 28 industry partners contributed to ONCO 2026, representing a broad spectrum of the healthcare sector, including pharmaceutical and biopharmaceutical organizations, diagnostics and molecular pathology services, medical technology and radiotherapy solution providers, medical devices and oncology support services, as well as healthcare-focused service organizations. Their collective participation reflected a shared commitment to advancing oncology education, innovation, and patient-centered cancer care.

Industry engagement at ONCO 2026 played an important role in facilitating a comprehensive scientific program, enabling knowledge exchange on emerging therapies, diagnostics, and technologies, and encouraging constructive interaction between clinicians, researchers, and industry stakeholders. This collaboration contributed to a deeper understanding of innovations shaping contemporary oncology practice while supporting meaningful professional dialogue.

The Pakistan Society of Clinical Oncology remains firmly committed to upholding the principles of scientific integrity, transparency, and ethical collaboration. All industry engagement during ONCO 2026 was conducted in accordance with established professional and ethical guidelines, ensuring that educational content and scientific discussions remained independent, evidence-based, and focused on patient benefit.

The Editorial Board of the Journal of Clinical Oncology Pakistan (JCOP) acknowledges and appreciates the collective contribution of all 28 industry partners, whose responsible support strengthened the academic, educational, and collaborative impact of ONCO 2026 and contributed to the advancement of oncology practice in Pakistan and the region.



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