CURRENT ISSUES IN EARLY DIAGNOSIS, COMPREHENSIVE TREATMENT, AND PREVENTION OF SURGICAL AND ONCOLOGICAL DISEASES

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Abstract: *Background: Surgical and oncological diseases remain leading causes of morbidity and mortality worldwide. Early diagnosis, multimodal treatment, and effective prevention strategies are critical to improving outcomes. Objective: To analyze current challenges and advances in the early detection, comprehensive management, and prevention of surgical cancers. Methods: A narrative review of peer-reviewed literature from 2015–2025 was conducted using PubMed, Scopus, and Google Scholar. Key topics included biomarkers, imaging, neoadjuvant therapy, minimally invasive surgery, and public health prevention. Results: Early diagnosis is hampered by nonspecific symptoms and limited access to screening. Novel liquid biopsies and AI-assisted imaging show promise. Comprehensive treatment now integrates targeted therapy, immunotherapy, and precision surgery. Prevention through vaccination (HBV, HPV) and lifestyle modification reduces incidence. Conclusion: Multidisciplinary approaches and health system strengthening are essential to address current gaps.*

Keywords: *early diagnosis, surgical oncology, comprehensive treatment, cancer prevention, minimally invasive surgery, biomarkers*

INTRODUCTION

Cancer is the second leading cause of death globally, with surgical diseases accounting for a substantial proportion of oncological emergencies. Despite advances in medical science, delayed diagnosis and suboptimal treatment integration remain persistent challenges. The concept of “comprehensive treatment” encompasses neoadjuvant chemotherapy, radiation, surgery, and adjuvant therapies tailored to tumor biology and patient condition. Early diagnosis, particularly in resource-limited settings, is often missed due to lack of screening programs and public awareness. This article reviews current issues and emerging solutions in the triad of early diagnosis, comprehensive treatment, and prevention of surgical and oncological diseases.

Methods

A narrative review was performed using electronic databases: PubMed, Scopus, Google Scholar, and ResearchGate. The search period was January 2015 to March 2025. Keywords used: “early diagnosis surgical oncology”, “comprehensive cancer treatment”, “cancer prevention”, “minimally invasive surgery”, “tumor biomarkers”, and “neoadjuvant therapy”. Inclusion criteria: peer-reviewed original articles, systematic reviews, and clinical guidelines in English. Exclusion criteria: case reports, non-English papers, and studies without full text. Data were synthesized thematically into three sections: early diagnosis, comprehensive treatment, and prevention.

Results

Early Diagnosis: Challenges and Innovations

Delayed diagnosis remains common for pancreatic, ovarian, and gastric cancers. Traditional imaging (CT, MRI, ultrasound) has sensitivity limitations for small lesions. However, liquid biopsy detecting circulating tumor DNA (ctDNA) and exosomes has shown sensitivity up to 85% for stage I colorectal cancer (Cohen et al., 2024). Artificial intelligence (AI) applied to mammography and endoscopy reduces false negatives by 30–40%. In low-resource settings, point-of-care ultrasound (POCUS) and portable biomarkers (e.g., fecal immunochemical test) are improving access.

Comprehensive Treatment: Integration of Modalities

Multimodal therapy improves survival compared to single-modality approaches. For locally advanced rectal cancer, total neoadjuvant therapy (TNT) followed by organ-preserving surgery achieves pathologic complete response (pCR) rates of 30–40% (Smith et al., 2023). Minimally invasive surgery (laparoscopic, robotic) reduces hospital stay and complications without compromising oncologic outcomes. Immunotherapy (checkpoint inhibitors) before surgery (neoadjuvant) in melanoma and lung cancer shows major pathologic response in >50% of patients.

Prevention: From Primary to Tertiary

Primary prevention includes HPV vaccination (reduces cervical cancer by 90%), HBV vaccination (liver cancer), and smoking cessation. Secondary prevention: screening colonoscopy, low-dose CT for lung cancer, and mammography. Tertiary prevention: rehabilitation and surveillance after curative treatment. Adherence to screening remains low (<50% in many countries). Community-based education and mobile screening units have increased uptake by 25% in pilot studies.

Discussion

This review identifies three critical areas. First, early diagnosis is evolving with liquid biopsies and AI, but cost and validation limit widespread use. Second,

comprehensive treatment requires multidisciplinary tumor boards and access to advanced surgery – gaps exist in low- and middle-income countries. Third, prevention is cost-effective yet underutilized; political will and public education are key. Limitations of this review include reliance on published data and potential publication bias. Future research should focus on affordable point-of-care diagnostics and implementation science.

CONCLUSION

Early diagnosis, comprehensive treatment, and prevention of surgical and oncological diseases face both challenges and opportunities. Integrating novel biomarkers, AI imaging, multimodal therapy, and population-based screening can significantly reduce cancer burden. Health systems must invest in infrastructure, training, and public awareness to translate these advances into routine practice.

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