Laparoscopic Biliary Bypass with an Autologous Tubed Gastric Flap: A Pilot Study

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Although biliary bypass technique which used jejunum as a conduit is a common procedure in open technique of hepatobiliary tract surgery, its complicated technique made it is not feasible for laparoscopic surgery. Before 1960, stomach was used vastly for biliary drainage but late stricture which resulted from too much tension along suture line made it not much acceptable. The authors report surgical technique of laparoscopic gastric tube flap for biliary bypass in order to made it practicable for laparoscopic surgery.

Keywords: *Laparoscopic surgery, Biliary bypass technique, Gastric tube flap, Biliary-gastric bypass, Animal experimental model*

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Obstructive jaundice is one of the most common surgical problems which caused from both benign and malignant conditions. Biliary drainage can be done by many techniques including endoscopy[1-4], intervention radiology[5]or surgical drainage[6]. In addition to relief symptoms of obstructive jaundice, the procedure should resemble to normal physiology of biliary system. Since 1940, many biliary bypass techniques have been developed such as hepatico-gastrostomy, hepaticoduodenostomy, hepaticojejunostomy (Roux-en-Y or Braun's loop); most of them have different advantages and disadvantages. Among them, jejunum has been used widely as a conduit for biliary drainage particularly in open surgery because it easily accessible and movable to proximal bile duct anatomosis.

Laparoscopic surgery has developed rapidly and gained much acceptable among surgeons. Some techniques cholecystectomy have replaced traditional operations such as laparoscopic. However, laparoscopic biliary bypass using jejunum as a conduit is time-consuming procedure and needs experienced laparoscopic surgeon. Before 1960, hepaticogastrostomy was used as a biliary bypass procedure, but anastomosis stricture which caused from too much tension along the suture line resulted in poor outcome. The authors introduced a new technique by using autologous tubed gastric flap (ATGF) as a conduit for biliary bypass in order to decrease tension at the anastomotic site. Additionally, an ATGF can be done easier than jejunal conduit under laparoscopic technique.

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Material and Method

Three pigs which weigh 20-30 kilograms were selected for the experiment. The operations were done under general anesthesia using laparoscopic technique. The authors resected part of stomach to create a tubular structure (ATGF) which could be easily anastomosed to the gallbladder as a part of biliary system.

Surgical Technique

Instruments

Basic laparoscopic set, 0° and 30° 10-mm telescope, Multi-fired Endo GIA 60 were used in this technique.

Trocar position

A 10-mm trocar was inserted at supraumbilicus for camera port, then two 5-mm trocars were inserted at the right and left subcostal margin along anterior axillary line. Lastly, two 10-mm trocars were placed at right and left midclavicular line between the previous two ports. The surgeon stood on the left side of the table and the first assistance stood on the right (Fig. 1).

Each pig underwent endotrachial general anesthesia. The pig's abdomen was sterilely prepped and drapped. In addition, it was placed on supine position and elevated the head up to 30% (reverse Trendelenburg position). Nasogastric tube was inserted. The first camera port was done by open technique at supraumbilicus. Air was inflated until air pressure was approximately 14 mmHg in order to create sufficient working space, then other trocars were inserted in sequential under direct vision. After abdominal cavity was entered, stomach and its blood supply along the greater curvature especially the junction between the right and left gastroepiploic vessels were identified (Fig. 2).

Initially, the nasogastric tube was placed along the greater curvature with its tip pointing to the fundus of stomach. The tube was seized with a laparoscopic atraumatized instrument. The gastrocolic omentum was divided and dissected from stomach edge. Stomach transection was started at the greater curvature where the tip of nasogastric tube located at the junction between the right and the left gastroepiploic vessels. Guided with nasogastric tube, a tubular structure along the greater curvature of stomach was created with two or three Multi-fired Endo GIAs. After development of an ATGF with approximately 3 centimeters proximal to the pylorus (Fig. 3), a 2-0 vicryl stitch was done at an angle between the base of gastric tube and antrum in order to secure the angle of suture line. Consequently, the 2-centimeters suture line was performed by continuous running suture with 3-0 vicryl between the end of gastric tube and the gallbladder (Fig. 4). The nasogastric tube was passed through the anastomotic site for postoperative contrast study. Bleeding was secured and abdominal wall was closed as usual. No drain was needed.

Immediately after the operation, the contrast media was fed through nasogastric tube to demonstrate the patency of anastomotic site (Fig. 5). All pigs were started feeding after starving for 72-hours. There was no immediate or late complication. After 6-8 weeks, all three pigs were killed; their livers, gallbladders, extrahepatic biliary systems and stomachs were sent for pathologic examination

Fig. 1 Reverse trendelenburg position (A), Port position (B)

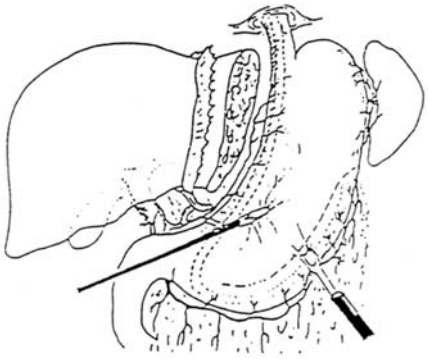

Fig. 2 Identification the junction of right and left gastroepiploic vessels on stomach Wall

Results

Post-operative imaging study in all pigs showed no leakage, good functioning and patent of anastomotic site. Pathologic examination of stomach and gallbladder also revealed the patency of anastomosis, mild generalized gastritis at gastric tube and no abnormality in hepatobiliary system (Fig. 6).

Conclusion

Although the development in laparoscopic surgery techniques and instruments make it worldwide acceptable and useful, its disadvantages are still an obstacle to most surgeons, especially in some complicated operations which require experienced surgical

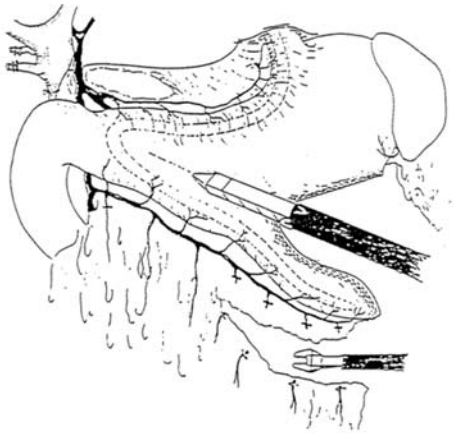

Fig. 3 Application of the stapler are made all the way to approximately 3 cm proximal to pyrolus

skills. The authors developed a new technique for laparoscopic biliary bypass which using gastric tube as a conduit for biliary bypass from gallbladder to stomach. This technique is less complicated than traditional Roux-en-Y jejunal bypass and more compliant to laparoscopic surgery. Though the stomach wall is thicker than jejunum, there was no technically difference in performing anastomosis between stomach and gallbladder. Due to its length and mobility, we can also use gastric tube for proximal biliary bypass such as hepaticogastrostomy without any problem of over-tension along the suture line.

From the authors' point of view, there is the difference between pig's stomach and human's. In general, pig's stomach is bigger than men's which makes performing gastric conduit in pig much easier.

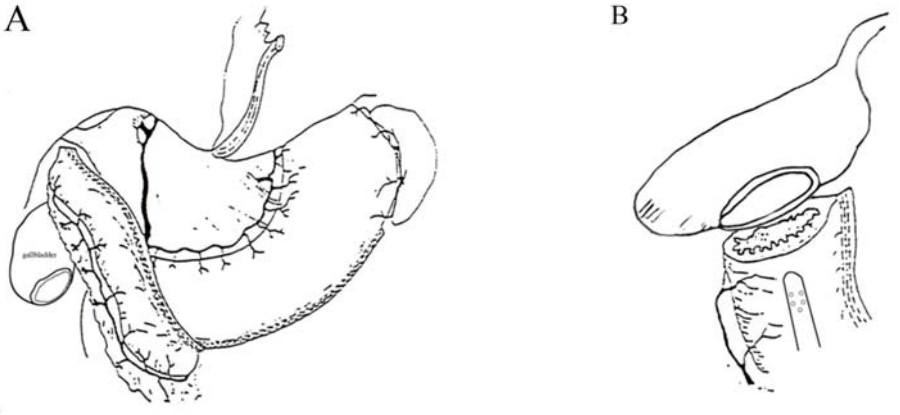

Fig. 4 The Autolonous Tubed Gastric Flap is mobilized upward, it is positioned with ante gastric fashion (A) then anastomosed to gallbladder (B)

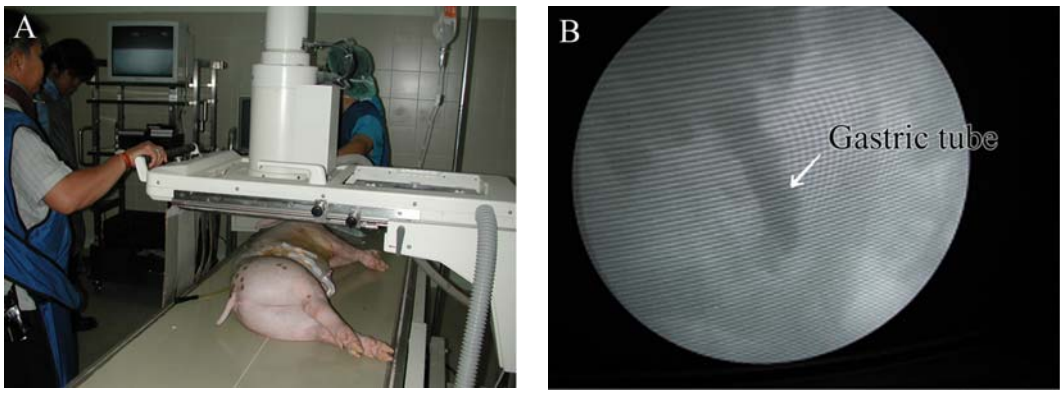

Fig. 5 Postoperative contrast study (A), contrast media was fed through nasogastric tube to demonstrate gastric tube (B).

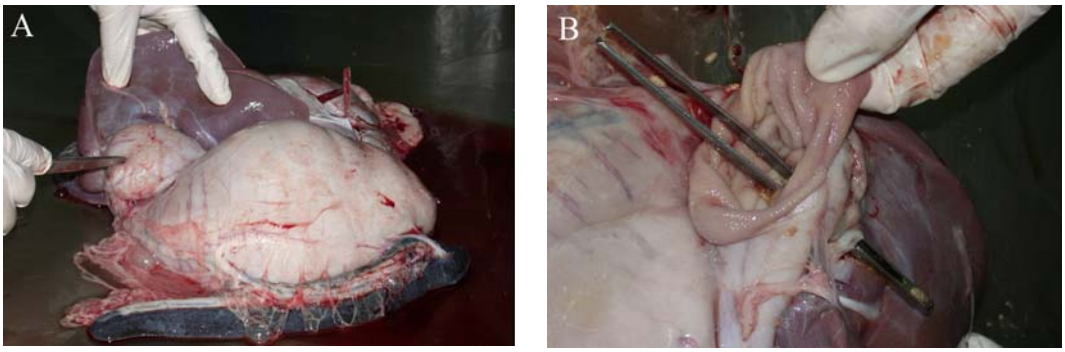

Fig. 6 Pathologic examination (A) Gross specimen, (B) Cholecystogastrostomy anastomosis.

One drawback from cholecystogastrostomy is bile irritation which results in generalized gastritis in the gastric tube. Other late complications such as prolonged gastitis, ascending cholangitis and anastomosis stricture may be further investigated as the results from long-term study.

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วิธีการผ่าตัดโดยส่องกล้องด้วยการประยุกต์ใช้เนื้อเยื่อกระเพาะอาหารสร้างท่อเพื่อรองรับน้ำดีให้ลงสู่ทางเดินอาหาร

ปริญญา อัครานุรักษ์กุล, สมเกียรติ วัฒนศิริชัยกุล, เอกกิตติ์ สุรการ

การผ่าตัดเพื่อระบายน้ำดีลงสู่ทางเดินอาหารในกรณีที่ทางเดินน้ำดีเกิดการอุดตัน โดยใช้ลำไส้เล็กส่วนต้นเป็นทางระบายของน้ำดีเป็นหัตถการที่ทำกันอย่างแพร่หลายในการผ่าตัดช่องท้องแบบเปิด แต่ถ้าเป็นการผ่าตัดช่องท้องโดยการส่องกล้องจะมีความยุ่งยากในการทำโดยวิธีนี้ ก่อนปี พ.ศ. 2503 เคยมีผู้ใช้กระเพาะอาหารต่อกับ ทางเดินน้ำดีเพื่อใช้ระบายน้ำดี แต่เนื่องจากผลการผ่าตัดพบว่ามีการตีบตันของรอยต่ออันเนื่องจากความตึงของ รอยแผลตัดต่อจึงทำให้ไม่เป็นที่ยอมรับในเวลาต่อมา รายงานนี้นำเสนอเทคนิควิธีการผ่าตัดเพื่อระบายน้ำดีโดยการ สร้าง gastric tube เป็นทางระบายน้ำดีเพื่อให้การผ่าตัดดังกล่าวสามารถทำได้ง่ายขึ้นในการผ่าตัดช่องท้องโดยการ ส่องกล้อง