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Robotic single anastomosis duodenal switch after sleeve gastrectomy: step-by-step video technique using the Hugo™ RAS system

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Abstract

The single anastomosis duodenal switch after sleeve gastrectomy (SADI-S) is a recommended technique for patients with a body mass index (BMI) > 50, either as a primary or secondary procedure, or for patients with insufficient weight loss or weight regain following a vertical gastrectomy. In 2024, we performed the first SADI-S procedures using the Hugo™ RAS robotic system. The objective of this study is to present a step-by-step video of the technique. The case involves a 35-year-old female patient with a history of hypertension and obesity, who had an initial BMI of 48. She underwent sleeve gastrectomy in 2014 and reached a minimum postoperative weight of 75 kg. However, she subsequently experienced progressive weight regain, reaching a BMI of 40, for which surgery was indicated. The Hugo™ RAS robot consists of 4 independent modular arms and an open console. In this surgery, 4 robotic arms and one laparoscopic trocar for the assistant were used. A common limb of 300 cm was measured, and a manual isoperistaltic side-to-end duodeno-ileal anastomosis was performed in two layers. The performance of SADI-S using the Hugo™ RAS robotic system is feasible and safe.

Keywords:

- single anastomosis duodenal switch after sleeve gastrectomy (SADI-S)
- Sleeve gastrectomy (SG)
- Robotic bariatric surgery
- Hugo™ RAS system

Introduction

The single-anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) has gained significant attention due to its simplicity, favorable weight loss outcomes, effective metabolic disease control, and low complication rates, particularly when performed as a revision surgery for weight regain or as a second-stage procedure after a sleeve gastrectomy (SG) (1,2). The technique, as described originally by Sánchez-Pernaute, involves duodenal transection at the level of the gastroduodenal artery and a hand-sewn end-to-side anastomosis between the duodenum and the ileum 200 cm from the ileocecal valve (3). This suture represents a significant technical challenge when performed laparoscopically, especially in patients with grade IV and V obesity due to increased abdominal wall thickness, large liver size, and greater visceral fat (4).

The introduction of robotic platforms has enhanced precision, flexibility, and control by providing high-definition 3D visualization and enabling instrument manipulation that mimics human hand movements, with a range of motion exceeding natural anatomical capabilities, potentially improving perioperative outcomes (5).

The gradual expiration of hundreds of patents held by Intuitive since 2016 has allowed the emergence of new robotic platforms, including the Hugo™ RAS system by Medtronic, first used in Europe in 2022 (6). This system features an open console and modular architecture, offering logistical, ergonomic, and economic advantages. At our hospital, we have had access to the Hugo™ RAS robot since 2023, at which point we began performing bariatric surgeries following cadaver-based training at the ORSI academic center. We initiated our learning curve with simpler procedures such as

SG, followed by Roux-en-Y gastric bypass (RYGB), and finally, SADI-S.

The aim of this report is to describe the SADI-S technique using the Hugo™ RAS system assisted by laparoscopy.

Materials and methods

We present the case of a 35-year-old female patient with a history of hypertension and obesity, with an initial body mass index (BMI) of 48. She underwent SG in 2014 and achieved a postoperative minimum weight of 75 kg (BMI 30). However, she subsequently experienced progressive weight regain, reaching a BMI of 41. She was evaluated by a multidisciplinary committee and deemed a candidate for conversion surgery—in this case, a SADI-S.

The patient was positioned supine with legs apart in a 12-degree anti-Trendelenburg position. Pneumoperitoneum was established in the left hypochondrium using a Veress needle, and the trocars were placed as follows: one 12 mm supraumbilical trocar for the camera at 20 cm from the xiphoid process, two 8 mm trocars in the left flank for the right robotic arms, one 8 mm trocar in the right flank for the left robotic arm, one 12 mm trocar in the right flank for the assistant, and one 5 mm trocar in the right hypochondrium for liver retraction.

The procedure began with the identification of the ileocecal valve and laparoscopic measurement of 300 cm of ileum. This loop was fixed to the abdominal wall using a long distal Vicryl suture and a short proximal Vicryl suture to ensure proper identification later. The robotic arms were then docked, and a retroduodenal tunnel was dissected 2 cm distal to the pylorus, followed by duodenal transection using a 60 mm purple cartridge Signia stapler.

An isoperistaltic, hand-sewn end-to-side duodeno-ileal anastomosis was performed using a 3/0 absorbable barbed suture in two layers. Anastomotic integrity was tested using methylene blue, and a Jackson-Pratt drain was placed to guide the duodenal stump.

Results

The procedure was completed without conversions or complications. The docking time was 26 minutes, console time was 122 minutes, and total surgical time was 180 minutes. No collisions occurred between robotic arms. The estimate blood loss was under 50 ml. The patient was discharged 24 hours after surgery following our hospital's first postoperative day discharge protocol. During 6 months of follow-up, the patient had no complications or readmissions. Her weight was 90 kg (BMI 36), with a total weight loss (TWL) of 13% and excess weight loss (EWL) of 31%.

Discussion

SADI-S, proposed by Sánchez-Pernaute and Torres in 2007 as a modification of the classic biliopancreatic diversion (7), offers simplicity through a single anastomosis, comparable outcomes in terms of weight loss and comorbidity control, and a lower complication rate by eliminating one anastomosis (2,8,9).

The implementation of robotic platforms has significantly improved the performance of these procedures by providing greater flexibility, precision, and control—especially during hand-sewn sutures—thanks to their ability to mimic human hand movements with an expanded range of motion.

The Hugo™ RAS system is a novel platform introduced to the European market in 2021, thus literature on its use in bariatric surgery is still limited. Its design allows for improved communication between the surgeon and the team and enhanced field perception due to its open console. Additionally, the modular design offers flexibility in arm positioning, making it especially beneficial for patients with obesity.

In this case, docking time (26 minutes) was higher than times reported in similar procedures using Hugo RAS (Pennestri et al. (10) report a docking time of 5.6 ± 1.2 min during RYGB). The limited clinical experience published on the Hugo™ RAS system poses a challenge for standardizing certain technical aspects, such as arm docking angles, which forces surgical teams to rely heavily on individual experience. This is our center's third SADI-S case using the Hugo platform, and we expect that continued experience will lead to a gradual reduction in docking time.

In this case, the duodeno-ileal anastomosis was performed 300 cm from the ileocecal valve to reduce the risk of protein malnutrition. This has been confirmed in multiple studies that report a higher incidence of malnutrition in patients with a 200 cm common channel (11–12).

The current system's lack of advanced energy devices

increases dependence on the laparoscopic assistant during the procedure. However, this limitation is expected to be resolved soon, improving surgeon autonomy and surgical efficiency. In our case, prior experience with other robotic platforms was not necessary for using the Hugo™ RAS system, although we consider the training provided by Medtronic in experimental animals to be essential.

Conclusions

Performing SADI-S with the Hugo™ RAS robotic system is feasible and safe, offering enhanced precision, control, and visualization, which may help reduce the risk of complications.

Conflict of interest

The authors declare no conflicts of interest related to this article.

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