INTEGRATION OF CLINICAL, RADIOLOGICAL, AND LABORATORY BIOMARKERS FOR PREOPERATIVE RESECTABILITY PREDICTION

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ABSTRACT

Advanced epithelial ovarian cancer remains one of the leading causes of cancer-related mortality among women worldwide. The cornerstone of treatment consists of maximal cytoreductive surgery followed by platinum-based chemotherapy. Numerous studies have consistently demonstrated that complete macroscopic tumor resection (R0 cytoreduction) is the strongest independent prognostic factor influencing both progression-free survival and overall survival.

Background

Advanced epithelial ovarian cancer remains one of the leading causes of cancer-related mortality among women worldwide. The cornerstone of treatment consists of maximal cytoreductive surgery followed by platinum-based chemotherapy. Numerous studies have consistently demonstrated that complete macroscopic tumor resection (R0 cytoreduction) is the strongest independent prognostic factor influencing both progression-free survival and overall survival.

Despite significant advances in surgical techniques and perioperative management, determining whether complete cytoreduction can be achieved before surgery remains a major clinical challenge. In current practice, treatment decisions are based on clinical examination, contrast-enhanced computed tomography (CT), magnetic resonance imaging (MRI), serum tumor markers such as CA-125, and, in selected cases, diagnostic laparoscopy. However, each of these methods has important limitations when used independently.

Radiological assessment provides valuable information regarding disease dissemination but has limited sensitivity for detecting small-volume peritoneal implants, mesenteric involvement, bowel serosal infiltration, and diffuse

diaphragmatic disease. Similarly, serum biomarkers including CA-125 and HE4 reflect tumor burden but cannot accurately predict technical resectability. Clinical variables such as performance status, nutritional condition, and ascites volume also influence surgical outcomes but lack sufficient predictive value when considered individually.

Consequently, a significant proportion of patients undergo unnecessary exploratory laparotomy or suboptimal cytoreductive surgery that fails to achieve complete tumor removal. These patients might benefit more from neoadjuvant chemotherapy followed by interval debulking surgery. Therefore, development of an integrated preoperative prediction model combining multiple independent predictors represents an important unmet clinical need.

Aim

To develop and evaluate a multiparametric predictive model integrating clinical characteristics, radiological findings (CT/MRI), and laboratory biomarkers (CA-125, HE4, serum albumin) for preoperative estimation of resectability in advanced ovarian cancer.

Materials and Methods

A retrospective analysis of patients undergoing primary cytoreductive surgery was performed. Clinical data, cross-sectional imaging reports, and preoperative laboratory values were collected and combined into a composite predictive score, which was compared against intraoperative and pathological resectability outcomes.

Results

The composite multiparametric model demonstrated higher predictive accuracy for complete cytoreduction than any single parameter evaluated in isolation, allowing more reliable identification of patients unlikely to achieve optimal debulking.

Conclusion

Combining clinical, radiological, and laboratory data into a single predictive model improves preoperative selection of candidates for primary cytoreductive surgery and may reduce the rate of suboptimal debulking procedures and unnecessary diagnostic laparoscopies.