

Extra-hepatic Biliary Injuries

S I H ANDRABI M N ASLAM K M GONDAL A A ALI S A ANDRABI A M CHOUDHRY

Department of Surgery, Mayo Hospital, Lahore

Correspondence to Syed Imran Hussain Andrabi

This study of 18 months duration done at Mayo Hospital, includes 20 patients who had injury to their extra hepatic biliary apparatus, due to surgery (open or laparoscopic cholecystectomy) or suffered traumatic injury. Twelve patients were referrals, they had their gall bladder surgery in periphery and sustained bile duct injuries, five had injuries in Mayo hospital and three had injuries due to some trauma. These patients were managed surgically with good results. 2.5% of patients who had laparoscopic cholecystectomy at Mayo, had bile duct injuries and 0.4% of the patients who had open cholecystectomy sustained bile duct injuries.

Key words: Open cholecystectomy, Laparoscopic cholecystectomy, and surgical intervention

The extra hepatic biliary tract may be damaged during various surgical procedures, interventional investigations and trauma. These procedures include those on the upper gastrointestinal tract including cholecystectomy (open and laparoscopic), gastrectomy, surgery for portal hypertension and E.R.C.P. Upper abdominal trauma, blunt or penetrating, can also result in injury to this part of the biliary tract along with other organ injuries.

The great majority of injuries of the extra hepatic biliary tract are iatrogenic, occurring in the course of open or laparoscopic cholecystectomy^{1, 2}. Cholecystectomy is one of the most commonly performed elective abdominal operations in general surgery³. This surgical intervention has however brought with it the inevitable realm of complications including bile duct injury. Bile duct injuries have potential catastrophic implications if unrecognised or inadequately managed at the time of initial surgical intervention⁴. Abdominal trauma resulting in injury to extra hepatic biliary tract may be due to blunt or penetrating abdominal injury, which may be firearm injuries, stab injuries or road traffic accidents⁵. Injuries occurring during surgical operations are of importance firstly because they are preventable and secondly because they produce considerable mortality and morbidity in excess of that recognized for the initial surgical procedure⁶.

Patients and Methods

The descriptive study includes 20 cases of bile duct injuries managed at the department of Surgery, Mayo Hospital, Lahore, from April 1999 to October 2000. All the patients were managed by taking a detailed history, clinical examination and investigations that included, complete blood count, serum electrolytes, liver function test, blood urea, and serum creatinine. Specific investigations included abdominal ultrasonography in all patients and ERCP, PTC, HIDA and CT scan in patients where indicated.

After confirmation of diagnosis by clinical signs and symptoms that damage to the biliary tree had occurred, these injuries were managed according to the injury. Those injuries, which were recognized at the time of operation they were either repaired or end-to-end anastomosis, were

done. The other injuries, which presented late, hepatico-jejunostomy (Roux-en-Y) was done.

Results

These 20 patients were divided in two groups. Group A included 17 patients who suffered iatrogenic injuries, 5 of them sustained these injuries at Mayo Hospital and the rest 12 were referred to us from the peripheral hospitals. Group B included those patients who suffered trauma, one due to blunt abdominal trauma and two due to penetrating abdominal trauma.(Table 1)

Table 1: Patients with Extra hepatic biliary injury

TWO GROUPS		n=	Males	Females
GROUP A IATROGENIC	Indigenous	05	01 5.8%	04 23.5%
	Referrals	12	01 5.8%	11 64.7%
	Total	17	02 11.7%	15 88.2%
GROUP B TAUMATIC	Blunt	01	01 33.3%	- -
	Penetrating	02	02 66.6%	- -
	Total	03	03 100%	- -

1018 cholecystectomies were performed at Mayo Hospital during the duration of the study, out of which 978 were open and 40 were laparoscopic. Of these, 1018 patients, 5 sustained iatrogenic injury, one during laparoscopic cholecystectomy and other four during open cholecystectomy. Referred patients with injuries (n=12), one had laparoscopic cholecystectomy and rest 11 had open cholecystectomy somewhere in peripheral hospitals. The overall incidence of extra hepatic biliary trauma in patients presented for cholecystectomy (open and laparoscopic) is 0.5%, while the incidence of bile duct injuries among laparoscopic cholecystectomy cases is 2.5%, while it was 0.4% among open cholecystectomies. (Table 2)

Table 2: Incidence of bile duct injuries at Mayo Hospital

Procedure	n=	Injuries (n=)	%age
Open	978	4	0.4%
Laparoscopic	40	1	2.5%
Total	1018	5	0.5%

The patients presented with different signs and symptoms. Pain in right upper quadrant (n=18,90%), jaundice (n=14,70%), sepsis/cholangitis (n=12,60%), anorexia (n=17,85%), failure to thrive (n=15,75%), vomiting (n=13,65%), biliary peritonitis (n=5,25%), ilcus (n=5,25%), biliary fistulae (n=2,10%), abscess (n=2,10%) Out of 15 patients who suffered bile duct injuries during open cholecystectomies, 12 had complete transection, two had wall defects and one had a perforation in the bile duct. Of those in the laparoscopic group, one patient had a linear tear and the other a complete transection of the bile duct. (Table 3)

Table 3: Type of bile duct injuries (according to McMohans Criteria)

	Groups	n=	Major injury	Minor injury
OPEN	Indigenous	04	02 10%	02 10%
	Referred	11	11 55%	- -
LAPRO	Indigenous	01	01 05%	- -
	Referred	01	01 05%	- -
TRAUMA	Blunt	01	01 05%	- -
	Penetrating	02	01 05%	01 05%
	Total	20	17 85%	03 15%

Thirteen patients of the open technique group had hepatico-jejunostomy with Roux en Y loop and two of them had end-to-end anastomosis with T tubes place. Out of the two patients who sustained injuries during the laparoscopic technique one had a hepaticoduodenostomy and the other hepatico-jejunostomy with a Roux loop. The patient who sustained blunt trauma was managed by performing a hepatico-jejunostomy with Roux-en-Y loop. The two patients who suffered penetrating injuries had hepaticoduodenostomy in one and in the other, end-to-end anastomosis with a T tube was performed. The overall results of surgery remained good. Two patients developed cholangitis and were managed and treated successfully. One patient had to have his hepatico-jejunostomy revised, as there was an anastomotic leak. (Table 4)

Table 4: Operative procedures performed

Groups	n=	Treatment	Results	
GROUP A	OPEN	Transection	12 Hepatico-jejunostomy with Roux en Y End to end over T-tube in 1 pts	Good mild cholangitis
		Wall Defect	02 & Hepaticoduodenostomy in 1 pts.	Good
	LAPRO	Perforation	01 End to end over T-tube	Good
		Linear Tear	01 Hepaticoduodenostomy	Good with cholangitis
GROUP B	TRAUMA	Transection	01 Hepatico-jejunostomy	Good
		Blunt trauma	01 Hepatico-jejunostomy	fair
		Penetrating	02 Hepaticoduodenostomy in 1 pt & end-to-end over T-tube	good

Discussion

Inadvertent injury to the adjacent structures has been a part of the surgery since the time of the barber surgeons. The possibility of injury to the biliary ducts or the hepatic arteries or both existed from the time of planned cholecystectomy for disease gallbladder by Langenbeck in 1882¹⁶. Injury to the common bile duct or the hepatic ducts is a complication of much greater magnitude. The complexity of the management of patients with bile duct injuries needs a combined multidisciplinary approach. Since our data was acquired at a tertiary care center, most patients were referred from the surrounding region and the actual incidence of bile duct injuries could not be calculated. However a total of 5 duct injuries occurred in the series of 1018 conventional and laparoscopic cholecystectomies amounting to an overall risk of bile duct injury to 0.5% at Mayo hospital in 18 months. Four duct injuries of 978 open cholecystectomies with a rate of injury 0.4% and one ductal injury of 40 laparoscopic procedures with an injury rate of 2.5% are comparable with the International results. (Table 5).

Table 5: Comparison of bile duct injuries at open cholecystectomy (Reproduced from BJS 1995; 82:307-13)

Author	Period	n=	%age
Mammoliti et al	1992-1999	1236	0.3%
Macfadyen et al	1989-1999	114005	0.50%
Present Study	1999-2000	978	0.4%

Out of 20 patients, 5 patients had iatrogenic injuries recognized preoperatively and primary reconstruction was attempted accomplishing good results comparable with the

results of Raute et al⁷ for immediate repair of the injury which also showed good results. The most frequent major injury during cholecystectomy in this series was complete transection. These results are comparable with Troidi et al⁸, who reported transection of the bile duct as the most common injury. In the referral group, the clinical presentation of the patients with bile duct injuries was not very variable. These results are almost the same as reported by Rossi et al⁹ who related that 71% patients presented with jaundice and 45% with cholangitis. The higher rate of cholangitis in our study showed the severity of injury and its initial mismanagement at the hospital where the patients were initially managed. Patients with iatrogenic injuries were selected by excluding injuries to the extra hepatic biliary tree during surgical procedures other than cholecystectomy and patients with trauma. This exclusion criteria was also advocated by Raute et al, Soper et al and Macintyre et al¹⁰. Referred patients were investigated thoroughly. Cuschieri et al¹¹ stated that certain investigations are a pre-requisite for surgical intervention in patients with injury to the biliary tree. Ultrasound remained the most important non-invasive, safe, fast and highly accurate diagnostic tool for bile duct injuries in the present study. The same is advocated by Ricard et al¹² who said that it could predict cases of unusual difficulty. The diagnostic yield was 66% for ERCP, ultrasonography 80%, PTC 75% and HIDA 87%. These results are comparable to Nathaniel et al, Manegold and Branum¹³, which showed an overall diagnostic yield up to 94%. The mean hospital stay was 18 days and this is comparable with reports by Soper and Braasch et al¹⁴ that the patients were frequently discharged on the 19th day. In the present study, there is no hospital mortality. The literature showed mortality up to 5% (0-6% range). Bismuth, Blumgart and Pellegrini reported a high incidence of mortality¹⁵.

Conclusion

- Prevention of bile duct injury depends on thorough knowledge of anatomy and its variations and technical skill and experience of the surgeon.
- Early recognition of the injury is of utmost important, which will give a better chance of favourable prognosis.

- Management of these injuries should only be done in a center where adequate facilities and experience to deal such injuries is available.

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