

Major Intraoperative Complications of Cholecystectomy in a Teaching Hospital, Addis Ababa, Ethiopia

E. Abebe, B. Kotisso

St Paul's teaching hospital, AA, Ethiopia.

Correspondence to: Dr. Engida Abebe, Email: engidaabebe@yahoo.com

Background: Gall stone disease is one of the commonly handled surgical pathologies by a General Surgeon. Major intra operative complications are less commonly encountered in experienced hands. The rate may increase in a teaching hospital where Residents are allowed to operate. Therefore it was with this assumption that a study was carried to assess the incidence and contributing factors for the complications in a tertiary teaching hospital.

Methods: A retrospective chart and operation log book review was done in a two -year period between January 2009 and December 2010 in St Paul's teaching hospital, AA, Ethiopia.

Results: A total of 645 cholecystectomy, 588(91.2%) open and 57(8.8%) laparoscopic, were done in the study period. Females comprised 80.9% of the patients. The average age of the patients was 42.8 years with a range of 18 to 80. Major surgical complications were seen in 19(2.9%) patients but adequate information was found for 16 patients only with a retrieval rate of 84.2 %. Of the 16 patients 14(87.5%) were female. Thirteen patients had open cholecystectomy and the rest 3 patients had laparoscopic cholecystectomy. Accordingly the rate for open cholecystectomy was 13/588(2.21%), and that of laparoscopic surgery 3/57(5.26%). Twelve (92.3%) of the complicated cases in open cholecystectomy were done by residents alone. The rate of complications for the consultants in open surgery was 0.2% and that of the residents 6.0%. The odd that patients operated by residents will develop IBDI was 6.25 times higher than that of the seniors. There is statistically significant association between seniority and major surgical complications($X^2=11.91$, $P=0.001$).

Conclusions: The incidence of major complications of cholecystectomy is unacceptably high in this study. Almost all complications occurred in the hands of residents which show that experience matters. Therefore it is our recommendation that residents should not be left alone until they get reasonable experience in the field.

Introduction

Gall stone diseases are among the most common gastrointestinal surgical illness requiring hospitalization,¹ with a prevalence of 11% to 36% in autopsy reports². The prevalence of the condition is said to be low in Africa and other developing countries^{3, 4,5,6,7, 8}. Cholecystectomy is one of the most common major abdominal surgical procedures performed in western countries⁹. Although the prevalence of cholelithiasis is said to be low in developing world compared to that of the westerners, it still contributes significant proportion of General Surgeon's operation in the developing country. Cholelithiasis was the most common cause of admission to Tikur Anbessa Hospital, Addis Ababa, Ethiopia making 10.3% all admission and 25.9% of all GI admission¹⁰.

Open cholecystectomy used to be the standard procedure for treatment of cholelithiasis until Laparoscopic Cholecystectomy was introduced in 1990¹¹. Laparoscopic cholecystectomy has now become the gold standard for treating gall stone disease in the developed world^{2, 9, 12}. However, open Cholecystectomy is still widely practiced in the developing world and may continue to be the case for some years here after. Besides the general complications encountered after any other major surgery, cholecystectomy has its own complications^{13, 14}. The major intraoperative complications are bile leak from either Bile Duct Injury (BDI) or slipped cystic duct stump, hemorrhage, retained bile duct stones and death¹⁵. In a study done at Ras

Desta Hospital, Addis Ababa, Ethiopia, seven patients were re-operated for common bile duct injury and subsequent stricture ¹⁶.

Intra operative bile duct injury (IBDI) during cholecystectomy may have a deleterious effect on the health of patients, including considerable disability & mortality, and can be costly for the individual patient and for the health care system¹⁶. Age, sex, characteristics of the hospitals and experience of surgeons are believed to influence the risk of Bile Duct Injury (BDI) ^{17, 18}. Moreover, coexisting acute or chronic inflammation around the gallbladder and hepato-duodenal ligament, obesity, fat within the hepato-duodenal ligament, poor exposure and bleeding obscuring the surgical site, and anatomical anomalies of the bile ducts and hepatic arteries contribute to the increased risk of IBDI. Older age and male sex are also shown to increase the risk of BDI^{18, 20}. However, it is misidentification of the biliary anatomy that has been the commonest cause of common bile duct injury in about 70–80 per cent of injuries ^{20, 25, 26}.

The chance of injury with laparoscopic approach used to be higher compared to open in the early nineties when it was first introduced but now it is comparable to open surgery and even less in some series ^{18,19}. Several classifications have been proposed in order to define the types of BDI, but none is universally accepted as each of them has its own limitations. However, the Bismuth's and Strasberg's classification are most commonly used by Surgeons^{21, 22, 23, 24}. The observation of relatively high incidence of BDI at St Paul's General Hospital, Addis Ababa, Ethiopia prompted the authors to embark on this study. Hence the purpose of this study is to assess the incidence, cause and outcome of major surgical complications of cholecystectomy at a tertiary hospital in Addis Ababa, Ethiopia.

Patients and Methods

This is a retrospective study compiled for a period of two years from January 2009 to December 2010 at St Paul's Hospital, Addis Ababa, Ethiopia. The hospital is one of the teaching hospitals of Addis Ababa University, School of Medicine both for undergraduate medical students and surgical residents, with a surgical bed capacity of 120. All cholecystectomy operations done for gall stone disease during the study period and those with documented major surgical complications were included in the study. Cholecystectomy done for malignancies were excluded. The operation theatre register and inpatient register were used to identify the cases. Demographic data, the operator, type of procedure, problems encountered intra-operatively, post operative course and complication, operative measure taken and the outcome were recorded by one of the authors in the format prepared for this purpose. Data was analyzed using SPSS version 17 statistical software.

Results

Of the 645 Cholecystectomy operations performed during the study period, 588 (91.2%) were open and 57 (8.8%) were laparoscopic. Female accounted for nearly 81 % with a female to male ratio of 4.2: 1. The mean age was 42.8 years with a range from 18 to 80 years. Major surgical complications occurred in 19 (2.94%) patients but the record of only 16 patients was found for analysis giving retrieval rate of 84% which made the basis of this study. The age for this particular group ranged from 20 to 68 years with a mean of 33.13 years. Thirteen of the 16 patients had open cholecystectomy while the remaining 3 underwent laparoscopic cholecystectomy making a 2.21% and 5.26% rate of injury for the respective groups (Table 1).

The complications were commonly encountered in surgeries performed by the residents, 75% of all the iatrogenic bile duct injuries. The figure rises to 92.3% when open surgery is considered separately as this was the operation they did on their own. Regarding the year of Residency 7(58.3%) were done by year III residents while 5(41.7%) were operated by 4th year residents but did not reach statistical significance. Hence the complication rate for open surgery in the hands of consultants was 0.2% while for the residents was 6%. The consultant to

resident IBDI ratio is 1:30. The odd that patients operated by residents will develop IBDI was 6.25 times higher than that of the seniors. There is statistically significant association between seniority and IBDI ($X^2= 11.91$, $P=0.001$). Table 2 indicates the type and site of injury and the operative remedy offered. The injury was detected during cholecystectomy in only one (6.3%) patient. About 50% were detected between the 3rd and 7th post operative day while 31.3% were detected after the 7th post operative day. Because there is no ERCP, MRCP or PTC service the site of injury for the late presenters was determined intra-operatively during intervention. The common bile duct (CBD) was the most commonly (56.3%) injured site followed by slipped cystic duct in 12.5% of the cases.

Table 1. Sex, Type of Surgery Performed and Performer in All Patients and Type of Surgery in Complicated Patients at St Paul's Hospital, January 2009-December 2010

Characteristic	Frequency	%
Sex of all patients who had cholecystectomy	Female	522
	Male	123
Type of all cholecystectomy done	Open cholecystectomy	588
	Laparoscopic cholecystectomy	57
Performer of the operation (n =661)	senior surgeons	433
	Resident	216
Diagnosis on patients who developed complications	Simple cholelithiasis	12
	Chronic cholecystitis	4
Type of surgery on complicated cases	open cholecystectomy	13
	laparoscopic cholecystectomy	3
Performer of the procedure on complicated open Cholecystectomies	Residents	15
	Seniors	1

Table2. The types and sites of BDI and the Surgical Measures Taken in 16 Patients at St Paul Hospital, January 2009 – December 2010

Characteristic	Frequency	Percent
Site of injury	CBD	9
	slipped cystic duct	2
	common hepatic duct	1
	Undefined	3
	Bleeding	1
	Total	16
Treatment given	lavage & drainage only	5
	Repair	2
	biliary enteric by pass	3
	T- tube	6
	Total	16

Massive bleeding occurred in one case for which the patient got re-operated and cystic artery ligated. Despite the bile leak and biliary peritonitis the site of injury was not identified in 3 (18.8%) patients. The operative measures taken for the BDI were T-tube drainage, lavage and drainage only, bilio-enteric bypass (hepaticojejunostomy), and ligation of cystic duct stump in 37.5%, 31.3%, 18.8%, and 12.5% respectively.

The outcome of the intervention is indicated on table 3 which was good in 12 (75%) patients while 4 patients later developed biliary stricture. The strictures were more commonly seen in those patients who were treated by lavage and drainage only. Unidentified site and CBD injuries each contributed for two strictures that occurred.

Table 3. Types of Surgical intervention and site of BDI Vs outcomes in 16 patients, January 2009 – December 2010

Characteristic		Outcome of patients	
		Cured No. (%)	Stricture No. (%)
Type of intervention (surgery)	lavage & drainage only	2(40)	3(60)
	Repair	2 (100)	0
	biliary enteric by pass	3(100)	0
	T tube	5(83.3)	1(16.7)
	Total	12(75)	4(25)
Site of injury	CBD	7 (77.8)	2 (22.2)
	slipped cystic duct	2 (100.0)	0 (.0)
	common hepatic duct	1(100.0)	0 (.0)
	Undefined	1 (33.3)	2 (66.7)
	Bleeding	1 (100.0)	0 (.0)
	Total	12 (75.0)	4 (25.0)

Discussion

The reported rate of iatrogenic bile duct injury in open cholecystectomy ranges from 0.2 to 0.4 %, ^{24, 27, 28}. That of laparoscopic cholecystectomy is slightly higher; some reports are comparable or even better^{24, 27}. The overall major complication rate of 2.4% seen in our setting is very high. The rate in the hands of the seniors is not different from that of the literatures^{24, 27}. But the rate in the resident's hand is significantly higher ($P=0.001$) than that of the seniors and the findings elsewhere^{18, 23, 24,27,29,30}. Although there are several factors contributing to IBDI, it seems that lack of experience played a major role in this particular study.

Our patients are young compared to what is mentioned in literatures^{13, 20}. In the developed world laparoscopic cholecystectomy has replaced the traditional open cholecystectomy and is now the gold standard treatment for gall stone disease³¹. In our case the complication rate was higher for Laparoscopic cholecystectomy which could be explained by the learning curve of the team. Similar rates were also reported for Laparoscopic cholecystectomy performed in the 1990s^{32, 33}. The common bile duct was the commonest site of injury. The fact that the CBD was the commonly injured site may tell something as to the mechanism of the injury, perhaps excessive traction on the gall bladder, under which circumstance the CBD may appear like the cystic duct and mistakenly cut^{20, 34}. In this situation the injuries should have been detected intra-operatively, which is not the case. The injuries might have been missed intra-operatively for they were unsuspected and porta hepatis area was not properly checked before closure of the abdomen. In agreement with other studies the majority of the IBDI were detected in the post operative course after the patients developed bile peritonitis ^{33, 35, 16}.

The early operative measures taken were simple drainage in the majority of the cases which is the recommended approach by most of the authorities in the field who recommend a specialized center for repair and hence a better outcome^{12, 28, 36}. As it was the case with us, those who are treated with simple drainage are bound to end up in stricture and obstructive jaundice sometimes in the future which necessitates close follow-up and intervention accordingly ³⁶.

Conclusion and recommendations:

The rate of major operative complication for cholecystectomy, BDI in particular, is high in this series which could be attributed to inadequate experience by the residents. Hence we recommend that residents should be supervised by seniors and gain adequate experience before they are permitted to do this procedure on their own. More over there is a need to closely check the porta hepatis area after each cholecystectomy for any unrecognized injury in order to either take appropriate measure or consult the expert to deal with the injury. Further prospective study is recommended to tell the incidence and factors associated with IBDI.

References

1. Bakhsh R, Zahid MA, Dar FS, Malik ZI, Akhtar N, Akhtar S. Iatrogenic bile duct injuries: experience at PIMS. *J Ayub Med Coll Abbottabad*. 2002 Oct-Dec;14(4):16-8.
2. Curet MJ, Conter M, Weber DM, Abrecht R. Laparoscopic cholecystectomy. *Surg Endosc*. 2002;16:453-7.
3. D. Parekh, H. H. Lawson, J. M. Kuyl. Gallstone disease among black South Africans; A review of the Baragwanath Hospital experience. *S Afr Med J*. 1987; 72: 23-26.
4. Akute OO, Obajimi MO. Cholelithiasis in Ibadan: an update. *West Afr J Med*. 2002 Apr-Jun;21(2):128-31.
5. M. E. Asuquo, M. S.Umoh, V. Nwagbara, A. Inyang and C. Agbor. Cholecystectomy: Indications at University of Calabar Teaching Hospital, Calabar, Nigeria. *Annals of African Medicine*. 2008;7(1) : 35-37
6. Assefa Getachew. Epidemiology of gallstone disease in Gondar University Hospital, as seen in the department of radiology. *Ethiop.J.Health Dev*. 2008;22 (2):206-211,
7. M S Khuroo, R Mahajan, S A Zargar, G Javid, and S Sapru. Prevalence of Biliary Tract Disease In India:A Sonographic Study In Adult Population In Kashmir. *Gut*. 1989; 30: 201-205
8. Ganiyu A. Rahman. Cholelithiasis and Cholecystitis: Changing Prevalence in an African Community. *Journal of The National Medical Association* . 2005Nov ;97(11) 1534-38
9. Fernando R. Laparoscopic cholecystectomy. *World J Surg*.2002;26:1401.
10. Adem A ,Abebe A & Abdurahman M, Pattern of surgical admissions to Tikur AnbessaHospital, Addis Ababa, Ethiopia. *East and Cent Afr J Surg* V6 No 1, 2001
11. Johnston SM, Kidney S, Sweeney KJ, Zaki A, Tanner WA, Keane FV. Changing trends in the management of gallstone disease. *Surg Endosc* 2003; 17: 781-786
12. Slater K, Strong RW, Wall DR, Lynch SV. Iatrogenic bile duct injury: the scourge of laparoscopic cholecystectomy. *ANZ J Surg*. 2002 Feb;72(2):83-8.
13. Waghim G,Jawid , Emad S and et al. Rate of conversion and complication of laparoscopic cholecystectomy in a tertiary care center in Saudi Arabia. *Ann of Saudi Med*. 2010 march -april;30(2): 145-8
14. Syed Asad Ali, Syed Muhammad Tahir, Abdul Ghani Soomoro, Akmal Jamal Siddiqui,Abdul Sattar Memon. Open Cholecystectomy Without Intraoperative Drainage. *J Ayub Med Coll Abbottabad* 2010;22(2)
15. Kaushik R. Bleeding complications in laparoscopic cholecystectomy: Incidence, mechanisms, prevention and management. *J Min Access Surg*. 2010;6:59-65
16. Francisco Javier González Rodríguez, Manuel Bustamante Montalvo, Rogelio Conde Freire, Jorge Martínez,Faustino Rodríguez Segade, and Evaristo Varo. Management of Patients With Iatrogenic Bile Duct Injury. *Cir Esp*. 2008;84(1):20-7
17. Zenebe Bekele and Kassahun Tegegn . cholecystitis :The Ethiopian Experience , a Report of 712 Operated Cases from one of The Referral Hospital.*Ethiop Med J*. 2002;4(3):209-216
18. Anne Waage, Magnus Nilsson . Iatrogenic Bile duct Injury: A Population Based Study of 152776 Cholecystectomies in the Swedish Inpatient Registry. *Arch Surg*. 2006; 141: 1207-1213

19. Savassi-Rocha PR, Almeida SR, Sanches MD, Andrade MA, Frerreira JT, Diniz MT, Rocha AL. Iatrogenic Bile Duct Injuries. *Surg Endosc.* 2003 Sep;17(9):1356-61
20. Jabłońska B, Lampe P. Iatrogenic Bile Duct Injuries: Etiology, Diagnosis And Management. *World J Gastroenterol.* 2009;15(33): 4097-4104
21. Neuhaus P, Schmidt SC, Hintze RE, et al. Classification and Treatment Of Bile Duct Injuries After Laparoscopic Cholecystectomy. *Chirurg.* 2000;71(2):166-73
22. Bismuth H, Majno PE. Biliary Strictures: Classification Based On The Principles Of Surgical Treatment. *World J Surg.* 2001;25(10):1241-4
23. Wan-Yee Lau and Eric C.H. Lai. Classification of iatrogenic bile duct injury. *Hepatobiliary pancreat Dis.* 2007 Oct; 6(5):459-62.
24. Strasberg SM, Hertl M & Soper NJ. An Analysis of The Problem Of Biliary Injury During Laparoscopic Cholecystectomy. *J Am Coll Surg* 1995;180:101-125.
25. Hugh TB. New strategies to prevent laparoscopic bile duct injury – surgeons can learn from pilots. *Surgery* 2002; 132:826–835.
26. Olsen D. Bile duct injuries during laparoscopic cholecystectomy. *Surg Endosc* 1997; 11: 133–138.
27. McMahon AJ, Fullarton G, Baxter JN, O'Dwyer PJ. Bile duct injury and bile leakage in laparoscopic cholecystectomy. *Br J Surg* 1995; 82: 307-313
28. MAM Ibnouf, A.Majid M. Massaad. Iatrogenic Major Bile duct Injuries Injury. *Sudan JMS* 2007 Sep;2(3):203-7
29. Moore DE, Feurer ID, Holzman MD, Wudel LJ, Strickland C, Gorden DL, Chari R, Wright JK, Pinson CW. Longterm detrimental effect of bile duct injury on health-related quality of life. *Arch Surg* 2004; 139: 476-481
30. Misra S, Melton GB, Geschwind JF, Venbrux AC, Cameron JL, Lillemoe KD. Percutaneous management of bile duct strictures and injuries associated with laparoscopic cholecystectomy: a decade of experience. *J Am Coll Surg* 2004; 198: 218-226
31. Archer SB, Brown DW, Smith CD, Branum GD, Hunter JG. Bile duct injury during laparoscopic cholecystectomy: results of a national survey. *Ann Surg* 2001; 234: 549-558;558-559
32. MacFadyen BV Jr, Vecchio R, Ricardo AE, Mathis CR. Bile duct injury after laparoscopic cholecystectomy. The United States experience. *Surg Endosc.* 1998 Apr;12(4):315-21.
33. Faisal Bilal Lodhi, Muhammed A and etals. Iatrogenic bile duct injuries ; Experience at allied Hospital , Faisalabad. *A.P.M.C* 2007 Jan ;1(1):14-8
34. Yuhsein V. Wu & David C. Linehan. Bile Duct Injuries in the Era of Laparoscopic Cholecystectomies. *Surg Clin N Am* 2010;90: 787–802
35. Chaudhry TH, Jamil M, Ali A. Acute cholecystitis; Early versus interval cholecystectomy for a comparative study. *Professional Med J* Jun 2010;17(2):185-192
36. S. Connor¹ and O. J. Garden². Bile duct injury in the era of laparoscopic cholecystectomy. *British Journal of Surgery* 2006; 93: 158–168