



Trans-Umbilical Laparo-Endoscopic Single Site Surgery with Hepatic Ductoplasty in Management of Childhood Choledochal Cyst: A Single Surgeon Experience with 46 Cases

Tran Ngoc Son^{1,2*}, Dinh Anh Duc¹ and Duong Van Mai²

¹Department of Surgery, National Hospital of Pediatrics, Vietnam

²Department of Pediatric Surgery, Saint Paul Hospital, Vietnam

***Corresponding author:** Tran Ngoc Son, Associate Professor of Surgery, Deputy Director, Chief of Department of Pediatric Surgery, Saint Paul Hospital, Vietnam.

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Abstract

Aim: To present our techniques and results of trans-umbilical laparo-endoscopic single site surgery (TULESS) with hepatic ductoplasty in the management of childhood choledochal cyst (ChC).

Methods: All ChC cases undergoing TULESS excision of ChC, ductoplasty and hepatico-jejunostomy by the same surgeon from October 2012 to October 2017 were reviewed. For TULESS, 3 trocars were placed at a single umbilical skin incision and conventional instruments were used.

Results: 46 patients (35 girls, 11 boys) with hepatic ductoplasty were identified from total 237 patients with ChC undergoing TULESS by the same surgeon for the review period. The median age was 17 months. Ductoplasty for a small common hepatic duct (less than 5mm) was carried out in 38 patients and for the presence of an aberrant duct in 8 patients. The median operative time was 195 minutes. There was no intraoperative complication, no conversion to open surgery. Additional trocars (conversion to conventional laparoscopic surgery) were required in just the first case of aberrant duct. Postoperative bile leak was noted in one patient (2.2%), which was resolved with non-operative treatment. The median postoperative hospital stay was 5 days. At a median follow up of 36 months (range: 3 months to 60 months), one patient needed redo surgery for anastomotic stenosis; all other patients were in good health, with excellent postoperative cosmesis.

Conclusion: TULESS with conventional instruments is feasible and safe for hepatic ductoplasty for childhood ChC with small common hepatic duct or aberrant duct.

Keywords: Chylous ascites; Intra-abdominal pressure; Pregnancy; Vaginal delivery

Introduction

Choledochal cyst (ChC) is a relatively common disease in children. Surgical repair is the mainstay in the management of this anomaly since total excision of the cyst and hepatico-enterostomy have been accepted as standard procedures. With the development of the minimally invasive surgical techniques, conventional laparoscopic surgery (CLS) with 4 separate trocars has become popular and has replaced the classic open approach in the management of childhood ChC in many centers nowadays [1-4]. For ChC in general, good hepatico-intestinal anastomosis is mandatory to minimize of postoperative morbidities such as bile leak and/or anastomotic stenosis and cholangitis. These complications have been reported to be up to 10 % in different series for both

open and laparoscopic approaches [1-9]. To avoid aforementioned complications, especially in cases of unfavorable biliary anatomy such as a very small common hepatic duct or presence of an aberrant duct, a hepatic ductoplasty (HDP) may be necessary [6-10]. Hepatic ductoplasty (HDP) is considered to be a technically demanding procedure and should be performed by surgeons with proficiency and experience [6-8]. Transumbilical laparoscopic single site surgery (TULESS) or SILS (single incision laparoscopic surgery) has been recently introduced to the management of childhood ChC with promising initial results and cosmetic advantages over the CLS [11-13]. However, surgeon's experience with TULESS is limited and the feasibility of TULESS for complex cases ChC requiring HPD

has been questioned [14,15]. Therefore, we conducted this first study to investigate the feasibility and safety of TULESS for HDP in management of childhood ChC.

Materials and Methods

All ChC cases undergoing ductoplasty by TULESS with conventional instruments at our centers from October 2012 to October 2017 were reviewed. All the operations were performed by the same surgeon with total excision of the cyst and hepatico-jejunosomy. The operative techniques of TULESS for ChC has been described in detail in our previous report [13]. Our indications for hepatic ductoplasty were ChC cases with diameter of the common hepatic duct diameter of less than 5mm or the presence of an aberrant duct. Ductoplasty for common hepatic duct smaller than 5mm was performed with a 4-5mm longitudinal incision by scissors on the anterior duct wall at 12 o'clock to create larger hepatico-jejunal anastomosis (at least 8-10mm). In the case of an aberrant bile duct, a "double barrel" orifice was created by suture with PDS 6.0 to join the aberrant duct to the common hepatic duct for a single hepatico-jejunal anastomosis. All hepatico-jejunal anastomoses were done with PDS 5.0 single layer running suture. Abdominal drain placement was optional. Patients were discharged after resuming full oral feeding and being asymptomatic. All patients were followed up after discharge by a protocol consisting of clinical examination, liver functional tests and an abdominal ultrasound at intervals of 1 month, 3 months, 6 months intervals and then annually. Patient's characteristics, intraoperative findings, operative time and results were analyzed.

Results

For the study period, from total 237 patients with ChC undergoing TULESS 46 patients with HDP were identified (19.4%). There were 35 girls (76.1%) and 11 boys (23.9%) with a median age of 17 months (range: 1 month to 11 years). The median bodyweight at surgery is 9.7kg (range: 3.4 to 32 kg). The median size of ChC is 3.8cm (range: 1.5cm to 11cm). HDP for small common hepatic duct were carried out in 38 patients. The median hepatic duct diameter is 3.4 mm (range: 2mm to 4.5mm). HDP for aberrant duct was performed in 8 patients. All aberrant ducts were on the right side of the common hepatic duct, with diameter of 1.5mm – 2.5mm and were discovered during transection of the upper end of the ChC together with the cystic duct. In 5 cases, the aberrant duct made confluence with the cystic duct. In other 3 cases, the aberrant duct confluent with the common hepatic duct was just next the cystic duct orifice. The median operative time is 195 minutes (range: 150-345 minutes). There are no intraoperative complications, no conversion to open surgery. Additional trocars (conversion to CLS) were needed in just the first case with aberrant duct. The rate of anastomotic complications is 4.4% with postoperative bile leak in one patient (2.2%) that resolved with nonoperative management. and hepatico-jejunal anastomotic stenosis 2 months after the operation in another patient (2.2%). The later patient developed jaundice and cholangitis necessitating redo surgery with normalization of liver function tests and abdominal ultrasound.

Both complications occurred in the HDP patients with a small common hepatic duct. There is no complication in the group of patients with HDP with aberrant duct. The remaining patients recovered well with median postoperative hospital stay of 5 days (range 4 -7 days). At a median follow up of 36 months (range: 3 months to 60 months), all the patients were in good health and without complication. The postoperative cosmesis is excellent as all patients were virtually scarless.

Discussion

One of the key points in the surgical management of ChC is performing of hepatico-enterotomy since most common complications after surgery for ChC such as bile leak or anastomotic stenosis (with subsequent cholangitis and biliary stones formation) were related to this anastomosis [1-9]. After open surgery for ChC, the rate of postoperative complications, especially anastomotic stricture requiring redo surgery, may be up to 10% [9]. The results of CLS for childhood ChC has been reported to be similar or better than open surgery [3,4] with the postoperative complication rate of 4.6% to 7.7% [1-8]. For unfavorable biliary anatomy (such as too small common hepatic duct or presence of an aberrant duct), the complication of bile leak and anastomotic stenosis rate might be higher because of difficulties with the hepatico-intestinal anastomosis. HDP techniques with a widened anastomosis and/or joining the aberrant duct to the common hepatic duct were recommended by Todani et al. [9] [10]. This technique using conventional laparoscopic HDP has been also reported [6-8].

The initial experience with TULESS or SILS by conventional laparoscopic instruments for childhood ChC has been reported to be with promising results [11,13]. Compared to CLS, the difficulties in TULESS are mainly ergonomic with very limited angulation and collision of the instruments [14,15]. A study comparing SILS and CLS showed no significant differences in operative time and results between the two approaches with better postoperative cosmesis for SILS [12]. Our study focused on TULESS in cases with HDP and it showed that TULESS was feasible and for HDP in children. In our series of 46 cases, only the first case of aberrant duct (and it was early in our series of TULESS) was converted to CLS. In all the remaining cases ductoplasty was successfully performed by TULESS, including 7 cases of aberrant duct. Our procedure of ductoplasty did not prolong the operative time with similar operative time as previously reported in TULESS cases [13]. Our rate of ductoplasty for ChC was higher than other report of CLS [6-8]. The reason was that we purposely adopted widening the anastomosis when the common hepatic duct less than 5mm. Our technique of ductoplasty for small common hepatic duct was similar to the technique described by Li L et al [7]. The different point in doing the hepatico-jejunal anastomosis in our TULESS series compared to our previous CLS series [1-2] was that we used running suture in all cases while interrupted sutures were used in CLS cases of common hepatic duct less than 10mm. The results of this study showed that the running suture combined with ductoplasty gave good results. The rate of anastomotic complications was 4.4% in this series, similar to other

reports of ductoplasty by CLS [6-8]. In our experience with both CLS and TULESS with conventional straight instruments, the surgeon can apply almost the same surgical tactics in both approaches for ductoplasty. Carefully gentle handling of biliary duct tissue, and proficiency of laparoscopic suturing are essential to get a good outcome.

Conclusion

Our TULESS technique with conventional instruments is feasible and safe for hepatic ductoplasty for childhood ChC with small common hepatic duct or aberrant duct. In experienced hands, TULESS can be a good option in the minimally invasive management of childhood ChC, including cases with unfavorable biliary anatomy.

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Conflict of Interest

No conflict of interest.

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