



# Western Surgical Association 2020 Annual Meeting

Monday, November 9, 2020  
4:00pm – 6:15pm Pacific Time  
– Virtual Meeting --

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## 2. THE ROBOTIC APPROACH TO DIAPHRAGMATIC HERNIA REPAIR IS ASSOCIATED WITH INCREASED COST AND PROLONGED LENGTH OF STAY

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**Background:** An increasing number of minimally invasive (MIS) diaphragmatic hernia repairs (DHR) are performed using robotic assistance. Few studies evaluate the impact of robotic assistance on clinical outcomes and costs of care in DHR. We examine the association between surgical approach and the index length of stay (LOS), rates of postoperative readmission, need for revisional endoscopy and surgery, and overall cost of care.

**Methods:** The Healthcare Cost and Utilization Project (HCUP) State Inpatient Database for Florida was queried to identify patients undergoing transabdominal open, laparoscopic, or robotic DHR between 2011 and 2015. Inpatient records were linked to the HCUP State Ambulatory Surgery and Services Database to identify related inpatient and outpatient readmissions occurring within 12 months of the index DHR. Patients undergoing robotic DHR were propensity score matched 1:1 for demographics, comorbid disease, facility type, facility volume, and procedure priority to those undergoing either open or laparoscopic DHR. Complication and readmission rates, index LOS and hospital costs, and total charges associated with readmission and interventional care for matched cohorts were compared.

**Results:** 4,747 patients underwent DHR. 3,257 (69%) were performed laparoscopically, 1,015 (21%) open, and 475 (10%) robotically. Utilization of robotic assistance increased from 5% in 2011 to 13% in 2015. On univariate comparison, patients undergoing laparoscopic and robotic DHR were slightly younger (open: 67.9 +/- 14.4, laparoscopic: 64.5 +/- 13.6, robotic: 66.5 +/- 13.1 years;  $p < 0.01$ ), more likely to have private insurance (21% vs. 30% vs. 25%;  $p < 0.001$ ) and to undergo DHR on an elective basis (52% vs. 86% vs. 85%;  $p < 0.001$ ) than those undergoing open DHR. 567 patients (12%) had at least one related inpatient or outpatient readmission within a year of the index procedure. The most common reason was for interventional endoscopy (68%). There were no statistical differences in the rate of or reason for readmission between surgical approaches. Propensity matching resulted in three cohorts of 475 patients. There were no statistical differences between matched cohorts with regard to rates of inpatient and outpatient readmission (open: 13%; laparoscopic: 11%; robotic: 14%;  $p = 0.27$ ), revisional surgery (open 3%; laparoscopic: < 2%; robotic: 2%;  $p = 0.49$ ), or postoperative endoscopy (open: 8%; laparoscopic: 8%; robotic: 12%;  $p = 0.12$ ). The mean index LOS for laparoscopic DHR was, however, statistically shorter than that for both open and robotic DHR (3.63 +/- 4.62



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days vs. 9.60 +/- 8.83 and 5.18 +/- 7.28 days respectively, all  $p < 0.001$ ). Index hospitalization costs for laparoscopic DHR were also significantly less than those for open or robotic DHR (\$15,554 +/- 14,878 vs. \$23,875 +/- 23,565 and \$24,487 +/- 22,316 respectively, both  $p < 0.001$ ). Index hospitalization costs for robotic DHR were statistically identical to those for open DHR ( $p = 0.68$ ), and aggregated one-year inpatient and outpatient charges were highest for those undergoing a robotic DHR (\$233,730 +/- 257,603 vs. open: \$202,604 +/- 210,673 and laparoscopic: \$134,500 +/- 134,574, all  $p < 0.05$ ).

**Conclusion:** For patients undergoing an MIS approach DHR, use of robotic assistance is associated with increased LOS, index hospital costs and overall procedure-related charges. Laparoscopic DHR is the most cost-effective approach to DHR.