

5 - Title: Intercostal Nerve Cryoablation for Postoperative Analgesia following Minimally Invasive Lung Resection

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Trainee's ICJME Authorship Role(s): Substantial contributions to the acquisition, analysis, and interpretation of data for the work; drafting the work and reviewing it critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Background: Intercostal nerve cryoablation (IC) is a procedure in which a cold temperature probe is used to reversibly disrupt peripheral nerve function. It has shown promise as an effective postoperative pain management tool, with many patients reporting subsequent pain relief lasting weeks to months. Previous studies have compared outcomes in patients undergoing IC after thoracotomy, especially for Nuss procedures, but limited data exist on the utility of IC after robotic video assisted thoroscopic surgery (RVATS) for anatomic lung resections.

Methods: A retrospective chart review was conducted on thoracic surgery patients who underwent RVATS for anatomic lung resection between 2023 and 2024. IRB approval was obtained for the study. Collected variables included length of stay (LOS), readmissions, emergency department visits (EDVs), complications, and total opioid usage (including fentanyl, hydromorphone, oxycodone, and morphine) calculated as morphine milligram equivalents (MMEs) across intraoperative, perioperative, and postoperative periods. Length of stay was calculated as time of admission to time of discharge. Perioperative opioid usage was defined as any opioids received after leaving the operating room but before being transferred to the wards.

Results: Forty-nine patients underwent robotic lung resection without IC, while thirty-four patients underwent the procedure with IC. The average total opioid administration, including intra, peri and postoperative doses, was 65.7 MME/day for patients without IC and 54 MME/day for patients with IC ($p=0.06$). When excluding intraoperative administration and only analyzing post operative usage, patients without IC required 34.6 MME/day and patients with IC required 21.5 MME/day ($p=0.003$). Finally, when looking at only that which was given on the floors, patients without IC required 25.9 MME/day and patients with IC required 16.5 MME/day ($p=0.007$). The median LOS was 3.14 days without IC and 3.15 days with IC. There was no significant difference in rates of readmissions, EDV, air leaks, atelectasis, or pneumothorax.

Conclusions: Intercostal nerve cryoablation is a safe and effective pain management strategy in minimally invasive thoracic surgery that reduces overall opioid usage. There was no difference found in LOS, readmissions or EDV, but this may change in a study with greater statistical