

# Intrahepatic Glissonian Approach for Pure Laparoscopic Left Hemihepatectomy

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## Abstract

**Background:** Recent advances in laparoscopic devices and experience with advanced techniques have increased the indications for laparoscopic liver.

**Aim:** The aim of this work was to present a video with technical aspects of a pure laparoscopic left hemihepatectomy (segments 2, 3, and 4) by using the intrahepatic Glissonian approach and control of venous outflow without hilar dissection or the Pringle maneuver.

**Patient and Method:** A 63-year-old woman with a 5-cm solitary liver metastasis was referred for treatment. Four trocars were used. The left lobe was pulled upward and the lesser omentum was divided, exposing Arantius' ligament. This ligament is a useful landmark for the identification of the main left Glissonian pedicle. A small anterior incision was made in front of the hilum, and a large clamp was introduced behind the Arantius' ligament toward the anterior incision, allowing control of the left main sheath. Ischemic discoloration of the left liver was achieved and marked with cautery. The vascular clamp was replaced by a stapler. If ischemic delineation was coincident with a previously marked area, the stapler was fired. The left hepatic vein was dissected and encircled. Parenchymal transection and vascular control of the hepatic veins were accomplished with a Harmonic scalpel and an endoscopic stapling device, as appropriate. All these steps were performed without the Pringle maneuver and without hand assistance.

**Results:** Operative time was 220 minutes with minimum blood loss. Hospital stay was 4 days. Pathology showed free surgical margins. The patient is alive with no signs of recurrence 18 months after the operation.

**Conclusion:** Totally laparoscopic left hemihepatectomy is safe and feasible in selected patients and should be considered for patients with benign or malignant liver neoplasms. The described technique, with the use of the intrahepatic Glissonian approach and control of venous outflow, may facilitate laparoscopic left hemihepatectomy by reducing the technical difficulties in pedicle control and may decrease bleeding during liver transection.

## Introduction

RECENT ADVANCES in laparoscopic devices and experience with advanced techniques have increased the indications for laparoscopic liver resection.<sup>1,2</sup> One of the main steps of liver resection is pedicle control. Anatomic hemihepatectomies require extensive hilar dissection with portal vein and hepatic artery control.<sup>3</sup> The intrahepatic Glissonian approach is useful for laparoscopic right hemihepatectomies and segmental right-liver resections.<sup>4</sup> We have previously described a technique to perform resection of left-liver segments, using small liver incisions, according to anatomic landmarks, such as the Arantius' and round ligaments.<sup>5,6</sup> This video demonstrates the technical aspects of a pure laparoscopic left hemihepatectomy (segments 2, 3, and 4), using the

intrahepatic Glissonian approach and control of venous outflow without hilar dissection or the Pringle maneuver.

## Patient and Method

A 63-year-old woman with a 5-cm solitary liver metastasis was referred for surgical treatment. The patient was placed in a supine position, with the surgeon standing between the patient's legs. An orogastric tube was inserted and removed at the completion of the procedure. Four trocars (two 12- and two 5-mm) were used. The pneumoperitoneum was established at a pressure of 12 mm Hg. The round ligament was transected by using laparoscopic coagulation shears (LCS; Ethicon Endo-Surgery Industries, Cincinnati, OH). Exploration of the abdominal cavity and ultrasound liver examination

were performed to rule out other metastasis, verify intrahepatic anatomy, and ascertain tumor location.

The left liver was mobilized by sectioning the falciform, left triangular, and coronary ligaments. The left lobe was pulled upward and the lesser omentum was divided, exposing the Arantius' ligament. This ligament runs from the left branch of the portal vein to the left hepatic vein or to the common trunk,<sup>6</sup> being a useful anatomic landmark for the identification of these structures. Arantius' ligament was divided and its cephalad stump could be used as a landmark to dissect the left hepatic vein and the common trunk, as described elsewhere.<sup>7</sup> The caudal stump of the ligament was used as a landmark for the main left Glissonian pedicle. A small (3-mm) anterior incision was made in front of the hilum, and a large vascular clamp was introduced behind the caudal stump of Arantius' ligament toward the anterior incision, allowing control of the left main sheath. This maneuver spared the caudate lobe (segment 1) portal branches. Ischemic delineation of the left liver was then achieved, and the line of liver transection was marked along the liver surface with cautery. Ultrasonography was then used to check if the tumor was inside the area of resection and ascertain a surgical margin larger than 1 cm. The vascular clamp was then removed and substituted with an endoscopic vascular stapling device, and the stapler was closed. If ischemic delineation were coincident with a previously marked area of transection, the stapler was fired; otherwise, the stapler would be repositioned. The left hepatic vein was then dissected and encircled. Parenchymal transection and vascular control of the hepatic veins were accomplished with a Harmonic scalpel and an endoscopic stapling device, as appropriate. All these steps were performed without the Pringle maneuver and without hand assistance. The specimen was extracted through a suprapubic incision inside a plastic retrieval bag. One round 19-F Blake abdominal drain (Ethicon) was left in place.

## Results

Operative time was 220 minutes, and hospital stay was 4 days. Estimated blood loss was 350 mL, and the patient did not need a blood transfusion. Postoperative recovery was uneventful. Final pathology showed free surgical margins. The patient is alive with no signs of recurrence 18 months after operation.

## Conclusions

Totally laparoscopic left hemihepatectomy is safe and feasible in selected patients and should be considered for patients with benign or malignant liver neoplasms. The described technique, with the use of the intrahepatic Glissonian approach and control of venous outflow, may facilitate laparoscopic left hemihepatectomy by reducing the technical difficulties in pedicle control and may decrease bleeding during liver transection.

## Disclosure Statement

No competing financial interests exist.

## References

1. Soubrane O, Cherqui D, Scatton O, Stenard F, Bernard D, Branchereau S, Martelli H, Gauthier F. Laparoscopic left lateral sectionectomy in living donors: Safety and reproducibility of the technique in a single center. *Ann Surg* 2006;244:815–820.
2. Koffron AJ, Auffenberg G, Kung R, Abecassis M. Evaluation of 300 minimally invasive liver resections at a single institution: Less is more. *Ann Surg* 2007;246:385–392.
3. Gumbs AA, Gayet B. Totally laparoscopic left hepatectomy. *Surg Endosc* 2007;21:1221.
4. Machado MA, Makdissi FF, Galvão FH, Machado MC. Intrahepatic Glissonian approach for laparoscopic right segmental liver resections. *Am J Surg* 2008;196:e38–e42.
5. Machado MA, Makdissi FF, Surjan RC, Herman P, Teixeira AR, Machado MC. Laparoscopic resection of left liver segments using the intrahepatic Glissonian approach. *Surg Endosc* 2009 Mar 19. [Epub ahead of print]
6. Machado MA, Herman P, Machado MC. Anatomical resection of left liver segments. *Arch Surg* 2004;139:1346–1349.
7. Majno PE, Mentha G, Morel P, et al. Arantius' ligament approach to the left hepatic vein and to the common trunk. *J Am Coll Surg* 2002;195:737–739.

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