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การบาดเจ็บต่อท่อน้ำดีระหว่างผ่าตัดถุงน้ำดี: ทบทวนเวชระเบียนผู้ป่วย 1,437 ราย

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Bile Duct Injury During Cholecystectomy: Audit of 1,437 Laparoscopic and Open Cholecystectomy

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หลักการและวัตถุประสงค์: การผ่าตัดถุงน้ำดีมีภาวะแทรกซ้อนที่สำคัญคือการบาดเจ็บต่อท่อน้ำดีระหว่างผ่าตัด ซึ่งทำให้เกิดผลเสียต่างๆในระยะยาวแก่ผู้ป่วย การศึกษานี้มีวัตถุประสงค์เพื่อทบทวนการผ่าตัดถุงน้ำดี ความชุกของการเกิดการบาดเจ็บต่อท่อน้ำดีในระหว่างผ่าตัด

วิธีการศึกษา: การศึกษาย้อนหลังจากเวชระเบียนของผู้ป่วยอายุ 18 ปีขึ้นไปที่มาผ่าตัดถุงน้ำดี ตั้งแต่วันที่ 1 มกราคม 2553 ถึงวันที่ 31 ธันวาคม 2557 ในโรงพยาบาลมหาราชนครราชสีมา

ผลการศึกษา: จากการศึกษา ผู้ป่วย 1,437 ราย พบความชุกของการบาดเจ็บท่อน้ำดีร้อยละ 1.32 โดยเกิดระหว่างการผ่าตัดแบบส่องกล้องมากกว่าผ่าตัดแบบเปิด แต่ไม่มีนัยสำคัญทางสถิติ (p=0.08) ผู้ป่วยที่มีการบาดเจ็บต่อท่อน้ำดีส่วนใหญ่ได้รับการวินิจฉัยระหว่างผ่าตัด หรือภายใน 14 วันหลังผ่าตัด ค่าใช้จ่ายรวมเพิ่มขึ้นจากกลุ่มที่ไม่มีการบาดเจ็บต่อท่อน้ำดีอย่างมีนัยสำคัญทางสถิติ (31,131.00 และ 65,806.05 บาท, p = 0.01) รวมทั้งระยะเวลาการนอนโรงพยาบาลมากกว่ากลุ่มที่ไม่มีการบาดเจ็บอย่างมีนัยสำคัญทางสถิติ ในการศึกษานี้ไม่มีผู้ป่วยที่เกิดการบาดเจ็บต่อท่อน้ำดีเสียชีวิต

สรุป: จากการศึกษานี้พบว่าการบาดเจ็บต่อท่อน้ำดีระหว่างผ่าตัดถุงน้ำดีมีความชุกร้อยละ 1.32 โดยพบระหว่างการผ่าตัดแบบส่องกล้องมากกว่าการผ่าตัดแบบเปิด แต่ไม่มีนัยสำคัญทางสถิติ (p=0.08) การเกิดการบาดเจ็บต่อท่อน้ำดีระหว่างผ่านตัดส่งผลให้เพิ่มระยะเวลาการนอนโรงพยาบาล มีค่าใช้จ่ายเพิ่มมากขึ้น และในบางรายต้องได้รับการผ่าตัดซ้ำเพื่อแก้ไขภาวะดังกล่าว

คำสำคัญ: การบาดเจ็บต่อท่อน้ำดี

Background and objective: Cholecystectomy is a common procedure, but bile duct injury is serious problem. This injury causes several consequences such as longer hospital stays and increase cost of treatment and re-operation. This study aimed to investigate the prevalence of bile duct injury during cholecystectomy.

Method: Retrospective review of medical records of patients age more than 18-year-old underwent cholecystectomy between 1st January 2010 and 31st December 2014 at Maharat Nakhon Ratchasima hospital.

Results: From 1,437 patients in this study, 1.32% prevalence of bile duct injury was found. The injury occurred during laparoscopic cholecystectomy more common than open cholecystectomy but without statistical significance (p=0.08). Most of patients with bile duct injury were diagnosed during surgery or during first 2 weeks after the operation. Mean cost of treatment is significant higher in bile duct injury group than non-injury group (31,131.00 vs 65,806.05 baht, p = 0.01) and hospital length of stay also significantly longer. There was no mortality in bile duct injury group.

Conclusion: The prevalence of bile duct injury in this study was 1.32% which occur in laparoscopic cholecystectomy higher than open cholecystectomy but no statistical significance (p=0.08). This leads to longer hospital stay, higher mean cost of treatment and some patients needed to re-operation.

Keyword: Bile duct injury

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Introduction

Cholecystectomy is a common operation. Open cholecystectomy (OC) was performed as main treatment for benign gallbladder diseases until laparoscopic cholecystectomy (LC) was introduced in the late 1980s and became standard treatment for symptomatic gallstones. Bile duct injury(BDI) is serious complication of open and laparoscopic cholecystectomy. Prevalence of BDI after open and laparoscopic injury are around 0.4-0.9%[1,2] and 0.2-0.3%[3,4] , respectively. It leads to several consequences such as longer hospital stays, increase cost of treatment, re-operation and liver failure. Both OC and LC are required operations of the surgical trainee. To prevent this complication, in some institute reported structured training program that trainee must have adequate experience in laparoscopic basic training and have minimum number of at least 5 OC before commencing LC[5]. This study aimed to assess prevalence and characteristic of bile duct injury.

Method

After institutional ethic review board approval, medical records of all patients age 18 and over who underwent cholecystectomy as a primary procedure in department of surgery, Maharat Nakhon Ratchasima hospital (MNRH) from 1st January 2010 to 31st December 2014 were reviewed. Operative notes of patient who underwent either OC or LC in MNRH will be retrieved from hospital database. Demographic data, indication for surgery, conversion to open surgery, trainee experience in cholecystectomy, operative time and operative blood loss will be recorded. BDI was classified according to Strasberg's classification[3]. Time of detection bile duct injury will be classified as intraoperative if BDI detected during surgery, early if detected within or at 2 weeks after surgery and late diagnosis if detected after 2 weeks after surgery. Treatment of BDI was also recorded. Patient who underwent cholecystectomy due to blunt and penetrating trauma, known malignant disease, cholecystectomy as part of other abdominal operations were excluded.

Statistical analysis

All data were analyzed by R-studio program. Continuous variables were presented as mean and SD or median and IQR where appropriate. Categorical variables were presented as percentage. Independent t-test was used to calculate the significant different in continuous variables and Chi-square test or Fisher's exact test were used to calculate the significant different in categorical variables where appropriate. Factors that have p-value less than 0.05 were considered as statistical significant.

Results

Total 1,437 patients underwent cholecystectomy in 5-year period from January 2011 to December 2014. One thousand and seventeen patients were female (70.8%) and 420 patients were male (29.2%). Age range from 18 to 94-year-old with a mean of 54.19 years. Two third were underwent OC. There were 14 trainees involved during that period. Three hundred and ninety-eight cholecystectomies (27.7%) were performed by surgical trainees (33 LC and 365 OC). There were 19 patients had bile duct injury (1.32%), 2 BDI patients occurred in emergency OC performed by surgical trainees whereas 17 out of 19 BDI occurred in operation performed by attending surgeons. The overall mortality rate was 3.27% (47 out of 1,437), and 43 out of 47 deaths were patients who underwent emergency OC.

In Table 1 shows patient's characteristics and operative outcomes categorized by types of surgery. Fifty-six patients needed to be converted from LC to OC (10.4%). In this study the mean cost of LC was slightly higher than OC but average hospital length of stay was shorter in LC group (4.45 vs 5.88 days, p <0.001). But if BDI occurred the mean cost of treatment was 2-fold higher (31,131.00 vs 65,806.05 baht, p = 0.01). Almost all emergency patients underwent OC. Diagnosis for patients underwent cholecystectomy were shown in Table 2

As shown in Table 1, BDI were occurred in LC 2 times more common than OC (2.05% vs 0.89%) and most of them occurred during elective surgery (Table 3). Most of these injuries were detected in intraoperative period (52.63%) and within 14 days after surgery (84.21%). Most common type of BDI in this study was type D (47.4%) according to Strasberg's classification (lateral wall injury) and second most common type was type E2 (42.1%) which most of type E2 injury were occur during LC. None of these patients died. Treatments for these injuries were biliary-enteric bypass in 9 patients, primary repair over t-tube placement in 8 patients and endoscopic treatment in 8 patients.

Table 1 Patient's characteristics and operative outcomes categorized by types of surgery

Factors	LC (n=537) n (%)	OC (n=900) n (%)	p-value
Age (mean±SD)	49.84 ± 14.69	56.78 ±15.44	< 0.001
Female	413 (76.91)	604 (67.11)	< 0.001
Bile duct injury (%)	11 (2.05)	8 (0.89)	0.08
Emergency: elective surgery	7:530	339:561	< 0.001
Operative time, minutes (mean±SD)	79.25 ± 32.32	56.17 ± 38.06	<0.001
Blood loss (mean±SD)	48.00 ± 29.78	148.95 ± 228.41	<0.001
Hospital stay (mean±SD)	4.45 ± 3.7	5.88±7.8	<0.001
Mortality (%)	2 (0.37)	45 (5)	<0.001
- elective	2 (0.37)	2 (0.22)	
- emergency	0	43 (4.78)	
Cost ,baht (mean±SD)	31,541.02 ± 15,582.68	30,885.99 ± 43,296.02	0.68

Table 2 Diagnosis categorized by type of surgery

Diagnosis	LC (n=537) n (%)	OC (n=900) n (%)
Symptomatic gallstone	504 (93.85)	524 (58.22)
Acute calculous cholecystitis	8 (1.49)	327 (36.33)
Acute acalculous cholecystitis	0	11 (1.22)
Gallstone pancreatitis	19 (3.54)	15 (1.67)
Gallbladder polyp	6 (1.12)	11 (1.22)
Twisted GB	0	8 (0.89)
Chronic cholecystitis	0	3 (0.33)
Hydrops gallbladder	0	1 (0.11)

Discussion

BDI during cholecystectomy is a serious complication, increase hospital length of stay, increase cost of treatment, need further surgeries to correct, reduce survival[6], impaired quality of life especially in patient who has delayed diagnosis[7,8]. There are many studies regarding risk factors of iatrogenic bile duct injuries, especially in LC. Most common factor that contributes BDI is misidentification of common bile duct or common hepatic duct as cystic duct. This may be because of variation of biliary anatomy or technical error. This can be avoided by careful dissection of tissue in Calot's triangle until base of liver is exposed and only 2 structures entering gallbladder are seen, so called "Critical view"[3]. Other factors are surgeon's experience, severity of diseased gallbladder, excessive traction on cystic duct with tenting upward of common hepatic duct, improper use of clip to control bleeding[9].

In this study number of LC is similar to OC in elective setting, but almost all emergency cases were done by open technique. The prevalence of BDI reported in other studies were 0.4-0.9% in laparoscopic and 0.2-0.3% in open cholecystectomy. We have comparable BDI rate in OC compare to other studies but higher BDI rate in LC compare to other studies[1,3,10–13]. This may be because of most of our cases were delayed laparoscopic or open cholecystectomy 2-3 months after successful medical treatment for acute cholecystitis and 17 out of 19 BDI that occurred were done by attending surgeons, this may be suggesting that in complex or complicated cases they were operated by attending surgeons. Average hospital length of stay was shorter in LC as reported in other studies but 4.45 days in LC group was longer than average hospital stay in other

Table 3 Bile duct injury during cholecystectomy categorized by type of surgery

characteristics	BDI in LC (n=11) n (%)	BDI in OC (n=8) n (%)
Post-operative detection (days)		
- intraoperative detection	4 (36.36)	6 (75)
- early (within 14th day postoperatively)	4 (36.36)	2 (25)
- delayed (later than 14th day postoperatively)	3 (27.27)	0
Starsberg's classification (%)		
- Type A	1 (9.09)	0
- Type B	0	0
- Type C	0	0
- Type D	4 (36.36)	5 (62.50)
- Type E1	0	1 (12.50)
- Type E2	6 (54.55)	2 (25)
BDI during emergency surgery	0	5 (62.50)
Conversion to open surgery	5 (45.45)	-
Hospital stay (median and IQR)	10.0 (7.0)	10.5 (7.5)
Mortality (%)	0	0

studies[14–16]. Due to this is retrospective study the information regarding potential factors that may associated with BDI such as body mass index, surgeon's experience or information about critical view of safety before the cystic duct was clipped were not available.

Conclusion

The prevalence of BDI in this study was 1.32% and prevalence of BDI in LC was higher than OC but no statistical significance (p=0.08). Common types of BDI found in this study were Strasberg's classification type D and type E2 injury. Most of injury were detected during the operation or within 2 weeks after surgery. Bile duct injury during cholecystectomy is a serious complication, increase hospital length of stay, increase cost of treatment, need further surgeries to correct and need long term follow up. This common operation needs careful and meticulous dissection to prevent bile duct injury.

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