Comparing ICG-Guided vs. Conventional Laparoscopic Lymphadenectomy in Gastric Cancer: A Systematic Review and Meta-Analysis

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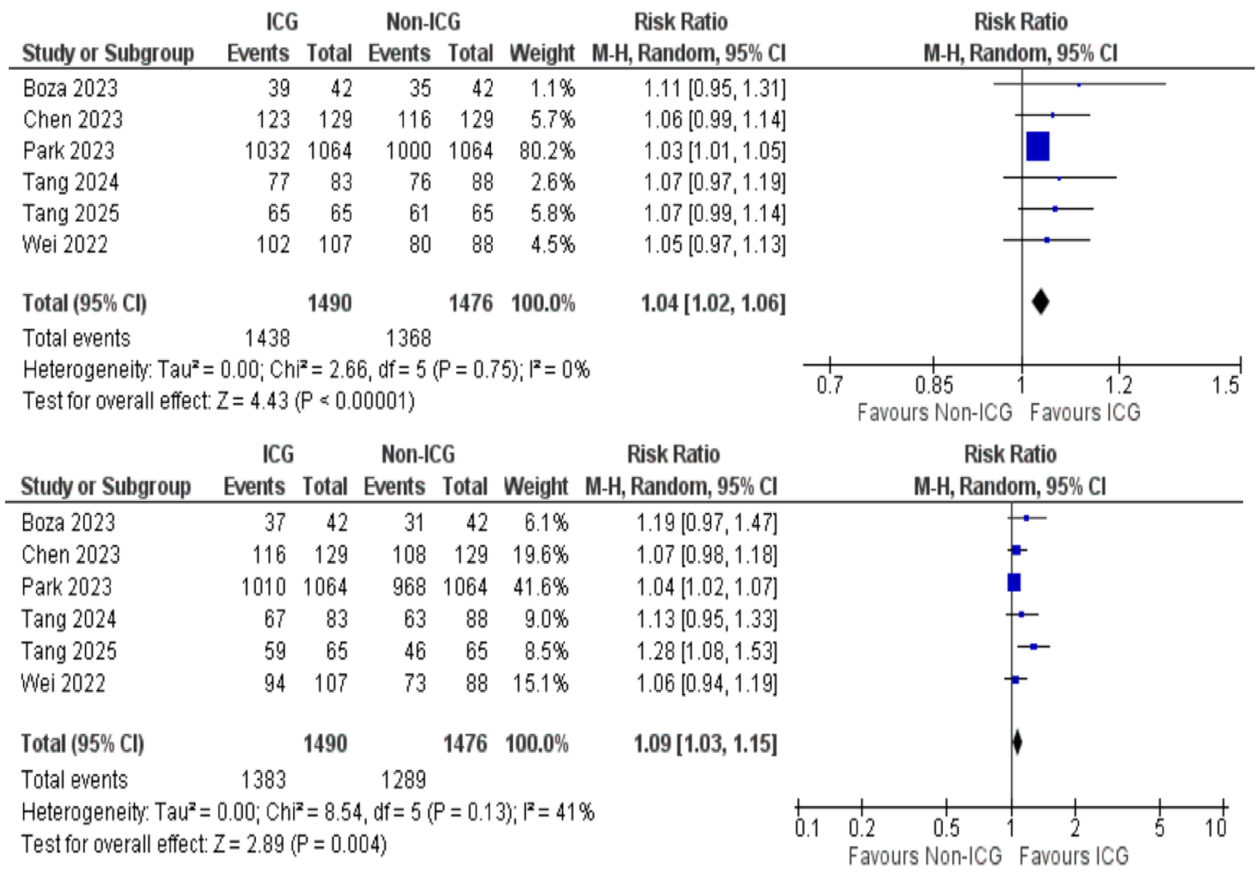
Introduction

Gastric cancer remains one of the leading causes of cancer-related mortality worldwide, with surgical intervention being a critical aspect of treatment. Lymphadenectomy plays a significant role in managing gastric cancer, with the extent of lymph node removal often influencing survival outcomes. Recent advancements in laparoscopic surgery have introduced the use of indocyanine green (ICG) fluorescence guidance to improve the accuracy and effectiveness of lymphadenectomy. However, the comparative efficacy of ICG-guided laparoscopic lymphadenectomy versus conventional techniques remains a topic of ongoing investigation. This study aims to evaluate the effectiveness and surgical outcomes of ICG-guided laparoscopic lymphadenectomy compared to conventional laparoscopic lymphadenectomy in patients with gastric cancer.

Methodology

A systematic review and meta-analysis, based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statements, was conducted (PROSPERO: CRD420251039604). A literature review was performed (sources: PubMed, Embase, and Cochrane Library databases; end-of-search date: April 22, 2025) and quality assessment was performed using the ROB 2 and Newcastle–Ottawa Scale. A random-effects model was used to pool the data for the meta-analyses..



Results

A total of 3996 patients from ten studies were analyzed, with 1870 undergoing ICG-guided surgery and 2126 in the non-ICG group. ICG use was associated with significantly improved 1-year (RR = 1.04) and 2-year (RR = 1.09) overall survival, and a greater number of retrieved lymph nodes (MD = 6.00). While intraoperative blood loss was significantly reduced with ICG (MD = −14.44 mL), no significant differences were observed in metastatic lymph node count, postoperative complications, operative time, or hospital stay.

Conclusion

ICG-guided surgery in gastric cancer is associated with improved short- and mid-term overall survival and enhanced lymph node retrieval. It also significantly reduces intraoperative blood loss without increasing postoperative complications, operative time, or hospital stay. These findings support the clinical value of ICG in improving surgical outcomes.

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