



# Robotic surgery facilitates complex minimally invasive operations

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Robotic surgery continues to become more prevalent and adoption of the technology is evident in many facets of surgery. Robotic esophageal, gastric, pancreatic, colon and rectal resections have increased at a faster pace compared to laparoscopic techniques, and open resections have decreased between 2010 and 2014 (1). The number of articles related to robotic surgery have increased substantially in the past 10 years, indicating ongoing strong interest in the technology. There is overwhelming evidence in the literature supporting improved post-operative recovery and decreased length of stay for minimally invasive operations, therefore there exists a strong push towards performing complex operations using minimally invasive techniques (2). A major reason for the interest in robotic surgery appears related to the facilitation of complex minimally invasive operations.

Conventional minimally invasive techniques, like laparoscopy and thoracoscopy, have limitations in range of motion and dexterity, two-dimensional visualization, and challenging ergonomics. The advent of robotic surgery has allowed technological improvements to range of motion and dexterity, attenuation of tremor, three-dimensional view and superior ergonomics for the surgeon. Robotic surgery may assist in performance of complex operations particularly in thoracic procedures due to the rigid nature of the chest wall, lending further advantages to the available wristed instruments. The adoption of robotic surgery for common operations has been slower where many surgeons have mature experience in advanced laparoscopic skills and the pliable nature of the abdominal wall allows access to

most areas of the abdomen using straight instruments (3).

The use of robotic surgery (T-RAMIE) compared to a hybrid laparotomy approach (H-RAMIE) for the abdominal portion of the esophagectomy was evaluated by Na and colleagues (4). Preparation of the gastric conduit and lymphadenectomy is a critical step for esophagectomy and is technically challenging. There were no statistical differences between robotic and open techniques regarding lymph nodes harvested, anastomotic leaks or other associated complications indicating that the total robotic approach is feasible and safe, albeit within the limitations of a retrospective study. Similar findings have been found in other complex operations performed using robotic surgery compared to open technique for gastric, pancreatic, colon, rectal, lung, prostate and uterine oncologic resections (1,5-7). Comparing clinical outcomes between robotic techniques and conventional laparoscopic or thoracoscopic techniques is difficult methodologically; however, studies have emerged implicating improved clinical outcomes for operations where robotic techniques have matured (6-8).

Complex operations such as esophagectomy, traditionally performed using an open surgical approach, are feasible and safe using robotic techniques. Significant interest in robotic surgery is due to the ability to facilitate completion of complex surgeries using minimally invasive techniques. Further studies are necessary focusing on the facilitation of complex operations while maintaining excellent clinical and oncologic outcomes during this period of increasing adoption, improvement and maturation of robotic surgical

technology.

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