

# Impact of the implementation of the robotic approach to bariatric surgery in our environment

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## Abstract

The use of robotic platforms for major abdominal surgery is booming, with more and more bariatric surgeons completing their learning curve for these procedures, thus increasing the number of bariatric interventions. atrics made using the Da Vinci Xi system. In this study, we present the results of robotic bariatric surgery performed in our center, compared with the laparoscopic approach, in terms of surgical complications, postoperative pain, hospital stay and surgical time.

## Keywords:

- bariatric surgery
- Robotic surgery
- Sleeve gastrectomy
- Gastric bypass
- Revisional surgery

## Introduction

The minimally invasive approach has been the gold standard for bariatric surgery for years, with clear benefits such as reduced morbidity and hospital stay. Among the multiple techniques performed, the most common are the vertical gastrectomy (GV) and the Roux-en-Y gastric bypass (BG). These techniques have classically been performed through laparoscopic surgery, although currently the use of the robotic approach in bariatric surgery is booming.

The initial concept of robotic surgery originated in 1970, when the United States attempted to develop a system that would allow surgery to be performed remotely. It was in 2000 that the Da Vinci surgical system was approved by the United States Food and Drug Administration (FDA). Since then, the impact of robotic surgery has not been limited to a single surgical discipline, transforming the concept of surgery around the world.

The use of the robotic platform in bariatric surgery began in 1999, with Cadier et al. (1) reporting the first case. Since then, its use has been progressively increasing both for primary surgery and for revision surgery, facilitating various

surgical maneuvers that are laborious to perform by laparoscopy. However, meta - analyses carried out on the advantages of robotic bariatric surgery over laparoscopic surgery present inconclusive results [2, 3].

The objective of our present work will be to analyze the impact of the implementation of the robotic approach using the Da Vinci Xi platform in bariatric surgery in our environment.

## Material and methods

surgical procedures safely in the surgical technique, reducing postoperative pain and accelerating functional recovery. However, the use of robotic devices requires a training process to accredit digestive surgeons for their use (performing 20 robotic procedures).

Robotic surgery has been established in our center since 2019, with the start of robotic bariatric surgery in 2022. The bariatric surgery unit of our center has completed the accreditation process for the Da Vinci robotic platform, having completed the learning curve for bariatric procedures. From June 3, 2022 to January 17, 2024, 92 patients underwent pri-

mary bariatric surgery, performing 6 conversion surgeries. Since the beginning of bariatric surgery in our center, the bariatric surgery unit has had a session every 15 days to perform interventions using the Da Vinci Xi platform.

In this study we will analyze the number of patients operated on with the Da Vinci Xi robotic approach, comparing the results of surgical time, average stay and complications with respect to the laparoscopic approach.

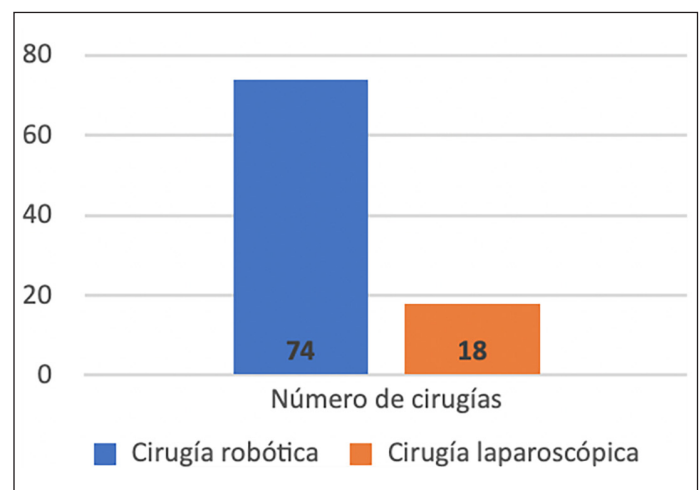
## Results

In the last two years, 91 patients have undergone bariatric surgery in our center, of which 74 have been operated on by a robotic approach (32 BG, 37 GV and 5 conversions to bypass) and 18 by laparoscopic (6 BG, 9 GV and 3 conversions to bypass) (*figures 1 and 2*). A total of 8 revision surgeries have been performed, 7 for de novo gastroesophageal reflux disease (GERD) and one gastric band removal. Of these revision surgeries, 3 have been operated on using a robotic approach.

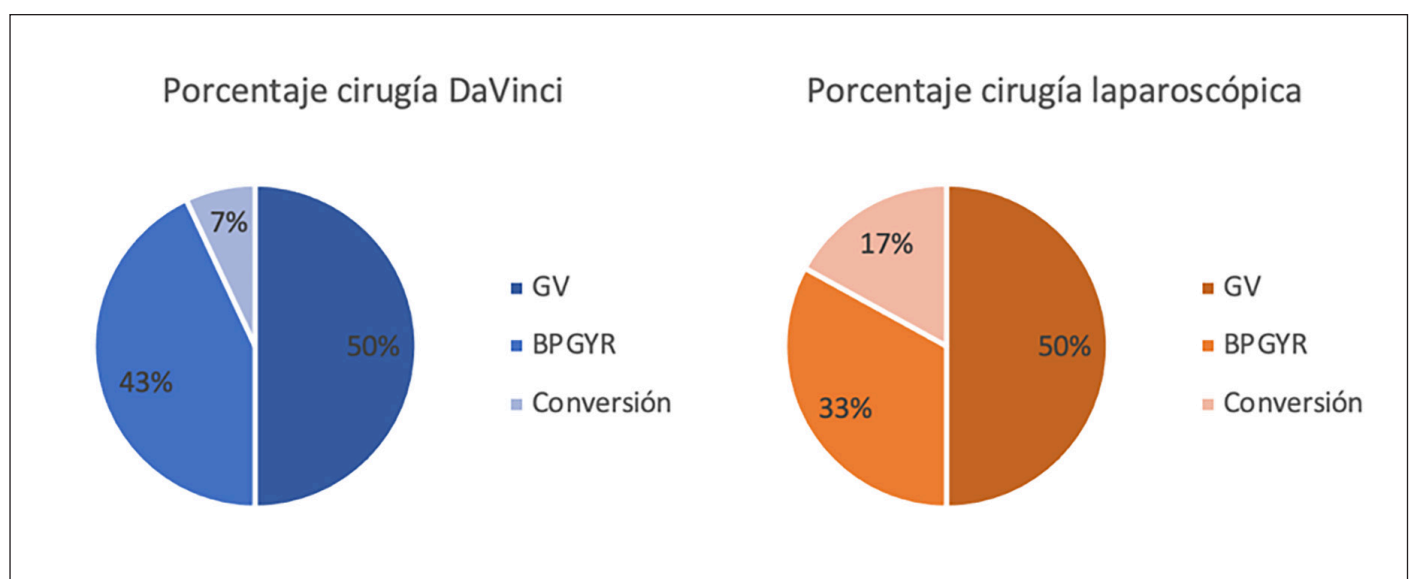
We have operated on a total of 30 men and 61 women, with an average age of 47 years (minimum 20 years, maximum 69 years) and average BMI of 133.31 kg/m<sup>2</sup> (minimum 91 kg / m<sup>2</sup>, maximum 170 kg/m<sup>2</sup>). The total robotic surgery times, including preparation and *docking*, were 120 minutes for the robotic gastric bypass (minimum 100 minutes, maximum 190 minutes), 75 minutes for the robotic vertical gastrectomy. otic (minimum 35 minutes, maximum 90 minutes), and

180 minutes for conversion from vertical gastrectomy to robotic gastric bypass. These surgical times can be compared with the results presented in the total time it took to perform bariatric surgery by laparoscopic approach, which was 90 minutes for gastric bypass (minimum 60 minutes, maximum 95 minutes), 40 minutes for vertical gastrectomy (minimum 35 minutes, maximum 60 minutes) and 120 minutes for conversion from vertical gastrectomy to laparoscopic gastric bypass.

Postoperative complications included a Clavien Dindo II complication (self-limited upper gastrointestinal bleeding in



**Figure 1. Number of bariatric surgeries performed by robotic surgery (74, 80%) and laparoscopic surgery (18, 20%).**



**Figure 2. Comparison of surgeries performed by the Da Vinci Xi robotic platform and laparoscopic surgery in our center.**

	Tiempo quirúrgico total (min.)	Complicaciones	Estancia media (horas)	Dolor EVA
<b>BG lap.</b>	90 (60-95)	1 HDA	48 (36-72)	
<b>GV lap.</b>	40 (35-50)	No	48 (36-72)	
<b>Conversión lap.</b>	120	No	96 (48-168)	
<b>BG DaVinci</b>	120 (100-190)	No	48 (36-72)	1.5
<b>GV DaVinci</b>	75 (35-90)	No	48 (36-72)	1.5
<b>Conversión DaVinci</b>	180	1 hemoperitoneo	96 (48-168)	

**Figure 3. Results of robotic - laparoscopic procedures performed since the establishment of bariatric surgery in our environment.**

a laparoscopic BG) and a Clavien Dindo IV complication (hemoperitoneum after revision surgery from vertical gastrectomy to robotic gastric bypass that required reintervention). Both complications occurred early in the learning curve. No leaks or dehiscences occurred postoperatively.

The average postoperative stay of the patients was 48 hours for primary procedures (minimum 36 hours, maximum 72 hours) and 96 hours for revisional surgery (minimum 48 hours, maximum 168 hours). Postoperative pain was evaluated with the VAS scale, with an average of 1.5 points in patients operated on using a robotic approach.

## Discussion:

Minimally invasive bariatric surgery continues to be the *gold standard* for this type of surgical intervention. On the other hand, many consider the use of the Da Vinci Xi robotic platform as the natural evolution of laparoscopic surgery, the use of which is gradually becoming established in different national and international hospital centers. Although the device was initially implemented in general surgery for colorectal pelvic surgeries, its advantages for both the patient and the surgeon are leading to its rapid establishment as a fundamental pillar in the different healthcare units. general surgery [2,3].

Robotic surgery offers potential benefits such as articulated instrumentation, high-definition 3D visualization, tremor cancellation in the surgeon's hands, as well as a more ergonomic posture for surgery. Its use has been limited by its high cost and long surgical times, as well as its doubtful ability to improve the times of conventional laparoscopy [4].

In bariatric surgery, its results have also been classically contradictory, and although it is suggested that it can help reduce anastomotic stenosis and anastomotic leaks, these findings have not been demonstrated in studies with large scales. patient cohorts. Yes, the simplification with the robotic system of complex maneuvers at a laparoscopic technical level has been demonstrated, such as the ease in performing total manual anastomoses, or the ease in releasing abdominal adhesions when performing the BG. The "lever" effect that occurs with laparoscopic trocars on the abdominal wall of the obese patient is improved with the use of robotic arms that compensate for the resistance applied by the patient's abdominal wall [5].

The implementation of the DaVinci Xi robot in our unit has had a positive impact for our patients. In this way, surgical times, complications and average length of stay become closer to the laparoscopic approach as the number of cases increases. In our results, surgical time is increasingly approaching those of interventions performed by laparoscopy. We have also increased the number of manual sutures performed, since the Da Vinci Xi platform allows them to be performed easily and safely. Finally, we have observed that postoperative pain is less in patients operated on using a robotic approach, although we believe that more long-term studies will be necessary to confirm these results.

In conclusion, although robotic surgery is increasing in popularity among surgeons and the results of its use are favorable in our center, multicenter studies and analysis of national and international databases are needed to clarify the role of primary and revisional robotic bariatric surgery [6].

## Conclusions

Classically, the results of laparoscopic bariatric surgery and robotic bariatric surgery are similar in terms of hospital stay, reinterventions after 30 days, complications, leak, stenosis or blood loss. postoperative among others. Robotic bariatric surgery has thus proven to be non-inferior to laparoscopic bariatric surgery in the treatment of obesity, as reflected in our results and those of the different studies reviewed. In addition, robotic surgery helps us simplify complex laparoscopic gestures, facilitating different stages of surgery. However, more studies are necessary to confirm these results [7].

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