



Central Hepatectomy (Mesohepatectomy) by Double Liver Hanging Maneuver (DLHM) in a Child with Hepatoblastoma

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Case Report

Background

Pediatric surgeons or surgical oncologists usually do not encounter many patients that require hepatectomy for malignancy compared to adult patients that require hepatic resection. Therefore, a wide technical gap exists between pediatric and adult hepatic surgery. However, the number of major adult liver resection cases has been recently increasing [1–3]. There have been at least 20 adult cases in which the liver hanging maneuver (LHM) was used at our institution. We report that LHM, so also, double hanging maneuver is a useful and safe technique for hepatectomy in pediatric cancer surgery.

Case Report

An 8-kg, 1-year and 4-month-old male child was born by cesarean section at the 38th gestational week weighing 2750 g. No significant family/medical history. Since 6 months,

a hard palpable tumor was noticed on his right flank by his mother, and he was referred to our hospital for a detailed work-up. An abdominal CT scan revealed a hepatic tumor occupying segments V, VIII, and IV of liver, shifting the middle hepatic vein to the left (Fig. 1). The alpha-fetoprotein (AFP) level was elevated to 1300 ng/ml. The patient was diagnosed with hepatoblastoma following an image-guided biopsy. The patient underwent 4 cycles of preoperative chemotherapy using cisplatin-monotherapy for a PRETEXT-III hepatoblastoma as per SIOPEL-3 guidelines. The tumor was reduced from 18 to 10 cm in maximum diameter and was localized to segments V, VIII, and IV the lobe (defined partial response according to RECIST 1.1).

However, because the tumor margin was still within limit of right and left hepatic veins on either side, we decided to perform a central hepatic lobectomy, which included plan to preserve right hepatic vein. A 6-cm skin incision was made below the right costal margin. The tumor was observed to be partially protruding and there was no obvious dissemination. After dissecting plane between IVC and hepatic veins, venous

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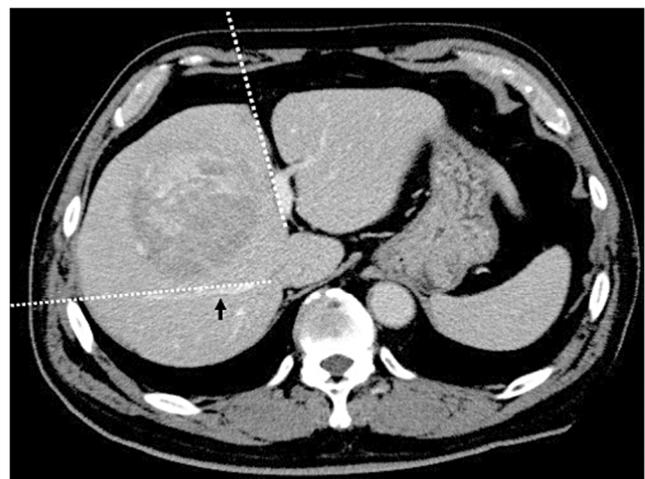


Fig. 1 CECT abdomen. Centrally located tumor, involving mainly segments 5, 8, and 4 with leftward displacement of middle hepatic vein

system and liver, dissection proceeded at porta where all vessels and bile duct clearly defined and separately looped with umbilical tape. Then taping of the right hepatic vein, common trunk of left and middle hepatic vein was done. Again, the most challenging part of dissection to separate left and middle hepatic vein was performed. Here we required small parenchymal transaction to separate these vessels intra parenchymally. We did not use Pringle’s method. We did not transect any hepatic artery or portal vein or bile duct at porta hepatis (Fig. 2).

We subsequently began the LHM with separation of the right and common trunk veins from the suprahepatic

portion of the inferior vena cava (IVC). Under direct vision in the dorsal surface of the liver, plane creation and separation was continued with dissecting fine Kelly long forceps, from the caudate lobe toward the loose space between the right hepatic vein and the trunk of the common hepatic vein (formed by confluence of middle and left hepatic veins). While passing Kelly some very small veins, directly entering IVC may be encountered, but as taping and traction done, minimal bleeding eventually stops. Next, 4-mm Teflon tape was passed through the area between the liver and the anterior surface of the IVC.

If resistance occurs, the forceps should be wiggled left and right to search for an area with no resistance. Forced blunt dissection or forcibly probing with the forceps is dangerous when resistance is encountered. It is safest to perform as much of the detachment under as much direct visualization as possible. Then we proceeded by using same tunnel to go between left and middle hepatic vein, after minimum transection of liver at posterior surface, a similar tape passed (Fig. 3). Here, we took at most care for margin.

Elevating the tapes that is hanging liver over IVC secured the IVC and revealed the hepatic parenchyma incision lines (Fig. 3). We finally conducted the hepatic transection, by Glissonian pedical approach for each sector.

There were two transaction lines, one between segments VI, VII AND V, VIII, and other between V, VII, and IV (Fig. 4). We transected the peripheral region of the middle hepatic vein that was in contact with the tumor but preserved the proximal region. We preserved both right and left hepatic veins. The transection was performed using the harmonic scalpel. Hemostasis on liver surface was done by bipolar cautery. Small biliary radicals more than 3 mm ligated individually. The right triangular ligament and coronary ligaments were transected, and a 10 × 14 × 12 mm tumor was removed. The operative time was

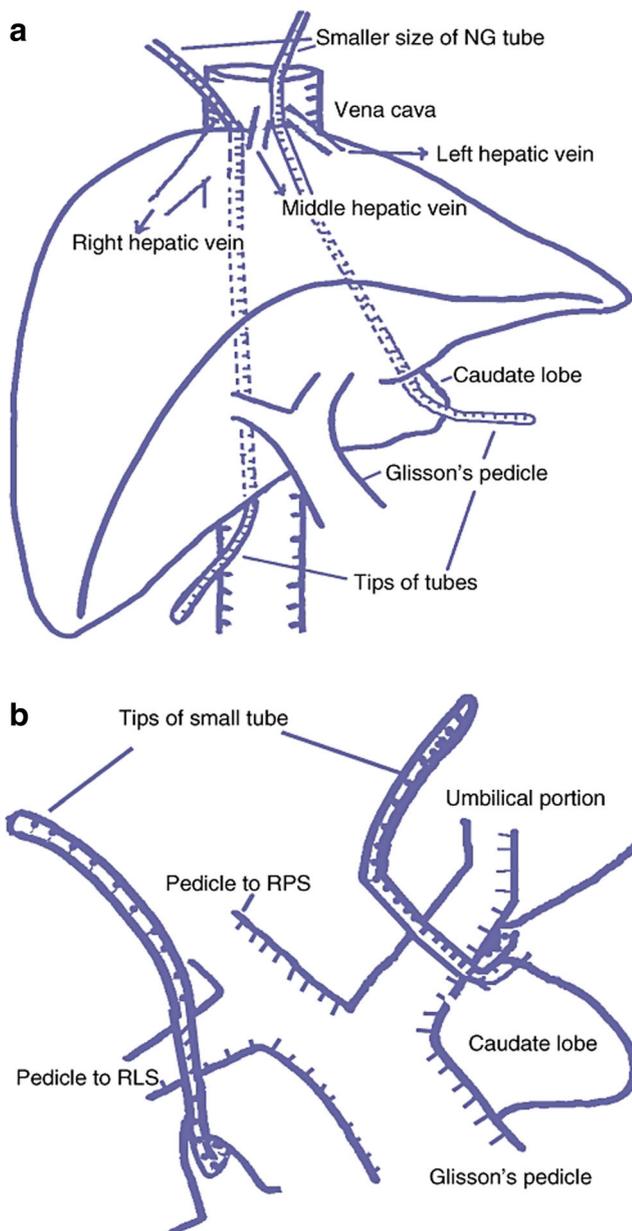


Fig. 2 Diagrammatic representation of double hanging maneuver

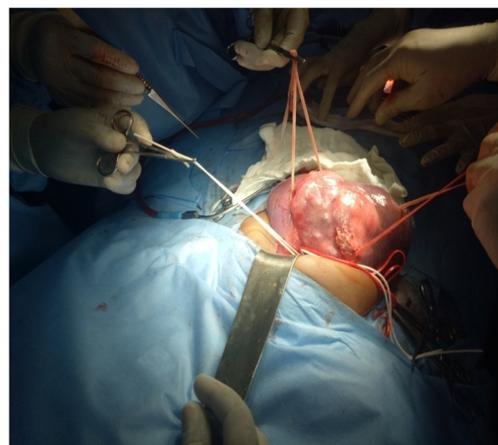


Fig. 3 Operative photograph showing double hanging of liver with two tapes

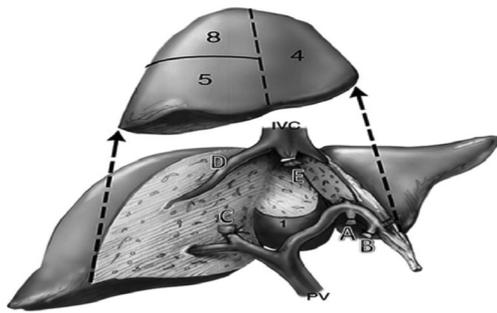


Fig. 4 Central hepatectomy. A, B sectoral pedicles to segment IV. C—portal vein pedicle to segments V and VIII. D—right hepatic vein. E—middle hepatic vein (ligated)

320 min with a hemorrhage volume of 150 ml. There were no postoperative complications. Patient discharged on postoperative day 7 and is under regular follow-up with USG abdomen and serum alpha-feto protein levels every three months.

Discussion

The LHM, which was first reported in 2001 by Belghiti et al. [4], has increased the safety of anterior approach hepatectomy. Taping the anterior surface of the IVC secured the IVC and minimized mobilization of the liver. The most important advantages include reduced risk of hemorrhage, tumor rupture, tumor dissemination, and hemodynamic changes that accompany mobilization of the liver. Elevating the entire liver anteriorly with tape enables the liver to be divided at the correct plane. Also, this technique allows the deviations in detachment direction. Retraction also compresses the wall of the hepatic vein, which can reduce hemorrhage. Additionally this technique helps for easier identification of hemorrhages and makes hemostasis easier to achieve. Simultaneously, retrograde IVC flow may be reduced because the detached surface is raised slightly by venous pressure.

The anterior approach results in better operative strategy compared with the conventional mobilization, both for hepatocellular carcinoma and hepatoblastoma [5, 6]. The techniques for the detachment of the anterior surface of the IVC are based on the anatomical fact that the IVC has an avascular area in the 10 to 11 o'clock position [7, 8]. In double hanging maneuver, this is same plane used till common trunk, then deviated little toward left to go between the two veins which forms the trunk. However, it is important to determine whether the IVC is invaded by the tumor prior to surgery (which is the only contraindication for performing this maneuver).

Although we have performed hepatectomies using LHM on many adult patients at our facility, this was the third time that we performed a hepatectomy using LHM

on a child. In previous two cases, we used single LHM. Here in this case as we have decided for central hepatectomy, we have done double LHM.

Till now, there are no reported cases of central hepatectomy by using double liver hanging maneuver in a child. Hence, we are presenting first case of central hepatectomy/mesohepatectomy by double LHM.

Only disadvantage of this technique compared to single LHM and extended right hepatectomy is two transection planes, resultant blood loss, and operative time. But considering benefit of preserving much of normal liver parenchyma and resultant reduction in postoperative liver failure, this consideration is meager in experienced hands.

Advances have been made in hepatic surgery in recent years, and strategies for the surgical treatment of hepatoblastoma are continually being developed [9–11].

Conclusions

It is absolutely important that hepatectomies in pediatric patients should be performed safely and precisely, making the LHM method extremely useful. Tendency of hepatoblastoma to form bulky tumors, in small livers of pediatric patients, makes imperative to consider for parenchyma preservation as much as possible. In this context, central hepatectomy by a double liver hanging maneuver plays a vital role. DLHM, although challenging, can be performed safely.

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