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Editor's Note

It is my pleasure to present this special supplement of the *Iranian Journal of Breast Diseases*, featuring the accepted abstracts of the 4th Ahvaz International Congress of Cancer Surgery, held in November 2025**.** This congress embraces a comprehensive oncologic scope; the abstracts in this supplement span a wide range of malignancies, mainly in breast cancer. Our decision to collaborate with this distinguished congress reflects our commitment to supporting high-quality scientific initiatives that foster meaningful exchange and advance the broader field of oncology.

Although our journal is primarily dedicated to breast diseases, we believe that interdisciplinary insights from across different cancer types ultimately strengthen the scientific foundations that benefit breast cancer research and patient care. This was an opportunity to highlight the interconnected nature of oncologic science and to promote dialogue and collaboration across subspecialties- elements essential for innovation and improved clinical outcomes.

We extend our sincere appreciation to the congress organizers, scientific committee members, reviewers, and contributing authors whose efforts made this supplement possible. We hope the works presented here will inspire further inquiry and enrich the surgical oncology community.

Shahpar Haghighat, MD
Editor-in-Chief
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Deep Learning-Based Artificial Intelligence for Intraoperative Margin Assessment in Breast Cancer Surgery: A Systematic Review

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Abstract

Introduction: Achieving negative surgical margins during breast-conserving surgery (BCS) is critical to minimize local recurrence and the need for re-excision. Traditional intraoperative margin assessment techniques, such as frozen section analysis and imprint cytology, have limitations in accuracy and turnaround time. Recent advancements in deep learning-based artificial intelligence (AI) hold promise for improving real-time intraoperative margin assessment. This review aims to systematically evaluate the diagnostic accuracy of deep learning-based AI methods for intraoperative margin assessment in breast cancer surgery, comparing these methods to standard care or no intervention.

Methods: A systematic search was conducted in PubMed, Embase, Cochrane Library, PsycINFO, and Google Scholar for studies published between January 2015 and October 2025. Inclusion criteria encompassed studies involving human subjects that assessed deep learning-based AI techniques for intraoperative margin evaluation during BCS. Studies were selected based on predefined eligibility criteria, and data extraction focused on study characteristics, AI methodologies, diagnostic performance metrics (sensitivity, specificity, accuracy), and comparison with standard care. The risk of bias was assessed using the QUADAS-2 tool, and the review adhered to the PRISMA guidelines.

Results: Out of 1,200 identified records, 18 studies met the inclusion criteria. AI techniques evaluated included convolutional neural networks applied to intraoperative imaging modalities such as ultrasound, hyperspectral imaging, and specimen mammography. Pooled sensitivity and specificity for AI-based methods ranged from 85% to 96% and 76% to 95%, respectively. Compared with standard intraoperative assessment methods, AI approaches demonstrated diagnostic accuracy comparable to or superior to those methods while reducing assessment time. However, significant heterogeneity in study designs and AI algorithms was noted, which may affect the generalizability of the results.

Conclusion: Deep learning-based AI methods show promise in enhancing intraoperative margin assessment during BCS, potentially reducing re-excision rates and improving patient outcomes. To validate these findings and facilitate clinical integration, it is crucial to standardize AI algorithms and conduct large-scale prospective studies that address current limitations.

Keywords: Breast-conserving surgery; Intraoperative margin assessment; Deep learning; Artificial intelligence; Systematic review

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Artificial Intelligence Models for Predicting Metastasis in Retroperitoneal Sarcomas: A Systematic Review

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Abstract

Introduction: Retroperitoneal malignancies, particularly sarcomas, present significant diagnostic and therapeutic challenges due to their deep anatomical location, which complicates imaging and surgical access, and their heterogeneous biological behavior, which leads to varied responses to treatment. Accurate prediction of metastatic potential is crucial for optimizing treatment planning, informing surgical decisions, and enhancing patient outcomes. Artificial intelligence (AI) techniques, including machine learning and deep learning, have recently garnered attention as promising tools for predicting metastasis by integrating clinical, molecular, and imaging data.

Methods: A systematic review was conducted using PubMed, Scopus, and IEEE databases from 2020 to 2025. Of 110 screened publications, 40 studies met the inclusion criteria, which required the application of AI algorithms for metastasis prediction and the reporting of key performance indicators, including accuracy, sensitivity, specificity, and the concordance index (C-index).

Results: AI-based models demonstrated strong predictive performance in assessing metastatic risk. Radiomics-driven approaches, combining CT and MRI data with clinical parameters, achieved 84–86% accuracy in predicting tumor characteristics and metastatic likelihood. Deep learning frameworks that integrate multimodal inputs—clinical, molecular, and imaging—outperformed traditional methods, increasing the C-index for distant metastasis prediction to 0.77. The integration of multimodal data consistently enhanced prediction reliability and enabled early identification of patients at high risk of adverse outcomes.

Conclusion: AI-driven predictive models provide a valuable framework for assessing metastatic risk in retroperitoneal cancers. Future research should focus on developing standardized imaging protocols, expanding multicenter datasets, and conducting external validations to facilitate clinical integration. To enable broader clinical translation, future efforts should emphasize standardized imaging protocols, larger multicenter datasets, and external validation. These models have the potential to support precision oncology and multidisciplinary management of retroperitoneal sarcomas.

Keywords: Retroperitoneal neoplasms; Artificial intelligence; Neoplasm metastasis

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Comparative Analysis of Neoadjuvant Chemotherapy Response Across Breast Cancer Molecular Subtypes

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Abstract

Introduction: Pathologic Complete Response (PCR) to Neoadjuvant Chemotherapy (NAC) is an essential marker for long-term survival in breast cancer. Response rates vary by tumor molecular subtype and individual patient factors. This study aims to identify specific pre-treatment clinical and pathological characteristics that can reliably predict PCR in different breast cancer molecular subtypes.

Methods: This retrospective cohort study analyzed 621 breast cancer patients treated with Neoadjuvant Chemotherapy at a single institution. Tumors were classified into four molecular subtypes: Luminal A, Luminal B, HER2-enriched, and Triple-Negative, based on immunohistochemistry and molecular profiling. Multivariable logistic regression was used to identify independent predictors of pathologic complete response before treatment.

Results: The overall pathologic complete response rate in the cohort was 22.1%. Response varied significantly by subtype, with HER2-enriched tumors achieving the highest rate (45.8%) and Luminal A tumors the lowest (9.4%). Four factors were identified as independent predictors of pathologic complete response: younger age at diagnosis, absence of lympho-vascular invasion, negative estrogen receptor status, and positive HER2 status.

Conclusion: Response to Neoadjuvant Chemotherapy varies substantially among breast cancer subtypes, with HER2-enriched tumors demonstrating superior pathologic complete response rates. These findings suggest the need for subtype-specific treatment protocols and further research into tailored therapeutic strategies. Identifying independent predictors, such as patient age, lympho-vascular invasion, Estrogen Receptor status, and HER2 expression, can inform personalized treatment planning and aid in the development of predictive tools in precision oncology.

Keywords: Breast cancer molecular subtypes; Neoadjuvant chemotherapy; Pathologic complete response

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Effect of Complete Decongestive Therapy on Reducing Limb Swelling and Improving Quality of Life in Patients with Breast Cancer-Related Lymphedema

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Introduction: Secondary lymphedema, a frequent complication following breast cancer treatment, results from impaired lymphatic drainage, leading to chronic upper-limb swelling. This condition significantly limits physical function and diminishes quality of life, necessitating effective management strategies to enhance lymphatic drainage, decrease limb volume, and improve patient outcomes.

Methods: Manual Lymphatic Drainage (MLD), compression bandaging, exercise, and skin care. The therapy is delivered in two distinct phases: an intensive phase lasting 2–4 weeks, during which patients receive daily treatments, followed by a maintenance phase focused on self-care and periodic professional sessions. Fifteen female patients with BCRL (mean age, 62 years; range, 40–94) who had undergone chemotherapy (mean, 8.6 sessions) and radiotherapy (mean, 28 sessions) participated. Circumferential limb measurements were taken at the dorsum of the hand, wrist, and 10 cm below and above the elbow before and after 10 CDT sessions. Histories of cellulitis and comorbidities were also recorded.

Results: After 10 sessions, mean circumference reductions were observed at all sites: dorsum of the hand 6.8%, wrist 7.3%, 10 cm below the elbow 7.6%, and 10 cm above the elbow, 7.6%. The most significant decreases occurred below and above the elbow, indicating that CDT effectively targets areas most affected by lymphedema, thus potentially enhancing patients' functional abilities and quality of life. No serious adverse events were reported, and CDT was effective in patients with comorbidities or a history of prior cellulitis.

Conclusion: CDT effectively reduces limb volume and enhances the quality of life in BCRL patients. These findings underscore the importance of early diagnosis, regular follow-up, and individualized care for optimal results. Future research should explore the long-term outcomes of CDT and its integration with other therapeutic modalities to improve patient care further. These findings support CDT as a key component of lymphedema management in breast cancer survivors.

Keywords: Secondary lymphedema, Breast cancer, Upper limb, Complete decongestive therapy, Limb volume reduction, Rehabilitation

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Protective Ovarian Transposition: Evaluation of Surgical Methods and Post-Radiotherapy Hormonal and Reproductive Effects

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Introduction: Preserving reproductive function in women with pelvic malignancies undergoing radiotherapy is a critical clinical objective, given the profound impact on quality of life and the complex interplay of factors influencing treatment decisions. Ovarian transposition, the surgical relocation of ovaries outside the radiation field, is an effective preventive method to minimize radiation-induced ovarian damage and maintain hormonal and reproductive potential.

Methods: A comprehensive review of current surgical techniques for ovarian transposition, including laparoscopic and open procedures, was conducted, focusing on study design, sample size, and outcome measures. The analysis focused on the surgical approach, the sites of ovarian repositioning, radiation dose exposure, and postoperative hormonal assessment. Relevant studies evaluating post-radiotherapy reproductive and endocrine outcomes were systematically reviewed.

Results: Laparoscopic ovarian transposition demonstrated superior efficacy, with a 30% reduction in radiation exposure and a 25% higher rate of preserved ovarian endocrine function compared to open surgery. Patients who underwent transposition showed a higher likelihood of menstrual recovery and natural or assisted conception after therapy. Hormonal markers, including FSH, LH, and estradiol, remained within the normal range in a significant proportion of patients. Additionally, reduced psychological stress and improved quality of life were observed among those with preserved ovarian function.

Conclusion: While ovarian transposition is an effective and safe technique for fertility preservation in young women receiving pelvic radiotherapy, further research is needed to optimize patient selection and address long-term outcomes. Optimal outcomes depend on careful patient selection, tumor location, radiation field design, and multidisciplinary collaboration. The integration of fertility preservation strategies, including oocyte or ovarian tissue cryopreservation, is recommended for patients at high risk.

Keywords: Ovarian transposition; Radiotherapy; Fertility preservation; Pelvic malignancy; Laparoscopy

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Therapeutic Potential of Reoviruses in Solid Tumors as an Oncolytic Virus: A Review

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Introduction: Despite significant advances in oncology, many solid tumors exhibit resistance to conventional therapies such as chemotherapy and radiation. This resistance often stems from genetic mutations and the tumor microenvironment, which protect malignant cells. Viral oncolysis, which uses naturally occurring viruses to target and destroy cancer cells selectively, has regained scientific interest. Reoviruses, in particular, show exceptional potential due to their ability to exploit abnormal Ras signaling pathways, a common mutation in resistant tumors.

Methods: To assess the therapeutic value of reoviruses, a systematic review of scientific literature published between 2000 and 2024 was conducted using PubMed and Scopus. Studies were included if they provided quantitative data on viral replication, cytotoxicity, and immune activation in both human and animal tumor models. The review process involved evaluating study design, sample size, and outcome measures to ensure robustness and relevance.

Results: Experimental data demonstrate that reoviruses induce multiple modes of tumor cell death, including apoptosis and necroptosis, with apoptosis rates increasing by up to 40% in treated models. Simultaneously, reoviruses trigger antitumor immunity, evidenced by a 50% increase in cytotoxic T lymphocyte infiltration and a 30% rise in activated natural killer cells. Clinical trials have confirmed the safety of reovirus, with tumor regression observed in 60% of patients, particularly when combined with immune checkpoint inhibitors or chemotherapy.

Conclusion: Reoviruses represent a safe, immunogenic, and adaptable platform for oncolytic therapy, demonstrating significant potential in preclinical and clinical settings. Their ability to induce tumor cell death and enhance antitumor immunity, particularly when combined with immune checkpoint inhibitors or chemotherapy, suggests they could significantly improve treatment outcomes for resistant solid tumors. Future research should focus on optimizing combination strategies and understanding the mechanisms underlying reovirus-mediated immune activation.

Keywords: Reoviridae infections; Oncolytic virotherapy; Solid tumors; Immunotherapy; Neoplasm regression.

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The Role of Viruses in the Development of Breast Cancer: A Review

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Introduction: In recent years, particularly the past seven, there has been a marked increase in attention to viral involvement in breast cancer, driven by advancements in molecular detection technologies such as next-generation sequencing and improved polymerase chain reaction techniques. Chronic viral infections may be significant contributors, promoting cellular transformation through mechanisms such as immune modulation, inflammation, and alterations in gene regulation.

Methods: A systematic review of publications from 2018 to 2025 was conducted using PubMed and Scopus databases. Studies that applied polymerase-based assays, immunohistochemistry, or sequencing to detect viral components within breast cancer samples were included. Particular focus was placed on mechanistic investigations of the biological consequences of viral gene expression in breast epithelial cells.

Results: Recent findings suggest that Human papillomavirus, Epstein–Barr virus, and Mouse mammary tumor virus-like elements are implicated in a subset of breast cancers. Their proteins—especially HPV E6/E7 and EBV LMP1—interfere with tumor-suppressor circuits and promote proliferative signaling. Persistent infection appears to sustain local inflammation and angiogenesis, creating a pro-tumor microenvironment. Variation in detection rates across different populations reflects both geographic and methodological diversity, emphasizing the complexity of viral associations with breast malignancies.

Conclusion: Although viral causality remains unconfirmed, accumulating molecular evidence suggests that viruses such as HPV and EBV may contribute to breast carcinogenesis through mechanisms including immune modulation and disruption of gene regulation. Continued efforts combining viral genomics, epigenetic mapping, and immune-response profiling will be vital for validating links and guiding preventive or therapeutic advances in virally associated breast cancer.

Keywords: Breast neoplasms; Oncogenic viruses; Human papillomavirus infections; Epstein–Barr virus infections; Viral carcinogenesis.

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Emerging Evidence of Viral Oncogenesis: Insights from the Past Decade, A Review

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Introduction: Over the past decade, groundbreaking discoveries in molecular virology have revolutionized our understanding of the intricate role that persistent viral infections play in human carcinogenesis. Certain viruses not only act as initiating agents but also participate in tumor maintenance through epigenetic remodeling, immune evasion, and metabolic reprogramming.

Methods: A systematic review was carried out using PubMed and Scopus databases for studies published between 2015 and 2025. Articles focusing on the molecular and immunological mechanisms by which Human papillomavirus, Epstein–Barr virus, Hepatitis B virus, and Merkel cell polyomavirus promote malignant transformation were analyzed and integrated.

Results: Recent findings reveal that viral oncogenesis is a multistage process involving continuous interplay between viral oncoproteins and host signaling pathways. Human papillomavirus E6 and E7 proteins disrupt genomic stability and epigenetic regulation; Epstein–Barr virus latent membrane proteins drive immune tolerance and cell proliferation; and Merkel cell polyomavirus integration has been established as a significant event in neuroendocrine skin tumors. High-throughput transcriptomics and single-cell sequencing have identified viral–host gene networks that predict clinical outcomes and identify potential therapeutic targets.

Conclusion: The past decade has underscored that viral-associated cancers form a distinct biological subset. Key findings highlight the need for tailored prevention and treatment strategies, including vaccination, targeted antiviral therapy, and immunomodulation. Vaccination, targeted antiviral treatment, and immunomodulation are now central components of future oncologic prevention frameworks.

Keywords: Oncoviruses; Viral carcinogenesis; Human papillomavirus infections; Epstein–Barr virus infections; Merkel cell polyomavirus.

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Synchronous Gastric and Rectal Cancer: A Case Report

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Abstract

Introduction: Synchronous Gastric and Rectal Cancer (SGRC) is a rare and complex occurrence of multiple primary malignancies that presents unique diagnostic and therapeutic challenges. Understanding SGRC is crucial as it can inform broader oncological practices and highlight the need for innovative diagnostic and treatment strategies. This case report presents a patient with SGRC, emphasizing the importance of thorough investigation and multidisciplinary management.

Methods: We describe the case of a 59-year-old male who initially underwent emergency surgery for a perforated peptic ulcer. Four months later, he presented with symptoms such as weight loss and changes in bowel habits, prompting further investigation. Diagnostic procedures, including upper and lower endoscopy, endoscopic ultrasound, and CT scan, revealed one gastric mass and one rectal mass. Based on these findings, the patient received neoadjuvant chemoradiotherapy, which was followed by surgical resection of both tumors.

Results: Histopathological examination confirmed the diagnosis of dual primary gastric adenocarcinoma and rectal cancer. Immunohistochemistry showed distinct profiles for each tumor (gastric: CK7+/CK20-; rectal: CK7-/CK20+), confirming their primary nature. The patient underwent successful surgical resection of both tumors following neoadjuvant therapy.

Conclusion: This case highlights the critical need for comprehensive evaluation in patients with suspicious findings, even in emergency settings. It illustrates the success of a tailored, multidisciplinary approach in managing SGRC. Key considerations include distinguishing primary from metastatic lesions, using immunohistochemical profiling, and planning individualized treatments. Implementing enhanced screening protocols for high-risk populations could improve early detection of rare synchronous cancers.

Keywords: Synchronous cancer, Gastric cancer, Rectal cancer, Multiple primary malignancies, Case report

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Low Anterior Resection Syndrome

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Abstract

Introduction: Rectal cancer is the second most common gastrointestinal malignancy and imposes a significant healthcare burden worldwide. Treatment strategies are determined by tumor location and stage, encompassing surgery alone or combined with neoadjuvant or adjuvant therapies. Rectal cancer is the second most common gastrointestinal malignancy and imposes a significant healthcare burden worldwide. Treatment strategies are determined by tumor location and stage, encompassing surgery alone or combined with neoadjuvant or adjuvant therapies. Low anterior resection (LAR) with total mesorectal excision (TME) has become the standard sphincter-preserving approach, replacing abdominoperineal resection in most cases of low and mid-rectal cancers. Anastomotic techniques include end-to-end, side-to-end, and colonic J-pouch configurations. Despite preserving the sphincter, Low Anterior Resection Syndrome (LARS) affects 70–90% of patients, causing symptoms like incontinence, frequent or urgent stools, incomplete evacuation, and soiling. Risk factors include anastomotic height, stoma formation, adjuvant or neoadjuvant radiotherapy, age, and surgical technique. This randomized clinical trial aims to compare the incidence of LARS, quality of life, and postoperative complications in patients undergoing LAR with TME using side-to-end versus end-to-end anastomosis. Primary endpoints include the incidence of LARS, quality of life, and postoperative complications; secondary endpoints focus on the rate of anastomotic leakage. The findings from this study are expected to inform surgical decision-making and enhance postoperative functional outcomes in patients with rectal cancer.

Methods: This is a prospective, randomized, double-blind clinical trial conducted on rectal cancer patients undergoing LAR with TME at Alzahra, Milad, and Sina Hospitals in Isfahan from 2024 to 2026 (Iranian calendar). The study protocol was approved by the Ethics Committee of Isfahan University of Medical Sciences and will be registered in a WHO-recognized clinical trial registry, such as the IRCT.

Results: Among 100 patients who underwent low anterior resection (LAR), 50 received an end-to-side anastomosis, while the remaining 50 underwent an end-to-end anastomosis.

Conclusion: Data collection revealed significant differences in the incidence of LARS and quality of life between patients undergoing side-to-end and end-to-end anastomosis.

Keywords: Low Anterior Resection Syndrome, Rectal Cancer, Total Mesorectal Excision, Anastomotic Techniques, Functional Outcomes

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