

## Laparoscopic Resection Shows Comparable Outcomes to Open Thoracotomy for Thoracoabdominal Neuroblastomas: A Meta-Analysis and Systematic Review

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**Abstract :** Background: Laparoscopic (LS) removal of neuroblastomas in children has been reported to offer favorable outcomes compared to the conventional open thoracotomy (OT) procedure. Critical perioperative measures such as blood loss, operative time, length of stay, and time to postoperative chemotherapy have all supported laparoscopic use rather than its more invasive counterpart. Herein, a pairwise meta-analysis was performed comparing perioperative outcomes between LS and OT in thoracoabdominal neuroblastoma cases. Methods: A comprehensive literature search was performed on PubMed, Ovid EMBASE, and Scopus databases to identify studies comparing the outcomes of pediatric patients with thoracoabdominal neuroblastomas undergoing resection via OT or LS. After deduplication, 4,227 studies were identified and subjected to initial title screening with exclusion and inclusion criteria to ensure relevance. When studies contained overlapping cohorts, only the larger series were included. Primary outcomes include estimated blood loss (EBL), hospital length of stay (LOS), and mortality, while secondary outcomes were tumor recurrence, post-operative complications, and operation length. The “meta” and “metafor” packages were used in R, version 4.0.2, to pool risk ratios (RR) or standardized mean differences (SMD) in addition to their 95% confidence intervals in the random effects model via the Mantel-Haenszel method. Heterogeneity between studies was assessed using the  $I^2$  test, while publication bias was assessed via funnel plot. Results: The pooled analysis included 209 patients from 5 studies (141 OT, 68 LS). Of the included studies, 2 originated from the United States, 1 from Toronto, 1 from China, and 1 was from a Japanese center. Mean age between study cohorts ranged from 2.4 to 5.3 years old, with female patients occupying between 30.8% to 50% of the study populations. No statistically significant difference was found between the two groups for LOS (SMD -1.02;  $p=0.083$ ), mortality (RR 0.30;  $p=0.251$ ), recurrence (RR 0.31;  $p=0.162$ ), post-operative complications (RR 0.73;  $p=0.732$ ), or operation length (SMD -0.07;  $p=0.648$ ). Of note, LS appeared to be protective in the analysis for EBL, although it did not reach statistical significance (SMD -0.4174;  $p=0.051$ ). Conclusion: Despite promising literature assessing LS removal of pediatric neuroblastomas, results showed it was non-superior to OT for any explored perioperative outcomes. Given the limited comparative data on the subject, it is evident that randomized trials are necessary to further the efficacy of the conclusions reached.

**Keywords :** laparoscopy, neuroblastoma, thoracoabdominal, thoracotomy

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