

**ORIGINAL ARTICLE – HEPATOBILIARY TUMORS**

# Laparoscopic Parenchymal Sparing Liver Resections using Intrahepatic Glissonian Approach

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## ABSTRACT

**Background.** One of the main criticism of laparoscopic liver resection, is that it is difficult, or not possible, to perform liver-sparing resections. The aim of this video is to present short videos where the intrahepatic Glissonian approach was used to perform anatomical liver segmental resections instead of a larger operation to avoid unnecessary sacrifice of the liver parenchyma.

**Methods.** We select six types of anatomical liver resections to exemplify the use of intrahepatic Glissonian approach to perform segment-oriented liver resections. These types of hepatectomies were used as alternative to right or left hepatectomy or as alternative to extended liver resections.

**Results.** The intrahepatic Glissonian approach was feasible in all cases. The use of anatomical landmarks previously described was essential to reach and control the Glissonian pedicles. Among the liver-sparing resections, we were able to perform right anterior (S5+S8) and posterior (S6+S7) sectionectomies, resection of segments 2, 3 and 4 and mesohepatectomy (S4+S5+S8). No patient presented postoperative liver failure.

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**Conclusions.** Laparoscopic liver sparing resections are feasible, and may be a good alternative to hemihepatectomies, or extended liver resections. The use of intrahepatic Glissonian approach can be useful.

The number of minimally invasive liver resections is rapidly increasing with more than 9500 cases performed worldwide (1). The proportion of surgeries being done for malignancies has increased from 50% at the time of the first international consensus to 65% currently after the second international consensus (2). The total number of cases has rapidly increased from 2804 to more than 9500, according to a recent review (1). Meta-analysis of studies comparing laparoscopic to open liver surgery show that laparoscopy is associated with less complications, less blood loss, less transfusions, less hospital stay, equivalent operative time and equivalent resection margins (3). The number of minimally invasive liver resections is rapidly increasing with more than 9500 cases performed worldwide (1). The proportion of surgeries being done for malignancies has increased from 50% at the time of the first international consensus to 65% currently after the second international consensus (2). The total number of cases has rapidly increased from 2804 to more than 9500, according to a recent review (1). Meta-analysis of studies comparing laparoscopic to open liver surgery show that laparoscopy is associated with less complications, less blood loss, less transfusions, less hospital stay, equivalent operative time and equivalent resection margins (3).

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We have previously described a laparoscopic technique of Glissonian approach for anatomical liver resections (4,5). The aim of this video is to present situations where the intrahepatic Glissonian approach was used to perform anatomical liver segmental resections instead of a larger operation to avoid unnecessary sacrifice of the liver parenchyma.

## METHODS

We select six types of anatomical liver resections to exemplify the use of intrahepatic Glissonian approach to perform segment-oriented liver resections. These types of hepatectomies were used as alternative to right or left hepatectomy or as alternative to extended liver resections. As alternative to right hemihepatectomy, laparoscopic Glissonian right anterior sectionectomy (resection of segments 5 and 8), and right posterior sectionectomy (resection of segments 6 and 7) are demonstrated. As alternative to left hemihepatectomy or left lateral sectionectomy, laparoscopic resection of segments 2, 3 and 4 are shown using intrahepatic Glissonian technique. Laparoscopic mesohepatectomy (removal of segments 4, 5 and 8) instead extended left or right trisectionectomy was also demonstrated.

## RESULTS

The intrahepatic Glissonian approach was feasible in all cases. The use of anatomical landmarks previously described was essential to reach and control the Glissonian pedicles. No patient presented postoperative liver failure.

## DISCUSSION

The main criticism of the intrahepatic Glissonian approach is the fear of inadvertent pedicle injury or hepatic vein damage during the insertion of the clamp and/or linear stapler. The intrahepatic Glissonian pedicle is involved by a thick layer of collagen that is very resistant. The clamp should be smoothly introduced and any resistance indicates that we are towards pedicle rather around it. If this occurs, a simple rotational movement to the left or right is enough to

enter in the space around the pedicle. A forceful insertion of the clamp can damage the pedicle and should be avoided. However, we have experienced some mild bleeding caused by tearing of small and terminal branches from hepatic veins. In these occasions, a gauze is inserted for temporary hemostasis and this maneuver is usually enough to cease the bleeding.

A concern has been raised about the division of the wrong pedicle. The main reason to test the clamping before use the stapler is exactly to be sure that we are dividing the correct pedicle. Sometimes we may not achieve to control the intended pedicle, especially when dealing with right anterior and posterior sectors. With growing experience with this technique in open (since 2001) and laparoscopic hepatectomies (since 2007), this event occurs less. However, in this situation we “convert” the technique to the one described by Launois and Jamieson (6): we simply enlarge the opening around the hilar plate with blunt dissection and we can gain direct view of the anterior and posterior pedicles and we divide the correct one.

Another point of discussion is the feasibility of this technique in the event of anatomical variation. In all patients, preoperative imaging such as CT scan and MRI is performed to rule out major anatomical variation. Also intraoperative cholangiogram and/or intraoperative ultrasound can be used to ascertain anatomy.

The intrahepatic Glissonian technique, as well any other technique of liver resection, should be performed with caution in patients with aberrant anatomy. We have observed that most variations occur within hepatic hilum and once inside the liver substance the Glissonian pedicle usually runs in a common fashion. The steadiness of the anatomy of intrahepatic Glissonian pedicle was demonstrated in a recent study (7).

In Conclusion, laparoscopic liver sparing resections are feasible, and may be a good alternative to hemihepatectomies, or extended liver resections. The use of intrahepatic Glissonian approach can be useful.

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