



# Laparoscopic Sleeve Gastrectomy After Orthotopic Liver Transplantation, Video Reported

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## Abstract

**Introduction** The immunosuppressive therapy for life after liver transplantation (LT) is considered as a risk factor for obesity. Seven percent of the transplanted patients develop severe or morbid obesity. The obesity induces non-alcoholic steatohepatitis (NASH), which is a major risk factor for liver cirrhosis and hepatocellular carcinoma, without forgetting the cardiovascular risk and the devastating impact of obesity on quality of life of the transplanted patients. Consequently, obesity exposes these patients to future transplant loss. Bariatric surgery has been proposed for transplant patients to reduce the obesity-related comorbidities and to improve survival. We report in this [video](#) the surgical technique of laparoscopic sleeve gastrectomy (LSG) after LT.

**Methods** We have performed between 2008 and 2017 the sleeve gastrectomy (SG) after LT in nine patients. Six procedures (66%) were performed totally by laparoscopy and three by upfront laparotomy. All the patients had a standard preoperative evaluation for obesity. All the procedures were assisted by a hepatic surgeon. Postoperatively patients were transferred to the liver ICU for 24 h then to the liver unit ward.

**Result** The median BMI was 41.9 kg/m<sup>2</sup> (range 38–46.1 kg/m<sup>2</sup>). Median operative time was 120 min (range, 90–240 min). No intra-operative complications occurred. The median length of hospital stay was 7 days (range, 4–81 days). The postoperative course of the majority of the patients was uneventful except for one patient who develops a staple line leak.

**Conclusion** LSG after LT is technically feasible. Larger series are needed to improve the safety of the procedure in this high-risk population.

**Keywords** Steatohepatitis · Bariatric surgery · Sleeve gastrectomy · Liver transplantation

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## Introduction

The immunosuppressive therapy for life after liver transplantation (LT) is considered as a risk factor for obesity. The prevalence of severe and morbid obesity of patients who received LT is around 7 % [1]. The obesity and some of its comorbidities, such as diabetes type 2, induce non-alcoholic steatohepatitis (NASH), which is a major risk factor for development of liver cirrhosis and hepatocellular carcinoma. In addition, obesity increases the cardiovascular risk and has a devastating impact on quality of life of the transplanted patients. Consequently, obesity exposes these patients to future transplant loss [2].

Bariatric surgery has proven to be the only effective treatment for obesity, resulting in significant weight loss and reduction in obesity-related comorbidities for long term, such as metabolic syndrome, hypertension, diabetes, sleep apnea, dyslipidemia, and NASH. For this reason, bariatric surgery (BS) has been proposed for transplant patients to improve survival

[3]. However, BS after LT comes with surgical risk of severe adhesions, wound complications, and anastomotic dehiscence due to the use of steroids and/or immunosuppressive drugs [4].

The systematic review that is conducted by our team showed that sleeve gastrectomy is the most used technique in transplant patients [5]. It has been preferred over gastric banding to prevent the implantation of foreign bodies. As well as this technique was preferred on the gastric bypass, in order to preserve the endoscopic access to the bile ducts and theoretically, there is no intestinal bypass; so that, the absorption of immunosuppressive drugs is not modified [6–8].

We report in this [video](#) the surgical technique of a laparoscopic sleeve gastrectomy (LSG) after LT.

## Method

We have performed between 2008 and 2017 the sleeve gastrectomy (SG) after LT in nine patients. Six procedures (66%) were performed totally by laparoscopy and three by upfront laparotomy due to the required combined repair of LT incisional hernia. The median delay from LT to LSG was 44 months (range, 36.0–46.1 months). All the patients had a standard preoperative evaluation for obesity, including a comprehensive medical evaluation and counseling by a multidisciplinary board (bariatric surgeon, endocrinologist, cardiologist, pneumologist, psychologist, and dietician) for at least 6 months, according to the French guidelines for bariatric surgery [9]. Decision to proceed to BS was discussed during a multidisciplinary meeting with the participation of hepatologists and liver surgeons. All the procedures were assisted by a hepatic surgeon. Oral calcineurin inhibitor-based immunosuppression was continued throughout the perioperative period which is by itself does not involve in the genesis of staple line leakage. Thromboprophylaxis with enoxaparin for 4 weeks was started 6 h after BS. Postoperatively patients were transferred to the liver ICU for 24 h then to the liver unit ward.

## Technique of LSG

The patient is placed in a supine position. Open pneumoperitoneum is performed at the left paramedian line, 10 cm down to the xiphoid. This incision will be used for the optical trochar. After exploration of the peritoneal cavity, a 5-mm trochar is added in the left hypochondrium (in general, it is an area with fewer adhesions as it is beyond the dissection area of the liver transplantation). We start the dissection of the adhesions by a single trochar; once we have the place, a 12-mm trochar is added at the right paramedian line and at the same horizontal line as the optical trochar. We proceed by a sharp and blunt dissection of hepato-epiploic adhesions of the left hepatic lobe until identification of the diaphragm, the esophageal hiatus,

and the angle of Hiss. A special attention to avoid the decapsulation of the grafted liver can be also fragile for handling. In most of the cases, there is no need to add a trochar for liver retractor because the liver is stuck spontaneously to the abdominal wall. Distal gastric dissection is performed until the identification of the pylorus. Then, we proceed by dissecting the greater curvature 5–6 cm from the pylorus until the left diaphragmatic crus—dissection of the posterior adhesions. After calibration by a 36-French tube, the SG is realized using a standard stapler as for the general population. The integrity of the staple line is checked by a blue test. Finally, the hemostasis of the staple line is achieved by bipolar cauterization and addition of biological glue.

## Result

The median BMI was 41.9 kg/m<sup>2</sup> (range, 38–46.1 kg/m<sup>2</sup>). Median operative time was 120 min (range, 90–240 min). No intra-operative complications occurred. The median length of hospital stay was 7 days (range, 4–81 days). The postoperative course of the majority of the patients was uneventful except for one patient who develops a staple line leak, needing multiple surgical and endoscopic reoperations. Once the leak is controlled, the patient developed a gastroparesis with severe dysphagia to solid. Neither invasive nor non-invasive test ruled out any abnormality. Manometry confirmed total aperistalsis of the stomach remnant. After several weeks of parenteral nutrition, and failure of medical treatment, the SG was converted by laparotomy into a Roux-en-Y gastric bypass (RYGB). The patient developed a leak from the gastric pouch, leading progressively to multiorgan failure and death 19 months after SG and 11 months after conversion to RYGB.

## Conclusion

Laparoscopic sleeve gastrectomy after liver transplantation is technically feasible. Larger series are needed to improve the safety of the procedure in this high-risk population towards that seen in the general population [6, 10, 11].

## Compliance with Ethical Standards

**Ethical Approval** The procedure was performed in accordance with the ethical standards of the institutional and the national research committee.

**Conflict of Interest** The authors declare that they have no conflicts of interest.

**Informed Consent** Informed consent was obtained from the individual participant included in the study.

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