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Perioperative outcomes after totally robotic gastric bypass: a prospective nonrandomized controlled study

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Abstract

BACKGROUND: Perioperative short-term outcomes could be improved after totally robotic Roux-en-Y gastric bypass (TR-RYGBP) compared with conventional laparoscopic gastric bypass.

METHODS: This is a nonrandomized controlled prospective study (N = 200) to evaluate perioperative short-term outcomes. The primary endpoint was to investigate risk factors for 30-day surgical complications.

RESULTS: Mean total operative time was shorter in patients who underwent TR-RYGBP (130 vs 147 minutes; $P < .0001$). However, postoperative surgical complications rate (13% vs 1%; $P = .001$), and mean overall hospital stay (9.3 vs 6.7 days; $P < .0001$) were higher after TR-RYGBP. By multivariate analysis, robotic surgery (hazard ratio [HR] = 15.1; 95% confidence interval [CI], 2.8 to 280; $P = .01$), and conversion to laparotomy (HR = 18.8; 95% CI, 1.7 to 250.8; $P = .014$) were independent risk factors for 30-day surgical complications.

CONCLUSIONS: Although robotic gastric bypass reduces mean operative time, TR-RYGBP is associated with an increased postoperative surgical complications rate and longer hospitalization.

Morbid obesity is a public health issue because of the comorbidities and excess mortality related with being overweight.[1] Currently, bariatric surgery is the only long-term effective treatment for obtaining significant and lasting weight loss and is associated with marked reduction in overall mortality.[2] Among the different available techniques, the laparoscopic Roux-en-Y gastric bypass (L-RYGBP) is performed most often and is considered by many as the gold standard.[3] Although perioperative morbidity and mortality rates are very low, L-RYGBP is still an advanced complex laparoscopic procedure requiring advanced training.

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Over the past 10 years, technical advances have led to the development of robotic assistance with the ambition to overcome some of the limitations associated with conventional laparoscopic surgical procedures. The use of a robotic system has been evaluated in many abdominal surgical procedures.[4] The potential benefits provided by the robot for laparoscopic bariatric surgery are numerous, with its 3-dimensional view, wristed instrumentation, optimized ergonomics, and tremor filter. These facilitating factors could result in improved dissection and suturing, creating a hand-sewn gastrojejunostomy with high accuracy. Thus, several publications have demonstrated the feasibility of the Roux-en-Y gastric bypass with the robotic approach.[5,6] Other previous studies have shown that robotic surgery reduces the incidence of gastrointestinal anastomotic stricture or leak, with no significant difference for other postoperative complications, operative time, and hospital stay.[7,8] However, these studies are mainly retrospective, heterogeneous, and include both robot-assisted (use of the robot for the gastrojejunal anastomosis only) and totally robotic procedures.

The aim of this study was to evaluate in a nonrandomized controlled prospective study, perioperative short-term outcomes (from operation to 90 postoperative days) in patients who underwent L-RYGBP and totally robotic Roux-en-Y gastric bypass (TR-RYGBP).[9,10] We hypothesized that perioperative short-term outcomes could be improved after TR-RYGBP compared with conventional L-RYGBP.

Methods

Selection of patients

All consecutive patients who underwent a bariatric surgical procedure in the multidisciplinary unit for obesity surgery have been included in a prospective database since 2007. A total of 736 bariatric procedures were performed between January 2007 and December 2011. Among them, 566 patients underwent a gastric bypass either as an initial bariatric procedure (498 patients) or after a previous bariatric procedure (68 patients). Among the 498 patients who had a gastric bypass as initial bariatric procedure, 166 patients underwent a TR-RYGBP and 332 patients a L-RYGBP. Two different board certified surgeons (N.R. and L.B.) performed all Roux-en-Y gastric bypasses. Selection for robotic or conventional laparoscopic approach was based on the patient's choice.

The learning curve reported in the literature for gastric bypass is about 75 cases, with increased complication rates in the early experience.[11,12] More precisely, the learning curve for L-RYGBP and TR-RYGBP ranges from 50 to 100 patients and 15 to 50 patients, respectively.[6,13–16] In April 2009 and before the first patient was included in this study, N.R. and L.B. had performed 110 (0 TR-RYGBP and 110 L-RYGBP) and 153 (54 TR-RYGBP and 99 L-RYGBP) gastric bypasses, respectively. Because learning curve bias for both approaches was avoided at that time, this nonrandomized controlled prospective study was started to evaluate perioperative short-term outcomes after L-RYGBP and TR-RYGBP. Applying previous retrospective data and published data, a sample size of 198 patients would give a >90% power (2-sided *t* test, $P = .05$) to detect a difference in the change in perioperative short-term outcomes (20% change) between the groups.[4,7,8,17,18] Consequently, 200 consecutive patients were included from April 2009 to October 2011. In this study all L-RYGBP were performed by 1 surgeon (N.R.) and all TR-RYGBP by another surgeon (L.B.). Of note, both surgeons were experienced laparoscopic bariatric surgeons with similar outcomes performing L-RYGBP. The study flowchart is represented in Fig. 1.

All patients included in this study met the National Institutes of Health (NIH) consensus criteria for bariatric surgery, the French guidelines for morbid obesity surgery, and fulfilled the institutional guidelines of medically supervised weight loss and psychological clearance.[19,20] Signed informed consent was obtained from all patients. This study was approved by our institutional review committee.

Surgical technique

Regardless of the surgical approach, all Roux-en-Y gastric bypasses were performed according to the method in Olbers et al.[17] In L-RYGBP patients, a side-to-side linear

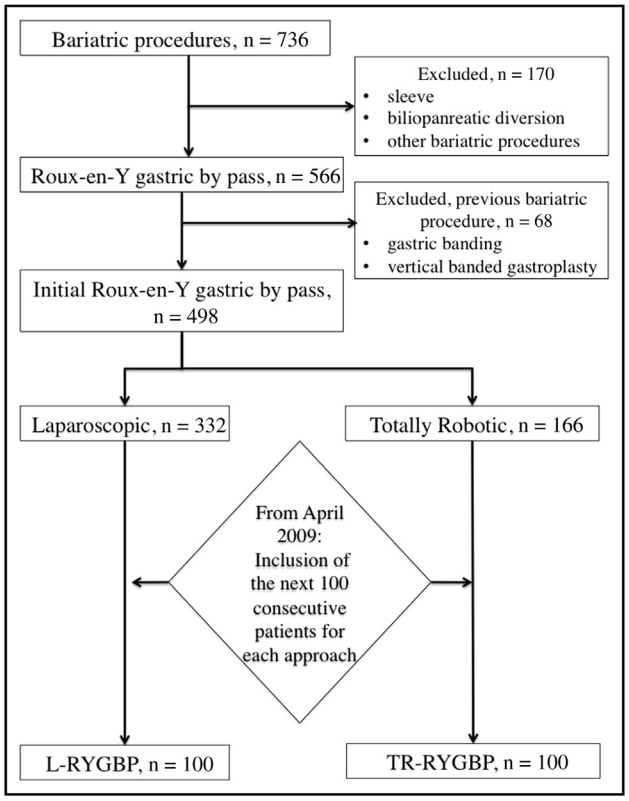

Figure 1 Flowchart for this study.