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Original article

Laparoscopic hand-assisted versus robotic-assisted laparoscopic sleeve gastrectomy: experience of 103 consecutive cases

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Abstract

Background: Laparoscopic sleeve gastrectomy has become a stand-alone procedure in the treatment of morbid obesity. There are very few reports on the use of robotic approach in sleeve gastrectomy.
Objectives: The purpose of this retrospective study is to report our early experience of robotic-assisted laparoscopic sleeve gastrectomy (RALSG) using a proctored training model with comparison to an institutional cohort of patients who underwent laparoscopic hand-assisted sleeve gastrectomy (LASG).
Settings: University hospital.
Methods: The study included 108 patients who underwent sleeve gastrectomy either via the laparoscopic-assisted or robot-assisted approach during the study period. Of these 108 patients, 62 underwent LASG and 46 underwent RALSG. The console surgeon in the RALSG is a clinical year 4 (CY4) surgery resident. All CY4 surgery residents received targeted simulation training before their rotation. The console surgeon is proctored by the primary surgeon with assistance as needed by the second surgeon.
Results: The patients in the robotic and laparoscopic cohorts did not have a statistical difference in their demographic characteristics, preoperative co-morbidities, or complications. The mean operating time did not differ significantly between the 2 cohorts (121 min versus 110 min, $P = .07$). Patient follow-up in the LSG and RALSG were 91% and 90% at 3 months, 62% and 64% at 6 months, and 60% and 55% at 1 year, respectively. The mean percentage estimated weight loss (EWL%) at 3 months, 6 months, and 1 year was greater in the robotic group but not statistically significant (27 versus 22 at 3 mo [$P = .05$] and 39 versus 34 at 6 mo [$P = .025$], 57 versus 48 at 1 yr [$P = .09$]). There was no mortality in either group.
Conclusion: Early results of our experience with RALSG indicate low perioperative complication rates and comparable weight loss with LASG. The concept of a stepwise education model needs further validation with larger studies. (Surg Obes Relat Dis 2015;∎:00–00.) © 2015 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Sleeve gastrectomy; Robotic; Bariatric surgery

Bariatric surgery has emerged as a successful modality in the treatment of morbid obesity with the revolution in minimally invasive surgery and stapling techniques [1,2]. Among Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy, adjustable gastric banding (AGB), and duodenal switch, the sleeve

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gastrectomy has quickly gained momentum as the most commonly used bariatric procedure in some centers [3,4]. Initially conceived as the restrictive component of the biliopancreatic diversion, sleeve gastrectomy has now emerged as a viable and definitive bariatric procedure for the management of morbid obesity [5–8]. Recent meta-analyses reviewing the studies in the last decade (2003–2012) have found sleeve gastrectomy to result in weight loss greater than AGB and comparable to RYGB [9,10].

Laparoscopic bariatric surgery has better safety profile than open approach and the application of minimally invasive techniques have steadily increased in the past decade [4,11]. Minimally invasive techniques have included both traditional laparoscopy and robotic-assisted laparoscopy. Although the use of a robotic system has been studied extensively in RYGB, there are very few reports on its utility for cases of sleeve gastrectomy [12,13].

In addition, there remains lingering hesitations on the best method to introduce robotic surgery in the training of surgical residents without adversely affecting operative time and patient safety. Our group previously reported the success of a proctored training model (PTM) in safely introducing robotic adjustable gastric banding with the objective of robotic training to surgical residents [14]. We employed a similar model for the introduction of the robotic approach to sleeve gastrectomy in the training program. Herein we report our early experience of robotic-assisted laparoscopic sleeve gastrectomy (RALSG) using a PTM compared with an institutional cohort of patients who underwent laparoscopic hand-assisted sleeve gastrectomy (LASG).

Methods

After Institutional Review Board approval, all consecutive patients who underwent sleeve gastrectomy from February 2010 to February 2012 at our institution were identified from a prospectively maintained administrative database. The data were collated to protect patient anonymity and retrospectively reviewed.

A total of 108 consecutive patients were identified who underwent sleeve gastrectomy during the study period. Inclusion criteria included age ≥ 18 years and body mass index (BMI) ≥ 35–39 with 1 obesity-associated comorbidity or BMI ≥ 40. Five patients were excluded from analysis; 4 cases were aborted and 1 was performed in a patient after gastric band removal. All 4 aborted cases were in the conventional LSG group. One was aborted secondary to cirrhotic changes noted intraoperatively, whereas the remaining procedures were aborted because of significant adhesions from prior foregut surgeries. The use of laparoscopic versus robotic technique was nonrandomized and determined by patient preference as well as the availability of robotic technology. All patients underwent identical preoperative evaluation, including a psychological evaluation and cardiovascular clearance in accordance with American Society of Metabolic and Bariatric Surgery guidelines.

Resident simulation training

Senior surgical residents completed a robotic training module using the Da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA, USA) before surgical rotation. Residents practiced 6 timed tasks: docking the robot at the bedside, manipulating instruments using the console, dissection of tissue, transection, figure-of-8 suturing, and running suturing. Surgical residents met minimum competency times for each task, as determined by Intuitive Surgical robotic trainer, before the use of the robot in the operating room.

Surgical technique and education

After endotracheal intubation, the patient was positioned supine with arms extended laterally and legs belted with footplate in position. A nasogastric tube and Foley catheter were placed. The patient was placed in steep reverse Trendelenburg position.

Laparoscopic hand-assisted sleeve gastrectomy was performed following the technique of Moy et al. [15] with the addition of a 7-cm handport incision placed in the right paramedian region. The patient was placed in a modified lithotomy position. After inflation, a 38F bougie was placed in the stomach. After taking down the minor adhesions between the stomach and the left lobe of the liver, an opening was made in the greater omentum across from the angularis. A linear stapler was used to create the gastric sleeve pouch from the greater curve to the angle of His superiorly. The short gastric vessels were then divided using the Ligasure vessel sealing device. A nasogastric tube was placed into the pouch and the pouch tested for leak using indigo blue. A no. 10 Jackson-Pratt drain was placed near the pouch.

Robotic-assisted sleeve gastrectomy utilized similar port positions with the exception of the handport. The Da Vinci S robotic platform was used for the procedures. In accordance with the previously validated PTM model [12], the RALSG procedure was divided into 7 key steps as determined by the 2 experienced primary surgeons (N. N. W. and K. R. D.): port placement, opening of the greater omentum along the greater curvature using Ligasure vessel sealing device, ligation of short gastric vessels, freeing of the attachment of the stomach from the left crus and the pancreas, gastric transection starting 4–6 cm from the pylorus to the gastroesophageal junction using sequential staplers, inspection of the staple line, and removal of the transected specimen. The robotic procedure involved 3 surgeons: a bedside surgeon (N. N. W.), the trainee who operated the robotic console, and a proctor surgeon