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Right Anterior Sectionectomy for Hepatocellular Carcinoma

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1. Introduction

Hepatectomy is an established first-line therapeutic option for hepatocellular carcinoma. Because there is high likelihood of cancer cells from hepatocellular carcinoma spreading throughout the portal venous system, anatomical hepatectomy is effective for eradication of the intrahepatic metastases of hepatocellular carcinoma [1, 2].

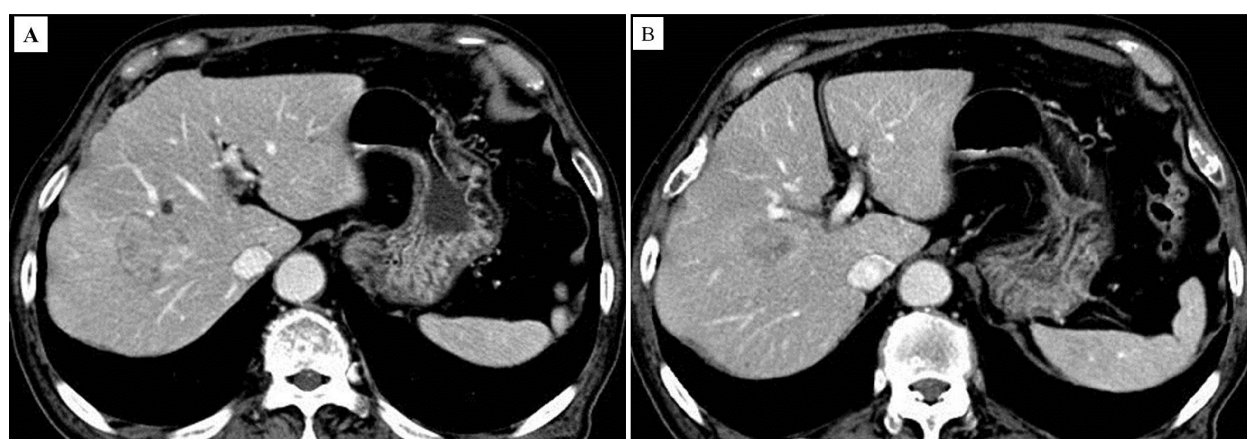


Figure 1. The hepatocellular carcinomas located in segment 8 of the liver (A) and close to the root of the right anterior or Glissonean pedicle (B).

For patients with hepatocellular carcinoma located in the right anterior section or close to the root of the right anterior Glissonean pedicle (Figure 1A, 1B), right anterior sectionectomy has an important advantage, i.e., preservation of nontumorous parenchyma, over conventional hemihepatectomy. Although right anterior sectionectomy is a difficult hepatic resection because of the danger of intraoperative bleeding from the middle and right hepatic veins and risk factor of postoperative bile leakage [3, 4], this surgical procedure is safe and effective in selected patients [5, 6]. Laparoscopic mesohepatectomy is performed at limited institutions [7, 8]; however, the use of this procedure is limited and controversial to date because of the high degree of proficiency required. Herein, we describe techniques of right anterior sectionectomy using the Glissonean pedicle transection method via a conventional open laparotomy approach. The Brisbane 2000 terminology of liver anatomy and resections is used in this manuscript.

2. Surgical technique

Laparotomy is performed through an upper midline incision with right lateral subcostal extension (reversed L-shaped incision). The xiphoid process is excised, the round ligament is ligated and divided, and the falciform ligament is divided along the surface of the liver. We routinely conduct an intraoperative ultrasonography for hepatectomy to define the tumor location and vessels to be manipulated for resection. The right hemiliver is mobilized by dividing the coronary and right triangular ligaments; however, the right adrenal gland is not dissected from the right hemiliver. The ventral surfaces of the root of the right and middle hepatic veins are exposed. A cholecystectomy is performed and a 4-Fr. biliary tube is inserted through the cystic duct for a bile leakage test after removing the specimen.

The hepatoduodenal ligament is encircled and taped. The peritoneum of the hepatoduodenal ligament is dissected at the ventral and dorsal sides of the hepatic hilum, the hilar plate is detached blindly and bluntly from the liver parenchyma, and then, the right Glissonean pedicle is encircled extrahepatically using Kelly forceps. To avoid injury to the elements of the caudate lobe, the right Glissonean pedicle should be encircled on the right side of the caudate process branch. After the cystic plate is dissected, the right anterior Glissonean pedicle is identified and encircled extrahepatically [9, 10] (Figure 2). If a large liver tumor is located near the root of the right Glissonean pedicle, it is difficult to approach the Glissonean pedicle extrahepatically; therefore, the anterior branches of the right hepatic artery and right portal vein are encircled separately [11].

After the right anterior Glissonean pedicle is clamped, discoloration of the right anterior section is confirmed, and the demarcation line is then marked by electrocautery (Figure 3).

Using the Pringle maneuver, a parenchymal dissection between the left medial and right anterior sections is performed along the demarcation line from the caudal toward the cranial direction using an ultrasonic surgical aspirator and the right side of the middle hepatic vein is exposed on the raw surface of the liver. The branches of the middle hepatic vein originating from the anterior section are ligated and divided, and the thick branches should be

clamped with vascular clamp forceps, divided and sewn with a continuous suture (Figure 4). At the cranial and caudal ends of the parenchymal dissection, the right side of the middle hepatic vein root and the left side of the right anterior Glissonean pedicle are identified, respectively. The dorsal end point of the parenchymal dissection is the line which connects the root of the middle hepatic vein and the hilar plate.

Using right hemihepatic vascular occlusion [12], a parenchymal dissection between the right anterior and posterior sections is performed along the demarcation line from the caudal toward the cranial direction using an ultrasonic surgical aspirator and the left side of the right hepatic vein is exposed on the raw surface of the liver. After the parenchymal dissection is progressed toward the right anterior Glissonean pedicle, the anterior Glissonean pedicle is exposed as distally as possible to avoid biliary injury of the right posterior section (Figure 5) and divided using the stapler or double transfixing sutures (Figure 6). At the cranial end of parenchymal dissection, the left side of the right hepatic vein root is identified.

By retracting the anterior section upward, the parenchymal dissection between the right anterior section and caudate lobe is advanced from the caudal to the cranial direction (Figure 7). Then, the right anterior section is removed (Figure 8).

Hemostasis of the raw surface of the liver is confirmed and the bile leakage test performed. Then, the biliary tube is extracted, and the stump of the cystic duct is ligated.

A closed drain is placed in the raw surface of the liver.

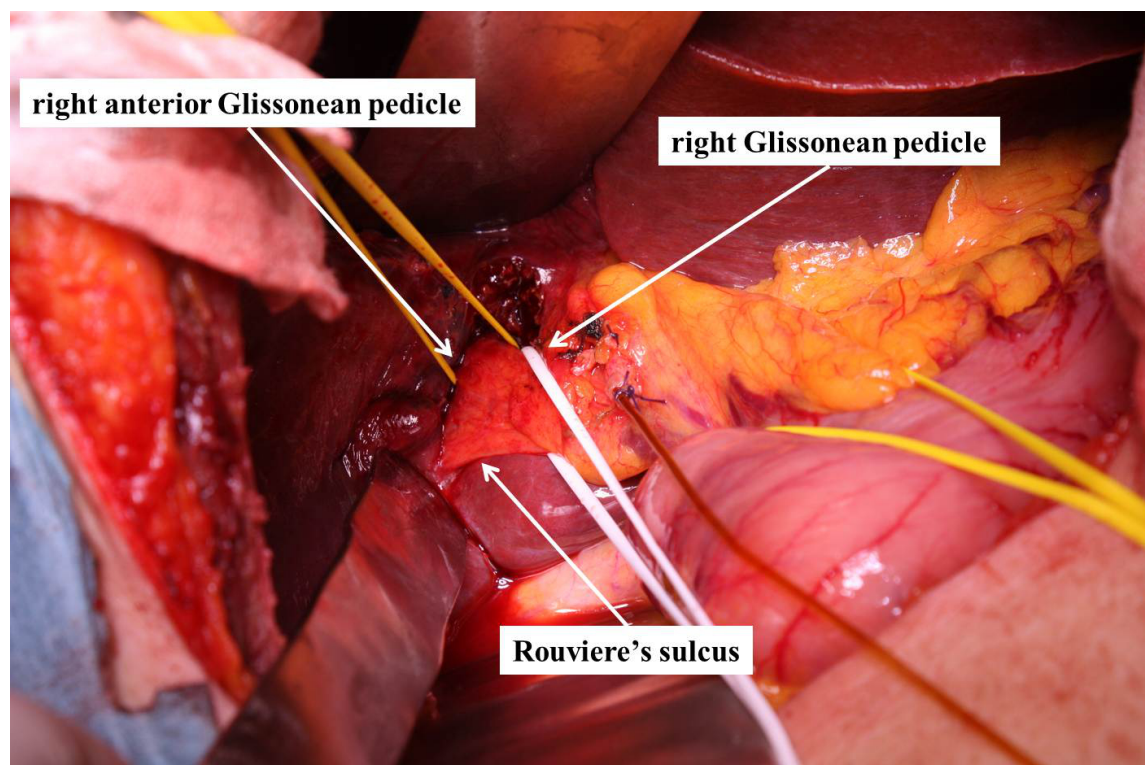


Figure 2. The right and right anterior Glissonean pedicles are encircled extrahepatically.



Figure 3. The right anterior section is marked by electrocautery.

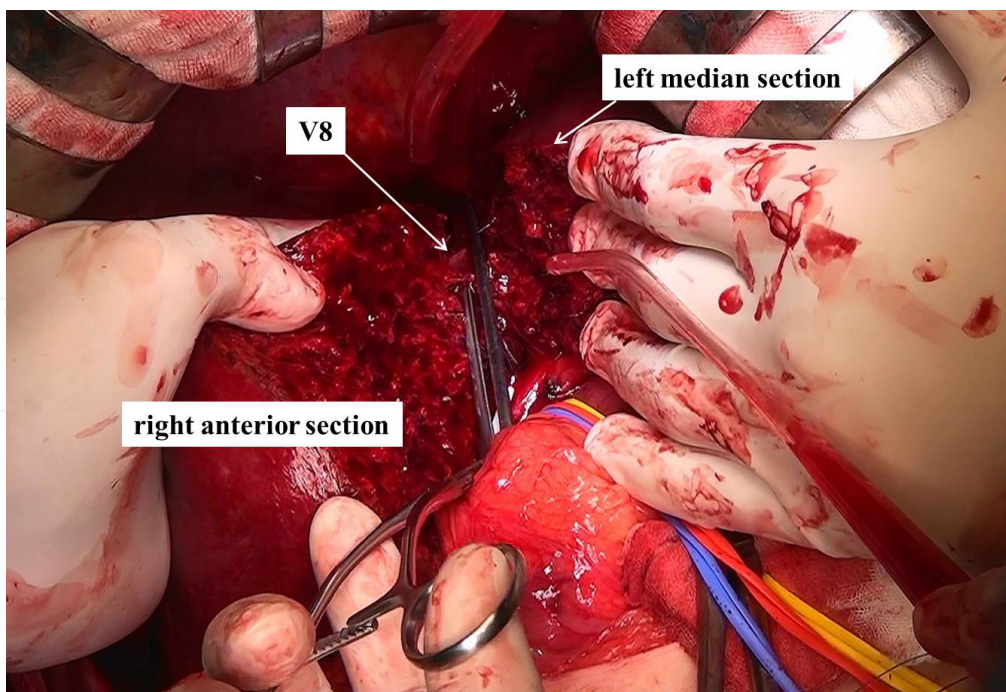


Figure 4. The branch of the middle hepatic vein originating from the anterior section (V8) is clamped with vascular clamp forceps.



Figure 5. The anterior Glissonean pedicle is exposed as distally as possible.

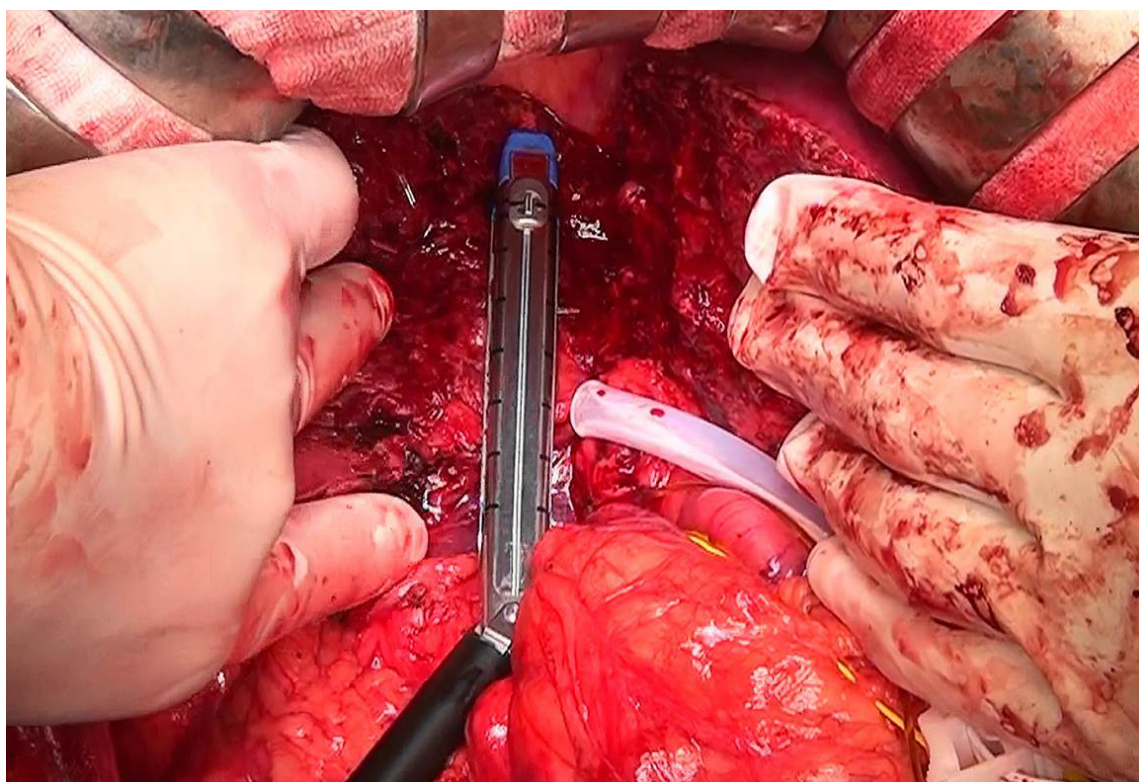


Figure 6. The anterior Glissonean pedicle is divided using the stapler.

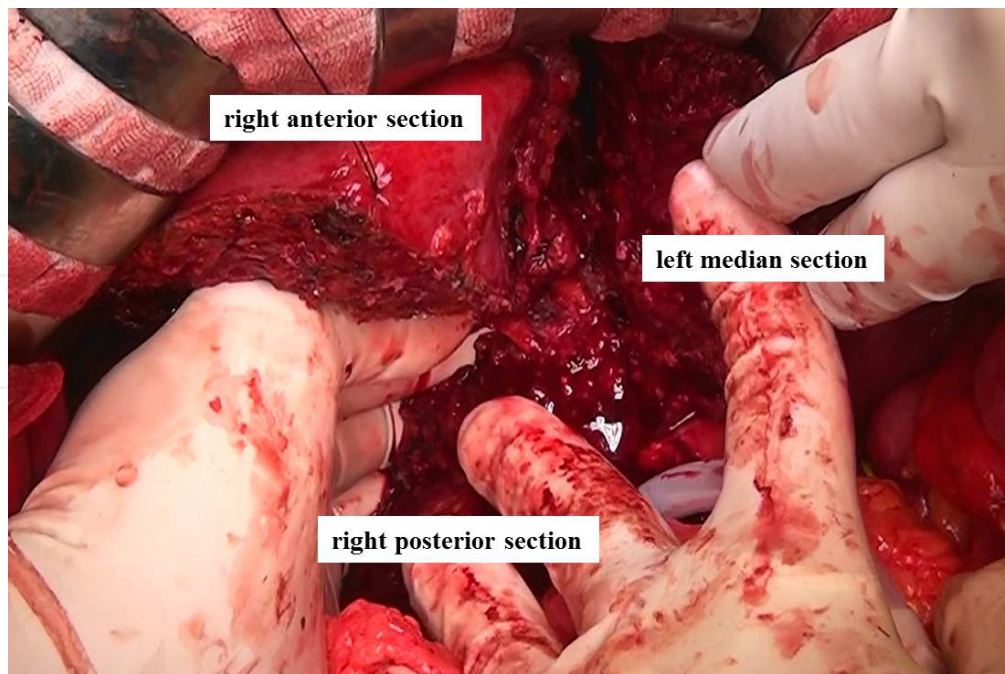


Figure 7. By retracting the anterior section upward, the parenchymal dissection between the right anterior section and caudate lobe is advanced from the caudal to the cranial direction.

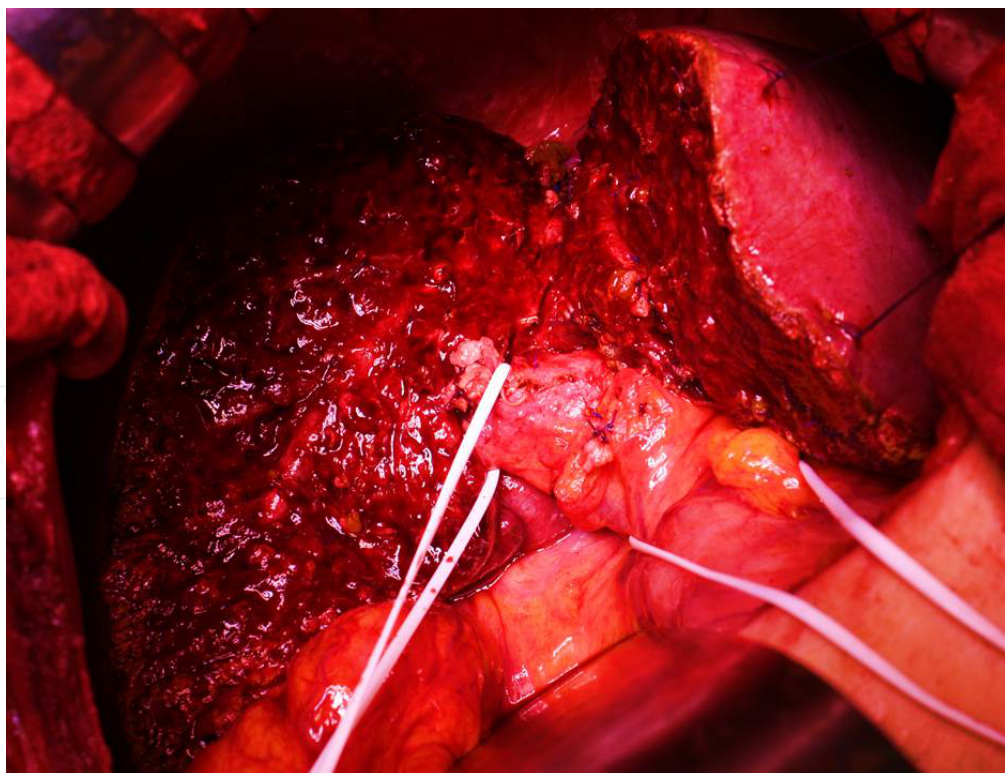


Figure 8. After the right anterior section is removed, the right side of the middle hepatic vein and the left side of the right hepatic vein are exposed on the raw surface of the liver.

3. Comments

Between April 2010 and May 2012, 8 patients underwent a right anterior sectionectomy using the Glissonean pedicle transection method for hepatocellular carcinoma at our institution. The median surgical time was 323 minutes (range: 227-468 minutes) and the median surgical blood loss was 830.5 ml (range: 180-2009 ml). There was one postoperative complication, i.e., bile leakage, and no mortality.

The extrahepatic Glissonean pedicle approach is preferable to avoid postoperative lymphatic leakage than separately dividing the arterial and portal branches of the right anterior section. It is important to divide the right anterior Glissonean pedicle as distally as possible to avoid biliary injury of the right posterior section.

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