Long-term follow-up of 120 patients after hepaticojejunostomy for treatment of post-cholecystectomy bile duct injuries: A retrospective cohort study

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Original research

Long-term follow-up of 120 patients after hepaticojejunostomy for treatment of post-cholecystectomy bile duct injuries: A retrospective cohort study

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HIGHLIGHTS

- Fourteen (11.6%) patients had anastomotic stricture manifested at median interval 63 months, range (2–204 months).
- Seventeen (14.2%) patients developed recurrent episodes of cholangitis at median interval 48 months.
- As regard quality of life assessment, the physical component was more affected than the mental component.
- Post-ERCP pancreatitis, number of anastomosis, operative time, post-operative early complications, and post-operative bile leak were independent risk factors for poor outcome.

ABSTRACT

Background: Long-term follow-up is essential for assessment of success of the surgical repair of post-cholecystectomy bile duct injuries (BDI). Factors affecting the long-term outcome and satisfactory length of follow-up have been little reported in the literature. The aim of this study is long-term evaluation of hepaticojejunostomy regarding clinical, radiological, laboratory and quality of life assessment.

Method: Between January 1992 to December 2007, 120 patients with postcholecystectomy bile duct injury surgically treated by hepaticojejunostomy Roux-en-Y were followed up for 20 years in Mansoura Gastroenterology Center. Long-term outcomes and quality of life (QOL) were evaluated for all patients. Univariate and multivariate analyses were done for detection of factors affecting long-term outcome.

Results: The median follow up period was 149 months, range (70–246 months). Successful long-term outcome was detected in 106 (88.3%) patients. Long-term complications were detected in 35 (29%) patients. Fourteen (11.6%) patients developed anastomotic stricture within different follow up intervals up to 17 years, of which Seventeen (14.2%) patients developed recurrent episodes of cholangitis at median interval 48 months, range (2–156 months). Post-ERCP pancreatitis, number of anastomosis, operative time, post-operative early complications, and post-operative bile leak were predictors for poor outcome. Physical component was much more affected than mental component in QOL.

Conclusion: Management of BDI in specialized centers is highly recommended. Longer time for follow-up of the patients of surgical repair of bile duct injury up to 20 years should be adopted to ensure successful outcome. Quality of life assessment is essential component of long-term follow-up.

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1. Introduction

The incidence of bile duct injuries (BDI) following laparoscopic cholecystectomy is much higher than that of open cholecystectomy (0.4%–0.6% and 0.1%–0.2% respectively) [1,2]. BDI has been supposed to be the most serious complication during cholecystectomy with possible reduced quality of life with high rates of subsequent...
Inaccurate, rework
3.2. Operative data

Data of operative findings and technique were shown in details in Table 3. The median hospital stay was 5 days, range (4–22 days).

3.3. Long-term follow up

One hundred and twenty patients were followed up within the median period of 149 months, range (70–246 months). As shown in Table 4, long-term complications were detected in 35 (29%) patients. Fourteen (11.6%) patients had anastomotic stricture manifested at median interval 63 months, range (2–204 months), of which, 2 (1.6%) patients were asymptomatic and had abnormal liver function tests with radiological evidence of anastomotic stricture in MRCP. 21.4% (3 patients) of strictures developed at 1 year, 43% (6 patients) within 5 years from surgical repair, 78.5% (11 patients) within 5 years from surgical repair, 78.5% (11 patients) within 5 years from surgical repair.

Table 3
Operative details.

<table>
<thead>
<tr>
<th>Number</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Operative findings:</td>
<td></td>
</tr>
<tr>
<td>a- Cirrhotic liver</td>
<td>21 (17.5%)</td>
</tr>
<tr>
<td>b- Internal choledochoduodenal fistula</td>
<td>9 (7.5%)</td>
</tr>
<tr>
<td>c- Intra-abdominal biloma</td>
<td>20 (16.7%)</td>
</tr>
<tr>
<td>d- RHA injury</td>
<td>4 (3.3%)</td>
</tr>
<tr>
<td>2- Operative technique</td>
<td></td>
</tr>
<tr>
<td>a- No. of anastomosis</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>113 (94.2%)</td>
</tr>
<tr>
<td>2- Size of stoma (mm)</td>
<td>4.4 ± 4.6</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td></td>
</tr>
</tbody>
</table>

surgery, markedly cirrhotic liver and ascites. All patients (5 patients died at 10 years after surgical reconstruction due to septicemia decrease to the normal level. serum bilirubin above its preoperative level for one week postoperatively then septic shock as a result of anastomotic stricture.

Seventeen (14.2%) patients developed recurrent episodes of cholangitis within 10 years. Three patients with recurrent stricture were diagnosed after 10 years up to 17 years from surgical repair. In our series, the rate of recurrent cholangitis was 14.2% in 7 patients while in Lubikowski et al study [27], it was detected in one patient (5%) and in Goykhman et al study [28], it was 27.6% detected in 8 patients.

As regard treatment of anastomotic stricture, 4 (3.3%) patients underwent refashioning of the HJ after 4—72 months interval, 2 (1.7%) patients underwent percutaneous transhepatic drainage and one of them underwent PT dilatation, the remaining 8 (6.7%) patients underwent conservative treatment due to unfit patients for surgery, markedly cirrhotic liver and ascites. All patients (5—4.2%) with recurrent cholangitis without evidence of biliary stricture were treated conservatively.

As regard quality of life assessment, the total mean score of the physical component summary was higher (more affected) than the mental health of the patients [23]. Interestingly, the majority of BDIs treated in our center were following open cholecystectomies, reflecting the fact that open cholecystectomy was performed far more commonly in the general and private hospitals (86.6% after OC vs 6.4% BDIs after LC) which had low facilities for laparoscopic surgeries in our country in the period of the study. In review of literature, long-term complications were detected in 41% of patients [23], while in our study, the rate was 29%. Many authors in referral hepatobiliary centers reported the rate of biliary strictures following reconstructions was 10—50% of patients [24,25]. Two-thirds (65%) of recurrent biliary strictures develop within 2—3 years after the reconstruction, 80% within 5 years, and 90% within 7 years. Recurrent strictures 10 years after the surgical procedure are also described in the literature [26]. In the present study, 43% of strictures developed within 5 years from surgical repair, 78.5% within 10 years. Three patients with recurrent stricture were diagnosed after 10 years up to 17 years from surgical repair. In our series, the rate of recurrent cholangitis was 14.2% in 7 patients while in Lubikowski et al study [27], it was detected in one patient (5%) and in Goykhman et al study [28], it was 27.6% detected in 8 patients.

Many previous studies in the literature recommended satisfactory length of follow-up in order to assess long-term results of the repair procedure, is 2—5 years [14] and few authors recommend 10 or 20 years of observation [29]. In our study, we found that even within 20 years of follow-up from surgical procedures, there was still potential risk for development of biliary restructure. In our series, the long-term outcome according to Terblanche clinical grading system was excellent (grade I & II) in 106 (88.6%) patients, and poor (grade III & IV) in 14 (11.4%) patients. In review literature, Bansal et al study [15] showed that the outcome as following; excellent (87%), good (7.3%), fair (3.6%) and poor (2.1%) at median follow up of 54 months, range (6—83 months) and these results were comparable to that of Sikora et al study [30].

In the present series, the quality of life assessment of the patients during long-term follow up showed that the physical health was affected more than the mental health of the patients (40.98 ± 8.88 vs 48.36 ± 7.26). The physical component summary scale was more affected in complicated HJ group than the non-complicated HJ group (complicated vs non-complicated, 35.54 vs 42.15; P = 0.01), and mental component summary scale was similar between 2 groups and there was no significant difference (complicated vs non-complicated, 46.65 vs 48.49; P = 0.29) during long-term follow up. The long-term outcome according to Terblanche clinical grading system was excellent (grade I) in 75 (62.5%) patients, good (grade II) in 31 (25.8%) patients, fair (grade III) in 9 (7.5%) patients and poor (grade IV) in 5 (4.2%) patients.

On performing univariate analysis, the following factors were found to be significantly affecting and associated with anastomotic stricture: post-ERCP pancreatitis (P = 0.035), preoperative serum alkaline phosphatase level (P = 0.045), previous attempts of repair (P = 0.015), level of injury according to Strasberg-Bismuth classification (P = 0.024), number of anastomosis (P = 0.028), operative time (P = 0.016), post-operative early complications (P = 0.018), post-operative bile leak (P = 0.023), interval from injury to referral (P = 0.011), and referral after 3 months (P = 0.025). On multivariate analysis, we found that post-ERCP pancreatitis (P = 0.018), number of anastomosis (P = 0.028), operative time (P = 0.007), post-operative early complications (P = 0.027), and post-operative bile leak (P = 0.003) were independent risk factors for poor outcome.

4. Discussion

Bile duct injuries (BDI) are the most catastrophic complications of cholecystectomy [18]. Despite advances in technology, BDI is still a considerable challenge for any surgeon [19]. The definitive management of BDI especially in loss of bile duct continuity or biliary stricture is bilio-enteric anastomosis [20]. The Hepaticojejunostomy for repairing post-cholecystectomy bile duct stricture is the most important determinant of post-operative complications and offers the best possible long-term results [21].

Laparoscopic cholecystectomy is the standard procedure for treatment of gallbladder disease [22]. Interestingly, the majority of BDIs treated in our center were following open cholecystectomies, reflecting the fact that open cholecystectomy was performed far more commonly in the general and private hospitals (86.6% after OC vs 6.4% BDIs after LC) which had low facilities for laparoscopic surgeries in our country in the period of the study. In review of literature, long-term complications were detected in 41% of patients [23], while in our study, the rate was 29%. Many authors in referral hepatobiliary centers reported the rate of biliary strictures following reconstructions was 10—50% of patients [24,25]. Two-thirds (65%) of recurrent biliary strictures develop within 2—3 years after the reconstruction, 80% within 5 years, and 90% within 7 years. Recurrent strictures 10 years after the surgical procedure are also described in the literature [26]. In the present study, 43% of strictures developed within 5 years from surgical repair, 78.5% within 10 years. Three patients with recurrent stricture were diagnosed after 10 years up to 17 years from surgical repair. In our series, the rate of recurrent cholangitis was 14.2% in 7 patients while in Lubikowski et al study [27], it was detected in one patient (5%) and in Goykhman et al study [28], it was 27.6% detected in 8 patients.

As regard the factors affecting the long-term outcome in the present series, longer delay of referral (>3 months) from index surgery was associated with poor outcome (P = 0.02) as detected in 8 of 14 patients who developed anastomotic stricture. It is most

Table 4

<table>
<thead>
<tr>
<th>Early and late complications, quality of life assessment and mortality.</th>
<th>Number</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early complications</td>
<td>43</td>
<td>35.8%</td>
</tr>
<tr>
<td>Intra-abdominal collection</td>
<td>31</td>
<td>25.8%</td>
</tr>
<tr>
<td>Bile leak</td>
<td>23</td>
<td>19.2%</td>
</tr>
<tr>
<td>Wound infection</td>
<td>7</td>
<td>5.8%</td>
</tr>
<tr>
<td>Internal haemorrhage</td>
<td>2</td>
<td>1.7%</td>
</tr>
<tr>
<td>Persistent hyperbilirubinemia</td>
<td>2</td>
<td>1.7%</td>
</tr>
<tr>
<td>Late complications</td>
<td>35</td>
<td>29%</td>
</tr>
<tr>
<td>1- Anastomotic stricture</td>
<td>14</td>
<td>11.6%</td>
</tr>
<tr>
<td>2- Recurrent cholangitis</td>
<td>17</td>
<td>14.2%</td>
</tr>
<tr>
<td>3- SBC</td>
<td>8</td>
<td>6.7%</td>
</tr>
<tr>
<td>4- Incisinal hernia</td>
<td>4</td>
<td>3.3%</td>
</tr>
<tr>
<td>5- DU</td>
<td>3</td>
<td>2.5%</td>
</tr>
<tr>
<td>6- Intrahepatic stones</td>
<td>3</td>
<td>2.5%</td>
</tr>
<tr>
<td>Quality of life assessment (mean ± SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical component summary (PCS)</td>
<td>40.98 ± 8.88</td>
<td></td>
</tr>
<tr>
<td>Mental component summary (MCS)</td>
<td>48.36 ± 7.26</td>
<td></td>
</tr>
<tr>
<td>Late mortality</td>
<td>10</td>
<td>0.083%</td>
</tr>
<tr>
<td>1- Causes related to surgery*</td>
<td>1</td>
<td>0.008%</td>
</tr>
<tr>
<td>2- Causes not related to surgery</td>
<td>9</td>
<td>0.075%</td>
</tr>
</tbody>
</table>

*Prolonged hyperbilirubinemia which was defined as persistant or increase of serum bilirubin above its preoperative level for one week postoperatively then decrease to the normal level. | **SBC:** secondary biliary cirrhosis, **DU:** duodenal ulcer.

As regard quality of life assessment, the total mean score of the physical component summary was higher (more affected) than the total mean score of the mental component summary as shown in Table 4. The physical component summary scale was more affected in complicated HJ group than the non-complicated HJ group (complicated vs non-complicated, 35.54 vs 42.15; P = 0.01), and mental component summary scale was similar between 2 groups and there was no significant difference (complicated vs non-complicated, 46.65 vs 48.49; P = 0.29) during long-term follow up. The long-term outcome according to Terblanche clinical grading system was excellent (grade I & II) in 106 (88.6%) patients, and poor (grade III & IV) in 14 (11.4%) patients. In review literature, Bansal et al study [15] showed that the outcome as following; excellent (87%), good (7.3%), fair (3.6%) and poor (2.1%) at median follow up of 54 months, range (6—83 months) and these results were comparable to that of Sikora et al study [30].

In the present series, the quality of life assessment of the patients during long-term follow up showed that the physical health was affected more than the mental health of the patients (40.98 ± 8.88 vs 48.36 ± 7.26). The physical component summary scale was more affected in complicated HJ group than the non-complicated HJ group (complicated vs non-complicated, 35.54 vs 42.15; P = 0.01). In review of literature, many studies found that BDI patients had significantly lower physical and mental component scores compared with those BDI patients who did not pursue litigation [31,32], while in contrast to other studies which Sarmiento et al [33] and Hogan et al [34] reported no effect of BDI on either physical or mental component.

As regard the factors affecting the long-term outcome in the present series, longer delay of referral (>3 months) from index surgery was associated with poor outcome (P = 0.02) as detected in 8 of 14 patients who developed anastomotic stricture. It is most...
probably due to earlier control of sepsis and earlier drainage of intra-abdominal collection and better care at a tertiary care center. The results were consistent with that reported in Bansal et al study [15]. In our study, 2 of 5 patients with previous attempts of repair developed anastomotic stricture after definitive surgical repair in our center (P = 0.044). We believe that the expertise of hepatobiliary surgeon is important to ensure optimal results following repair of BDI as reported by other several authors [35,36]. As regard the level of injury, we found that the majority of the patients (12 of 14) developed anastomotic stricture with lower level of injuries (E1/ E2). Only 2 patients had higher level of injury (E4), while many studies in the literature [15,37] showed that poor outcome were associated higher-level injury (E3/E4). The number of anastomosis significantly affected the outcome (P = 0.028) in our study while it had no effect in other studies [38].

The early post-operative complications (P = 0.018) including bile leak (P = 0.017) and intra-abdominal collections (P = 0.028) had significant effect on long-term outcome. We observed that 5 of 14 patients (35.7%) with poor outcome had postoperative bile leakage and 6 of 14 patients (42.9%) had intra-abdominal collections. Our explanation that bile leakage and intra-abdominal collection induce peri-anastomotic inflammation resulting in fibrosis with stricture formation. Other studies showed that bile leakage wasn’t statistically significant [39]. In the present series, post-ERCP pancreatitis was associated with poor outcome. Our explanation that ERCP trials may induce acute inflammatory changes leads to fibrosis in the bile duct which makes the surgical repair difficult and increases the incidence of biliary stricture.

The incidence of vascular injuries in our patients was 3.3% and we didn’t affect long-term outcome (P = 0.460) as no patients with anastomotic stricture in long-term follow up had associated vascular injury as resulted in other studies [27]. Higher incidence of associated with vascular injuries was reported in Schmidt et al study [37]. We proposed that there was association between vascular injury and timing of repair and their effect on the long-term outcome as most of patients with RHA injury underwent late surgical repair. On the contrary, we believe that the incidence of vascular injury in our study was underestimated due to no routine preoperative angiography was done for patients for diagnosis.

Sources of bias in this study were selection of the date of surgical repair, type of biliary drainage whether by ERCP, radiological or surgical drainage, detection of associated vascular injury, technique of anastomosis, diameter of stoma, and management of anastomotic stricture and need further studies in the future. Being a retrospective study was the major limitation of this study. The study results can be generalized due to considerable large number of patients included in the study followed up for relatively longer time (more than 5 years up to 20 years), but with caution due to its limitations and bias.

5. Conclusions

Our results showed that any attempts of repair of BDI by inexperienced surgeons should be avoided and early referral of patients with BDI to tertiary referral centers for early better management of BDI is highly recommended. Avoidance of ERCP for biliary stricture before reconstruction for its potential complications. Standardized surgical technique of hepatojejunostomy is essential for decrease of early postoperative complications and subsequently better long-term results. Longer time for follow of the patients of surgical repair of bile duct injury up to 20 years should be adopted to ensure successful outcome. Quality of life assessment is essential component of long-term follow-up.

Conflicts of interest

None.

Acknowledgment

Special thanks and appreciation to all professors and assistant professors in Mansoura Gastro-enterology Surgical Center for their general support and providing technical help.

References