ROBOTIC ROUX-EN-Y GASTRIC BYPASS: OPERATIVE RESULTS IN 100 PATIENTS

Bypass gástrico em Y-de-Roux por via robótica: resultados de 100 pacientes operados

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ABSTRACT – Background – Laparoscopic gastric bypass is gold-standard for morbid obesity treatment. Aim – To describe the results of robotic gastric bypass for morbid obesity patients. Method – Were operated on 100 morbidly obese patients through totally robotic gastric bypass between 2013 and 2014. They were 83% female. The age ranged from 20 to 65 years old (medium 48.5 years); the body mass index varied between 38-67 (medium 42.3 kg/cm²). The procedure was designed with 3 cm long gastric pouch, 1 m biliopancreatic limb, 1.2 m alimentary limb, manual or stapled anastomosis. There were four super-super-obese patients and four revisional surgeries. Results – Docking time varied from 1 to 20 min (medium 4 min). Console time varied from 40-185 min (medium 105 min). There were no intra operative complications or mortality. There were two lower limb deep venous thrombosis. There was no readmission in the first 30 days. Conclusion – Totally robotic gastric bypass is safe and reproduceable, with excellent results even during the initial experience with regular surgeries, revisional surgeries or in super-obese patients. Adequate training may shortens or obviates the learning curve.


INTRODUCTION

Laparoscopic Roux-en-Y gastric bypass, in its various versions - as the size of the gastric stump, anastomotic diameter, shape of anastomosis, extension of food and biliopancreatic loops, use or no use of constriction ring - is still the procedure of election to help control morbid obesity17. More recently, the operation called robotics - performing laparoscopic surgery using robotic arms controlled remotely by the surgeon – was proposed as an evolution of conventional laparoscopy, and is being evaluated in performing the gastric bypass. The objective of this paper is to present the results of the initial 100 cases of patients operated between 2013 and 2014, with totally robotic approach analyzing demographic data, length of docking time, console time, learning curve, time of hospitalization, immediate complications and re-admissions in the immediate postoperative period.

METHOD

One hundred non consecutive patients suffering from morbid obesity were operated. The selection between laparoscopic and robotic approach was based on patient choice and access to robotic platform without randomization. Eighty-three patients were women (83%), aged 20-65 years (mean 48.5), body mass index (BMI) between 38-67 (mean 42.3). They underwent Roux-en-Y gastric bypass totally robotic. The model of operation consisted of a 3 cm gastric pouch, biliopancreatic loop of 1 m, feed loop of 1.2 m, manual anastomosis or a linear stapler.

Two of the authors (CED and PV) had extensive prior training, consisting of theoretical learning, training on dry and wet lab, edited videos visualization, live
assistance to operations, training simulator for more than 40 h before the first procedure and supervision in the first 20 operations done by an enabled robotic bariatric surgeon.

**RESULTS**

All operations were done in fully robotic way, without any conversion. The docking time of the robotic platform is shown in Figure 1.

![Figure 1 - Docking time](image1.png)

**FIGURE 1** – “Docking time”

The adaptation of the robotic arms to the trocars, performed by the surgeon and the assistant, varied between 1 and 20 min, and proved to be practically constant since the beginning, with 15 cases in which there was no more than 5 min delay for docking, almost uniformly distributed during the period, tending to remain below 4 min after about 50 cases; in most cases this time was even lower than 4 min.

The console time of the surgeon (Figure 2) ranged from 40 min (one patient) to 185 minutes (one patient), with a mean time of 105 min. In the first 30 patients tended to be between 60 and 135 min; thereafter decreased between 50-80 min. There was consistent and progressive decrease in the average operating time with increasing experience.

![Figure 2 - Console time](image2.png)

**FIGURE 2** – Console time

There were no intraoperative complications but only two minor in the immediate postoperative period: two patients had deep venous thrombosis of in the lower limbs. These occurrences were unrelated to age, risk factors for thrombosis, medication use, operation time or prolonged immobilization, and occurred in case number 35 and 67.

Patients were free to eat in the next morning and released from hospitalization in 24 h or less. None needed to remain more than 24 h in the hospital. There were no leaks or fistulas. There was no postoperative mortality. There was no re-admission within 30 days postoperatively. Four patients previously operated on for morbid obesity were re-operated for complications or poor results of previous bariatric operation. In these revisional operations, the immediate postoperative course was similar to the conventional procedure, regardless of the complexity of the revisional operation. Four patients were super-obese, and the operation was performed safely and comfortably in them all; operation was not prolonged for this reason.

**DISCUSSION**

Bariatric surgery has evolved significantly over the past 20 years. Complications decreased and the leaks and fistulas occur in less than 0.5% of cases. Conversion rates, bleeding, fistulas or leaks from anastomoses and immediate re-operations are currently very low. Bariatric surgery has achieved the level of excellence through progressive learning with the standardization and systematization of the operative procedure, and the best results obtained in high-volume services.

The robotic surgery - laparoscopic surgery with the aid of mechanical arms with remote control - brought new perspectives. The three dimensional robotic vision, coupled with the precision of movements and the degree of freedom of the robotic grippers, brought new approaches for more complex laparoscopic operations. It has several advantages in patients with very thick abdominal wall, large amount of intra-abdominal fat, limited space for pneumoperitoneum, very large livers, small and difficult to access operative field. These facts may prolong procedure demanding great performance and requiring great physical strength of the surgical team, decreasing the precision of movements. The robotic platform has features that would bring advantages and solutions to these difficulties. The robotic arms are fixed and offer constant traction without the need of force by the surgeon. The puncture point of the abdominal wall is stable, and the arm rotates around this point, not exerting any force on the wall; by contrary, allows further lifting and increase the abdominal cavity by trocar drift coupled with the longer arm, catching a few inches up. Space can be larger than the laparoscopic field, and much more stable without the need to exert force in manipulating the instruments. These features assist in performing the procedure with precision and certainty. The three-dimensional view and high image magnification allows the surgeon to operate on tiny operative field operative even in small spaces. The fixed camera and the stable arm also help determine safety and accuracy. However, this characteristic of the positioning and fixing of the robot may be responsible for a greater number of postoperative hernias of the trocars sites.

All these differences favoring the robot could determine the achievement of better results than with conventional laparoscopic bariatric surgery. However, analysis of case series, systematic or comparative reviews, have difficulty in proving significant advantage of the robot over conventional laparoscopy. One of the reasons is that the current laparoscopic treatment has low morbidity and mortality, necessitating very large number of patients to obtain significant results.

Prospective studies comparing robotic and laparoscopic gastric bypass demonstrated equal or better results with robot. In a study was made comparison of robotic initial series with the previously performed laparoscopic series, showing higher immediate complications and longer hospitalization in the robotic series.

The analysis of these studies requires assessment to the so called learning curve, which can influence the
CONCLUSION

Totally robotic gastric bypass is safe and reproducible, with excellent results even during the initial experience with regular surgeries, revisional surgeries or in super-obese patients. Adequate training may shorten or obviate the learning curve.

REFERENCES