



Case Report

Laparoscopic caudate lobectomy for large hepatoblastoma in children: A case report

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ABSTRACT

Hepatoblastoma originating in the caudate lobe (segment 1) is extremely rare. Complete resection of the caudate lobe, without sacrificing other parts of the liver, remains a surgical challenge. We present our experience with laparoscopic complete resection of caudate lobe hepatoblastoma for a 7-years-old girl, with a history of hepatitis B.

1. Introduction and importance

Hepatoblastoma is the most common malignant hepatic tumor in children, usually observed in infants and children under 3 years of age, with an incidence of approximately 1.2/1,000,000 [1–3]. Hepatoblastoma accounts for over 90% of the primary hepatic malignancies among children less than 5 years of age. The combination of chemotherapy and surgery increased the 5-year overall survival by up to 80%, and with partial hepatectomy the survival rate was increased as high as 91% [3,4]. Despite the crucial role of chemotherapy, surgical resection is the only curative treatment [4].

Caudate lobe HB is a very rare, reported form of this condition [1,2]. Due to the surgical difficulties involved to the complex anatomical position of the caudate lobe as well as it is close to the surrounding major blood vessels (inferior vena cava, hepatic veins, hepatic pedicle, etc.), an isolated caudate lobe approach is rarely performed. Moreover, scientific reports refer to the laparoscopic approach for isolated caudate lobectomy in children is limited. We present a case of 7-year-old girl with hepatoblastoma who successfully underwent isolated laparoscopic caudate lobe resection. This case report has been reported in line with the SCARE Criteria [5].

1.1. Case presentation, clinical

A 7-year-old girl, with a 5-year history of hepatitis B (no antiviral treatment for hepatitis) and no family history of viral hepatitis, was admitted to the hospital because of an abdominal pain and a palpable abdominal mass. Computed tomography (CT) scan revealed a 9-cm hypodense mass located in Segment 1, which pushes the inferior vena cava to the right and compresses the left and middle hepatic veins. There was no evidence of portal vein thrombosis and metastasis (Fig. 1-A). Serum A-fetoprotein was 114,518 ng/ml, HBV-DNA is below detection threshold. Parasite test: positive for *Fasciola Gigantica*, *Toxocara*, *Echinococcus granulosus*, negative for *Clonorchis Sinensis*. Liver biopsy under CT guidance was performed, which confirmed hepatoblastoma.

The patient was diagnosed with PRETEXT II hepatoblastoma and received neoadjuvant chemotherapy based on Block A-SIOPEL 4 regimen along with Triclabendazol and Albendazole for parasites treatment and Entecavir. After three completed cycles, AFP fell to 1210 ng/ml, and tumor size reduced to 4 cm (Fig. 1-B).

1.2. Surgical technique

The patient lies in the supine position, with the extended legs, the surgeon stands in the middle. The assistant surgeon is on the left side and the instrument assistant is on the right side of the patient. Central venous

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Abbreviations

HB	Hepatoblastoma
CT	Computed tomography
HBV	Hepatitis B virus
AFP	Alpha foetoprotein
SIOPEL	International Childhood Liver Tumors Strategy Group
S	Segment
T	Trocar
IVC	Inferior vena cava

pressure was maintained at 5 mm Hg. The 10-mm optical trocar (30-degree optic) was placed in the T1. Two surgical trocars were placed on the right (5 mm, T2) and on the left (10 mm, T3) at bilateral mid-clavicular level, three to four cm above the umbilicus. Two directional trocars (5 mm) were positioned below the left hypochondriac region (T4) and below the xiphoid process (T5) (Fig. 2A).

After elevating the left lobe through T4, the lesser omental is opened from the hepatic peduncle to the proximal insertion of the venous ligament and segment 1 is examined (Fig. 2-B). Place a foley tube through the entire hepatic peduncle (Pringle's maneuver) (Fig. 3-A), to gently pull the entire hepatic peduncle from right to left and expose the Spiegel lobe. The Spiegel lobe and the lower left edge of the paracaval portion are dissected portable away from the vena cava. The small veins, which extend from Segment 1 and empty directly into the inferior vena cava, are isolated separately. That leads to make a continuous tunnel at the plane between the caudate process and inferior vena cava. Simultaneously, we further freed the back of Segment 1 to the left to separate the residual connections between the liver and the inferior vena cava.

In the next step, hepatic peduncle is pulled gently to the right and the caudate process dissection begins at the point where the left portal vein and the left hepatic artery enter scissure portoombilicale. Expression is aided by the T5 trocar, which pushes down Segment 1 parenchyma, facilitating the localization of small vessels originating from the posterior aspect of the left portal vein and the left hepatic artery. All blood vessels are identified and ligated.

Finally, S1 is connected to the parenchyma of S4 and the left side of S7 by only a hepatic parenchymal bridge (formerly known as the caudate process). In order to avoid vascular damage, we use the Harmonic scalpel that allows for an optimal, almost avascular dissection; therefore, it can reduce the possibility of major bleeding. Control of the encountered vascular branches and bile duct is also performed with a Hemolock clamp (Fig. 3-B). Finally, the S1 section was covered with surgical, a drainage tube was placed through the T3 trocar, which goes posterior to the hepatic peduncle to the bed of S1.

The surgery lasted 120 minutes. The amount of blood lost was 100 ml. Blood transfusion was not required. There were not major intra-operative complications except for a minor laceration of the vena cava during dissection of the base of the paracaval portion, and it was repaired with non-absorbable sutures. The postoperative course was uneventful. She was discharged after 10 days.

The histopathological examination confirmed hepatoblastoma without vascular invasion, surgical margin was negative. The patient continued to receive chemotherapy according to Block C regimen. During the follow-up, AFP level has returned to normal with no sign of recurrence (Fig. 3-C).

2. Discussion

2.1. Anatomy of the caudate lobe of the liver

The caudate lobe (S1) according to Couinaud's classification is the portion of the liver parenchyma that is bounded superiorly by the hepatic veins as they enter the inferior vena cava (IVC) and posteriorly by the IVC itself. At the bottom, it is bordered by the hepatic hilum and the portal triad (Fig. 3-D) [6]. Author Kumon divided the caudate lobe into three parts: the Spiegel lobe, the paracaval portion and the caudate process [7,8].

Surgically, resection of the Spiegel lobe or caudate process does not require high-skilled technique, but the vascular and bile duct branches for the paracaval portion have not been detailed in textbook [7]. Furthermore, the paracaval's close proximity to many major vascular structures, as well as the extremely short retrohepatic caudate vein that drain directly into the IVC that are difficult to visualize on preoperative imaging will present major challenges for the surgeon.

2.2. Resection of the hepatic caudate lobe in the treatment of hepatoblastoma in children

Resection of the hepatic caudate lobe was first described in the 1990s by Takayama [9]. More than fifteen years later, isolated laparoscopic resection of the hepatic caudate lobe was described by Dulucq as two adult clinical cases [10]. Some authors have proposed three common approaches to isolated S1 resection have been described: left, right and anterior approach with parenchymal transection, depending on the location and size of the S1 tumor [10,11]. Our case was operated with a left-sided caudate lobe approach, because the tumor was small and localized in the Spiegel lobe and partly in the caudate process.

The main problems in resection of caudate lobe are dissection and control of bleeding (from the posterior short caudate veins when releasing the anterior aspect of the IVC and from parenchymal resection of caudate process with S7 and S4), especially in pediatric patients following chemotherapy because of tumor adhesion to surrounding

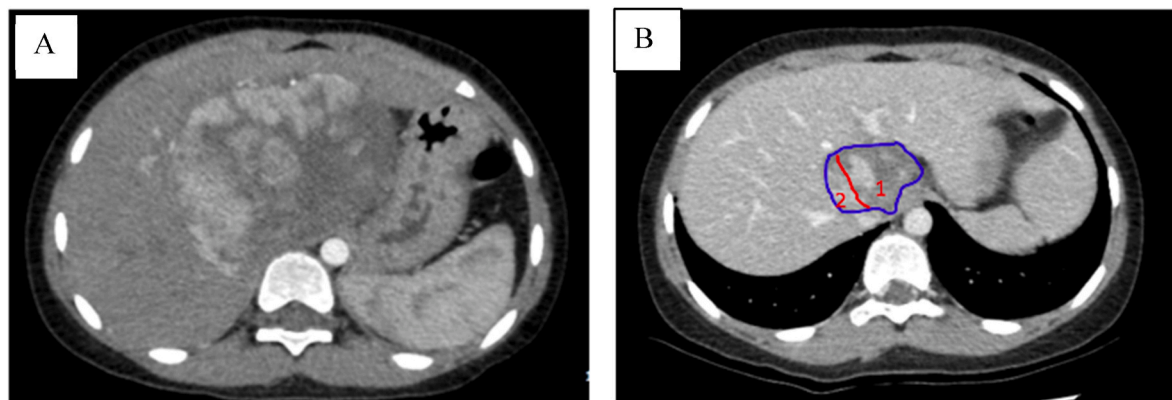


Fig. 1. Liver tumor in segment 1.

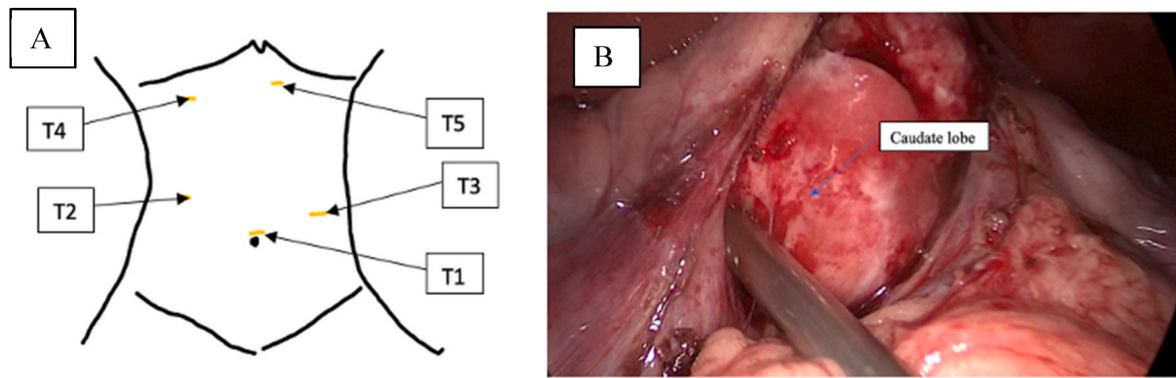


Fig. 2. Trocar placement and tumor of caudate lobe.

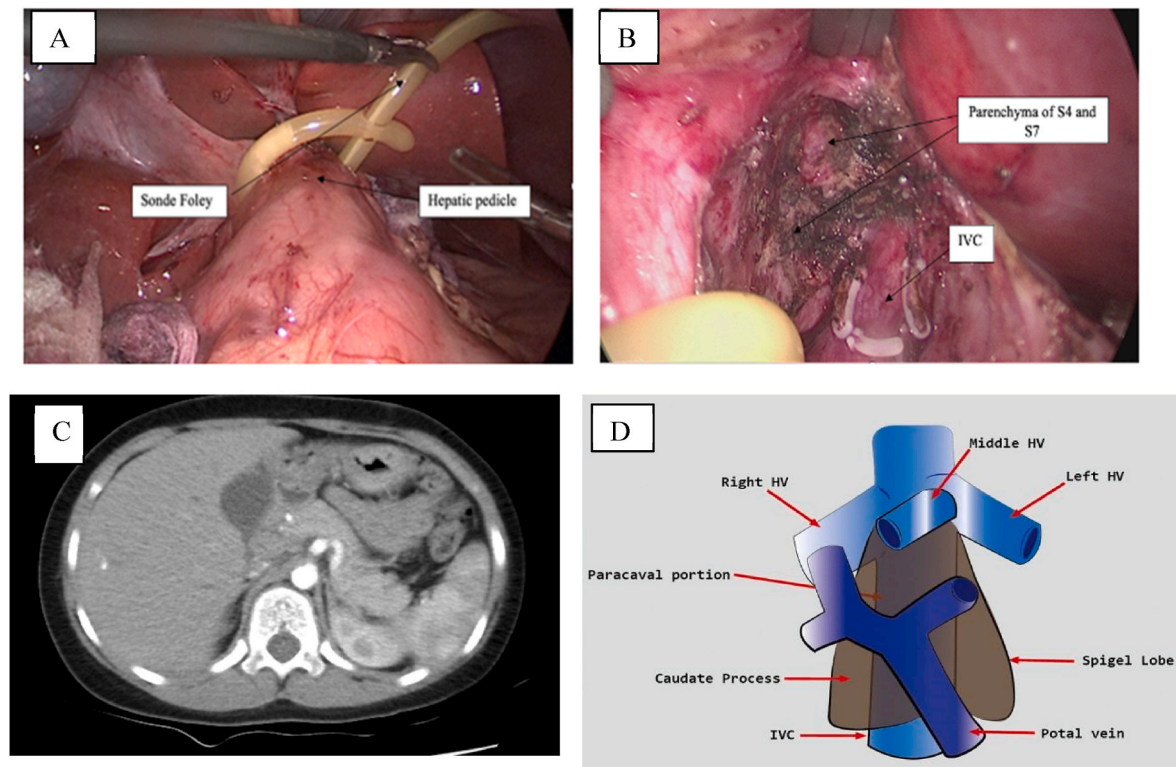


Fig. 3. Hepatic pedicle and sectional area after lobectomy segmental 1.

tissues and risk of intraoperative tumor rupture due to necrosis [10]. In a study by Kitagawa et al. when dissecting 55 liver specimens taken from donate Japanese cadavers, they have proposed using the right paracaval plane defined by the boundary landmarks (division of the right portal vein, the terminal portion of the right hepatic vein, and the notch of the gallbladder fossa) can be determined through intraoperative endoscopic ultrasonography [12]. As our facilities are limited, we elevated the entire hepatic peduncle to assist in exposing the caudate process by a 14th Foley tube. Not only the hepatic peduncle can be moved up, down, or to the sides, but also temporarily we can clamp the liver peduncle at any time through the Pringle maneuver to limit the source of bleeding during resection of caudate process. During dissection of the paracaval close to the IVC entry point of the middle hepatic vein, we caused a small tear in the inferior vena cava by exposing the tumor too close to the middle hepatic vein. This was promptly corrected by suturing without causing air embolism.

3. Conclusion

Caudate lobe hepatoblastoma is extremely rare. The application of total laparoscopic resection of the caudate lobe has proven to be safe and effective. This is one of the firsts cases of laparoscopic approach for isolated caudate lobectomy in the treatment of hepatoblastoma in children. Based on our experience, we recommend that this type of resection should be only performed in selected cases (small tumor size, without compression or invasion of surrounding veins) and performed by laparoscopic hepatobiliary surgeons who have high experience.

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None.

Ethical approval

Informed consent was obtained from the parents for the report

publication.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Hoa Viet Nguyen: Main surgeon. Phuong Ha Tran: Assistant surgeon. Trang Thi Huyen Dang: Assistant surgeon and wrote manuscript. Tuan Hong Vu, Quan Quy Hong, Ngoc Bich Nguyen: Did the management strategy, the follow-up.

Research registration

None. This is not the first technique performed on humans.

Guarantor

Mrs Hoa Viet Nguyen, Ph.D.

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Declaration of competing interest

None.

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