Original Article

Repair of Extrahepatic Biliary Duct over T-tube

Mohammed Shamim, Syed Asim Ali Jaffary, Shahid Shamim
Department of Surgery, Ziauddin Medical University, Karachi.

Abstract

Objective: To evaluate the result of surgical procedures adopted for repair of iatrogenic injuries of extrahepatic biliary tract over T-tube.

Methods: An interventional study conducted at Surgical Unit 1 of Abbasi Shaheed Hospital, Karachi; and private hospitals in Karachi, from 1974 to 2004 (30 years). All the iatrogenic injuries of extrahepatic biliary tract during open cholecystectomies were recorded. The records included age and sex of patients, site and extent of injury, method of repair and post-operative complications, if any. All primary repairs were done over T-tube. For injuries at the confluence, the T-tube was converted into a Y-tube, and its short limbs were introduced into the lumen of right and left hepatic ducts. Follow up was done in the outpatient department weekly for a month after discharge, and then annually for maximum 5 years.

Results: A total number of 5,000 open cholecystectomies were performed during the study period. Eleven patients (0.22%) had intraoperative extrahepatic biliary tract injury: 6 out of 11 had injury of common bile duct (CBD), 2 had common hepatic duct (CHD) and 3 had injury at the confluence. One patient was lost to follow up after a year. One patient died of myocardial infarction after two years. Nine patients were clinically and biochemically well at five years follow up after primary repair of the injuries.

Conclusion: Primary repair of extrahepatic duct injuries, situated at CBD, CHD or at the confluence, over the T-tubes is safe. In case of injury at the confluence the T-tube may be shaped like a Y-tube for secure anastomosis of all the three cut ends (JPMA 57:5;2007).

Introduction

Cholecystectomy is the most commonly performed elective abdominal surgical procedure.[1] Common bile duct injury is a well-known complication of cholecystectomies, both open and laparoscopic, causing significant impairments in quality of life.[2,3] It is the leading source of medical malpractice claimed against general surgeons.[1] A well-known report on medico legal implications of bile duct injuries states, that these injuries are not necessarily negligence[4], and thus surgeons refer to them as complications rather than mistakes.[5] Prior to the widespread use of laparoscopic cholecystectomy, major bile duct injuries were relatively infrequent occurring in approximately 2 of every 1000 open cholecystectomies.[6] Several studies consistently demonstrate that the rate of injuries is much higher in laparoscopic cholecystectomies[7-9], and has remained at about 0.6% despite the increased training.[10]

Extrahepatic biliary tract injury during open cholecystectomy is not a rare complication in Pakistan. Incidence of such injuries at 1.44 per cent has been reported.[11] Primary repair of such injuries, at the time of cholecystectomy, gives good results. In case of open cholecystectomy it is usual for the surgeon to ascertain that the biliary tract is intact, before closing the abdomen. The supra-duodenal common bile duct is more frequently involved in such injuries. However, the hepatic duct injury at the confluence of the right hepatic duct (RHD), the left hepatic duct (LHD) and the common hepatic duct is not rare. There may be loss of the area due to accidental excision of small length of ducts including the confluence. It leaves three divided ducts - the right hepatic, the left hepatic and the common hepatic. It is usual practice to tie the common hepatic, and anastomose both the right and left hepatic ducts to a Roux-en-Y loop of jejunum, which is called hepaticojejunostomy.[12] An alternate technique was adopted by the primary author, in which a T- tube was used as stent to unite the three cut ends together. The T-tube was converted into a Y- tube to act as a stent and to drain the bile. The technique of the surgical procedure has been reported earlier.[13]

The purpose of this study was to observe the results of primary repair of intraoperative iatrogenic extrahepatic biliary tract injuries over T-tube.

Patients and Methods

This is an interventional prospective study focused on iatrogenic extrahepatic biliary tract injury over a period of 30 years (1974 to 2004), during open cholecystectomies performed in the surgical unit 1, at Abbasi Shaheed Hospital (ASH) and in some private hospitals in Karachi. Most of the operations were done by surgeons in training under supervision of a senior consultant, who confirmed the intact anatomy of the area by direct visualization before closure of the

abdomen. All the patients with iatrogenic extrahepatic biliary tract injury were recorded on a separate proforma, which was submitted to the head of department in the monthly audit meeting. Patients' sex, age, site and extent of injuries (partial or complete section), and complications were recorded in the proforma. All the injuries of CBD and CHD were repaired over T-tube, and their T-tube cholangiogram was done after two weeks. The tube was removed after 3 - 4 weeks. Three cases of injuries at the junction had caused loss of confluence of right hepatic duct, the left hepatic duct and the common hepatic duct. These ducts were also repaired over a T-tube so that anatomical continuity could be re-established.[13]

Results

A total of 5,000 cholecystectomies were performed during the study period. Eleven cases of iatrogenic extra hepatic biliary tract injuries were recorded during the surgery. Six of the injuries were at supra-duodenal CBD, two of the injuries involved CHD and three were at the junction of right, left and common hepatic ducts (Table). All patients with intraoperative iatrogenic injury of extrahepatic biliary tract were repaired over T-tube. The recovery was uneventful in ten patients. One patient developed wound infection, which was treated with antibiotics and aseptic dressings. There was no mortality in the series. Nine patients were followed for five years, two cases followed for two and one year each. There was no clinical or biochemical evidence of stricture formation during the follow-up period. In three patients with injury at the junction of CHD, RHD and LHD, the T- tube was shaped like a Y- tube, which was used as a stent and for external drainage of bile. However, these patients constitute a small sample for statistical analysis of the result. At the last follow up patients were asked to contact one of the authors if they developed any symptom or sign of stricture of bile duct, any time in the future. None have contacted us so far.

Table. Sex and age incidence, site and extent of injuries and follow up period.

Case No.	Sex	Age (Years)	Site and Extent of of injury	Follow up
1	F	36	CBD, complete section	5 Years
2	F	39	CBD, partial section	5 Years
3	F	42	CHD, partial section	5 Years
4	M	57	Confluence, Complete section	2 Years. Died Due to Myocardial Infarction
5	F	52	CBD, complete section	5 Years
6	M	49	CBD, complete section	1Year. Lost to Follow up
7	F	50	Confluence, Complete section	5 Years
8	F	40	CHD, partial section	5 Years
9	F	30	Confluence Complete section	5 Years
10	F	28	CBD, partial section	5 Years
11	F	47	CBD, complete	5 years

F=Female, M=Male

Discussion

In our unit it was mandatory for junior surgeons and surgeons in training, to have the site of operation inspected by a senior surgeon before closing the abdomen. This was a preventive measure against iatrogenic injuries. In our series there were eleven cases of extrahepatic biliary tract injury out of 5,000 cholecystectomies (0.22%) performed in 30 years. This is comparable to the results of larger series reported as 0 - 0.5%.[3,13] Habib et al[14] have reported four cases of iatrogenic biliary trauma in a retrospective study to determine the incidence of the complications in one thousand consecutive cholecystectomies (0.4 per cent). Our series consists of open cholecystectomies, which causes these injuries less frequently than laparoscopic cholecystectomies.[9,14-17] In case of injury to CBD it is recommended to repair it over a T-tube.[18] In the event of injury to right or / and left hepatic ducts it is usual to anastomose the divided duct to a Roux-en-Y loop of jejunum.[19] We used a T-tube converted into a Y-tube to repair such injuries over it, and to act as a temporary biliary drainage tube. The advantages of this technique of repair of biliary tract injury at the confluence of right, left and common hepatic ducts is that formation of Roux-en-Y is not required and hence the complications associated with jejuno-jejunostomy are avoided. The complications associated with choledocho-jejunostomy or hepatico-jejunostomy - such as bile leakage in the early post-operative period, cholangitis and stricture formation in the late period are also avoided. With this technique anatomical continuity is restored. However, this technique is recommended in primary repairs only. It is not recommended if the divided hepatic duct is too narrow for the T-tube and/or the ends cannot be brought together without tension. Dissection to mobilize the ends is likely to damage the blood supply and tension on suture line may lead to breakdown of anastomosis.

Intraoperative diagnosis of iatrogenic lesions of bile duct and primary repair of the injury is an ideal management for reducing patient morbidity and also saves re-laparotomy within days after the cholecystectomy. In a reported series of 43 patients operated for iatrogenic lesion of the biliary tract, injury to the bile duct was detected intraoperatively in sixteen cases.[20] Satisfactory long-term results after correction of an iatrogenic lesion of the bile duct can be obtained

if the corrective procedure is undertaken immediately.[20,21] However, in our study we detected all the eleven injuries intraoperatively, which we corrected immediately with good results. Moossa[22] reviewed 81 patients with bile duct injuries and formulated a list of mitigating circumstances for such iatrogenic injuries, which follows: (1) inadequate access, exposure, and assistance; (2) absence of operative cholangiogram; (3) patient's obesity; and (4) early dissection of Calot's triangle. Common bile duct injury has potential catastrophic implications if unrecognized or inadequately managed at the time of initial surgical intervention. Therefore every precaution necessary to avoid such as injury should be taken.[23]

It has been reported that the injuries located high at the hepatic duct were three times more frequent than those located more distally.[24] In our study only three injuries involved the right and left hepatic ducts, which were repaired over a T-tube converted into a Y-tube. White[25] has reported 18 instances of bile duct injury over a period of 25 years. Eight injuries occurred while attempting to obtain cholangiograms in patients with small cystic ducts. In our study none of the injury was associated with such a procedure.

Conclusion

Primary repair of intraoperative extrahepatic duct injuries situated at CBD, CHD or at the confluence, repaired over T-tube is safe. In case of injury at the confluence the T-tube may be shaped like a Y-tube for secure anastomosis of all three cut ends.

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