Comparative Analysis of Robotic and Laparoscopic Hiatal Hernia Repair: Insights from a Surgical Artificial Intelligence (AI) Platform

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INTRODUCTION

Using an innovative surgical platform that provided Artificial Intelligence (AI) analysis of intraoperative insights, this study aimed to compare total procedure times and specific steps duration in robotic and laparoscopic revisional versus primary hiatal hernia repair (HHR), and to examine potential correlations between risk factors and postoperative outcomes.



METHODS AND PROCEDURES

A retrospective study was conducted on patients who underwent minimally invasive HHR between September 2023 and August 2024.

A surgical intelligence platform (Theator, Inc) provided total procedure times and durations of surgical steps and events, among them hiatal dissection, esophageal mobilization, hiatal repair, and wrap creation.

Demographics, operative and postoperative variables were collected from patient records. Operative times between robotic and laparoscopic cases in the primary and revisional groups were compared and logistic regression was used to assess the relationship between surgical approaches and complications.

RESULTS

92 patients were included:
•70 (22 robotic vs 48 laparoscopic) were primary HHR
•22 (7 robotic vs 15 laparoscopic) were revisional HHR

OT significantly differed between RHHR and LHHR:
•Revision HHR: 114 $\pm$ 23.3 vs 145.4 $\pm$ 34.1 mins, p= <0.05)
•Primary HHR: 101.1 $\pm$ 31.1 vs 135.7 $\pm$ 51.8; p<0.05

Wrap creation time differed between RHHR and LHHR:
•Revision HHR: 15.4 $\pm$ 4.8 vs 21.2 $\pm$ 5.6 mins, p= <0.05)
•Primary HHR: 17.5 $\pm$ 5.4 vs 21.6 $\pm$ 5.p<0.05

•No correlations was found for complications related to the approach (OR: 0.3, CI: 0.08-1.13; p: 0.076).

CONCLUSIONS

Robotic-assisted operations were shorter in total operative and in the duration of specific surgical steps in both revisional and primary cases, compared to laparoscopic cases.

Duration of procedures related to clinical outcomes demonstrated no significant correlation.

Nonetheless, when overall complications were correlated approaches, robotic-assisted surgeries showed trends towards fewer complications.