

A Prospective Study of Biliary Leakage And Its Management of Patients Attending Tertiary Care Centre of Jharkhand

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Abstract: The biliary tract is a complex organ system that performs the simple though vital task of collecting storage and delivery bile to the gastrointestinal tract. Disease of biliary tract can be extremely painful, debilitating and occasionally life threatening. The complex development of the liver and biliary system in utero can result in multiple anatomic variations. Thus hepatobiliary operation is challenging and its complication results in life long disability and death. In our study 100 cases were included which were underwent cholecystectomy from September 2011 to September 2013 in department of surgery RIMS Ranchi Jharkhand. Most of the patients underwent cholecystectomy were between the age of 30-40 years and 40-50 years with female preponderance. Common causes of biliary leakage was due to liver bed injury 5 (41.67%), Common bile duct injury had 3 (25%). Most of them managed conservatively and only 2% mortality was observed.

Keywords: Gall stone, Cholecystitis, Cholecystectomy, Biliary leakage.

I. Introduction

The biliary tract is a complex organ system that performs the simple though vital task of collecting, storing, and delivering bile to the gastrointestinal tract. Diseases of the biliary tract can be extremely painful, debilitating, and occasionally life threatening. The complex development of the liver and biliary system in utero can result in multiple anatomic variations. An absolute knowledge of these anatomic variations with careful dissection and identification of structures at the time of surgery is a minimal requirement for the safe performance of any hepatobiliary operation. Because of the unforgiving nature of the biliary system, errors in technique or judgement can be disastrous to the patient, resulting in lifelong disability or death. For this reason, a high premium exists on performing the correct procedure, without technical misadventure, the first time. Equally important is the ability to recognize iatrogenic injury so that prompt repair or referral to a surgeon who has expertise in hepatobiliary surgery can be instituted. Positive outcome requires a balance between sound judgement, technical acumen, and attention to detail. Additionally, the surgeon of today must be able to integrate surgical options with the broadening array of radiologic and endoscopic treatment options available in the management of patients who have these disorders.

Also because of the great frequency with which the operation is performed, cholecystectomy remains the greatest source of post-operative biliary injuries. In a review of more than 42,000 open cholecystectomies performed in the United States in 1989, the incidence of incidence of biliary injuries was documented to be 0.2%. Strasberg and associates reported a 0.3% incidence of injuries in a literature review of more than 25,000 open cholecystectomies since 1980. The advent and preference for laparoscopic cholecystectomy has refocused attention on this issue, however because of the significant increase in the number of injuries. Several studies worldwide have documented a marked increase in the frequency of bile duct injuries associated with the laparoscopic approach, ranging from 0.4% to 1.3%. Also in a review of nearly 125,000 laparoscopic cholecystectomies reported in the literature in the years 1991-1993, Strasberg and colleagues reported an overall incidence of biliary injuries of 0.85%.

Aims And Objectives

- 1) To study the incidence of biliary leak following cholecystectomy.
- 2) To evaluate the risks for bile leak after cholecystectomy.

II. Material And Methods

A prospective analysis was done on all cholecystectomy patients from September 2011 to September 2013 in Rajendra institute of medical sciences, Ranchi, which is a tertiary care centre of Jharkhand. The case papers, operative and post-operative records were scrutinized and data collected. All the cholecystectomy patients were observed in the post-operative period for presence of biliary leakage as evidenced by bilious fluid drainage in the drain tube. In our study inclusion criteria are as:

1. 50 ml or more or lasting for 2 days or more
2. Failure to recover along expected lines
3. Abdominal pain
4. Sepsis etc were also observed.

Each case was studied as per the following plan:

1. Age
2. Sex
3. Religion
4. Indication for cholecystectomy
5. Complication
6. Type of complication
7. Treatment given

Investigation Done

1. Total leucocyte count
2. Differential count of WBC
3. Bleeding time
4. Clotting time
5. Prothrombin time
6. Activated prothrombin time
7. Liver function test
8. Serum electrolyte
9. Ultrasonography abdomen and pelvis
10. Computed tomography of abdomen and pelvis
11. Magnetic Resonance Cholangiography & Pancreatography

III. Results

Table 1-Age wise Incidence of Cholecystectomy

Range of Age	Incidence	
	Number	Percentage
>60 yrs	5	5
50-60	16	16
40-50	30	30
30-40	39	39
20-30	10	10

Among the 100 cases, the patient underwent cholecystectomy between the age of 30-40 & 40-50 were 39% and 30% respectively.

Table 2- Sex wise Incidence of Cholecystectomy

Sex	Incidence	
	Number	Percentage
Male	20	20
Female	80	80

Among the 100 cases, 80% of the females underwent cholecystectomy.

Table 3- Indication of cholecystectomy

Indication	Incidence	
	Number	Percentage
Acute Cholecystitis	36	36
Chronic cholecystitis	54	54
Others	10	10

Patients underwent Cholecystectomy for Indication of Chronic Cholecystitis were 54% and for acute cholecystitis 36%.

Table 4- post-operative result among all the cases of cholecystectomy

Post-operative result	Incidence	
	Number	Percentage
Uneventful	73	73
Complications	27	27

Out of 100 cases, 73 patients did not show any complications whereas 27 patients had complications

Table 5- Distribution of Types of Complications

Complication	Incidence
Haemorrhage	15
Bile Leak	12

Out of 100 cases, 27 cases show complications in the form of Haemorrhage & Biliary leak in which 12 cases are of biliary.

Table 6- Age wise incidence of Biliary Leakage

Range of Age (years)	Biliary Leak
60-70	1 (8.3%)
50-60	1 (8.3%)
40-50	3 (25%)
30-40	5 (41.67%)
20-30	2 (16.6%)

Biliary leak were seen in the age group of 30-40 & 40-50 were 5 (41.67%) and 3 (25%) respectively.

Table 7- Sex wise Incidence of Biliary Leakage

Sex	Incidence	
	Number	Percentage
Male	4	33.33
Female	8	66.67

Out of 12 patients, 8 female patients had biliary leak.

Table 8- Religion wise Distribution of Biliary Leak

Religion	Incidence	
	Number	Percentage
Hindu	8	66.67
Muslim	4	33.33

67% Hindu shows Biliary Leakage.

Table 9- Indication of Surgery causing Biliary Leak

Indication of Surgery	Biliary Leak
Acute Cholecystitis	7 (58.3%)
Chronic Cholecystitis	3 (25%)
Others	2 (16.6%)

Biliary Leak was seen in Acute Cholecystitis 7 (58%) and chronic cholecystitis 3 (25%).

Table 10- Cause of Biliary Leakage

Causes	Biliary Leak
Cystic Stump	2 (16.6%)
C B D Injury	3 (25%)
Liver Bed	5 (41.67%)
Undiagnosed	2 (16.6%)

Out of 12 cases, 41% leak was due to liver bed injury, CBD injury had 25% whereas Cystic Stump & Undiagnosed cause had 16% each.

Table 11- Treatment given to causes of Biliary Leak

Procedure	Percentage of Treatment
Roux-en-y	1 (8.3%)
Choledochodudonostomy	1 (8.3%)
Primary Repairing	1 (8.3%)
Conservative	9 (75%)

Out of 12 cases of Biliary Leakage, most of the patients; 75% were managed conservatively whereas in few cases, Roux-en-y, Choledochodudonostomy Primary repairing treatment was given 8% each.

Figure 1- Showing Bile leak

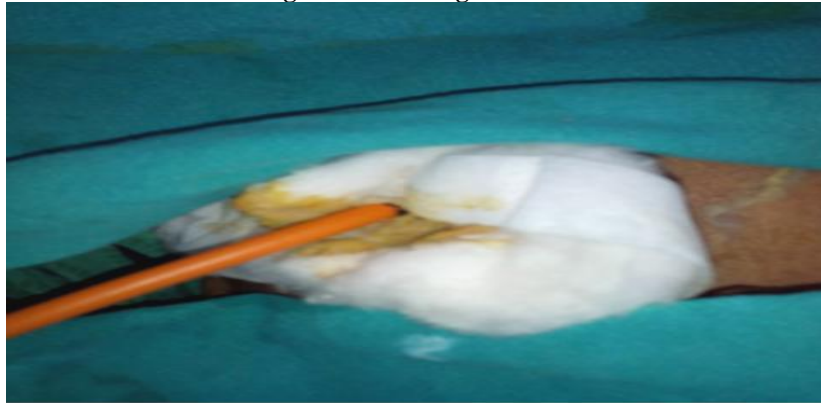
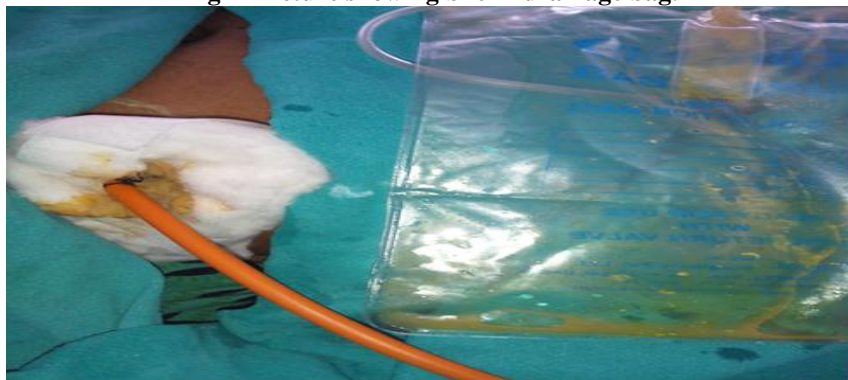


Fig 2- Picture showing bile in drainage bag.



IV. Discussion

This study consists of 100 patients who had undergone cholecystectomy in the department of surgery of Rajendra Institute of Medical Sciences, Ranchi during the period of September 2011 – September 2013. Maximum number of the patients who underwent cholecystectomy (open or laparoscopic) were between the age of 30-40 and 40-50 yrs. of age. The above observation shows that the peak age of incidence of different indications for cholecystectomy is in the age group of 30-40 and 50-60, as gall stone disease being a more common cause after the age of 20. Decamp (1932) reported 60 percent of his cases were between 30-60 yrs of age. Udape and Prasad (1957) and Tiwari et al have also reported maximum incidence to be 40-50 yrs. We have also found similar age incidence in our study.

A study of sex incidence shows that gall stone disease was four fold more common in female in comparison to male. Decamp (1952) reported 4:1 ratio. Udupe and Prasad (1957) reported 3.5:1 ratio and Tiwari et al reported 3:1 female to male ratio. Norrby et al (1983) reported 66% female and 24% male in his series which is slightly lower than that we observed. All these figures clearly indicate female preponderance in acute cholecystitis and chronic cholecystitis.

Maximum number of patients underwent cholecystectomy (open or laparoscopic) for the indication of chronic cholecystitis (54%). Acute cholecystitis comprised only 36% of cases, 10% cases for the other causes. As the above data support that the common indication for cholecystectomy is the chronic calculus cholecystitis.

In the post-operative period only 27 cases were eventful and most of them were without any complication. In the post-operative period the most common complication was observed as haemorrhage 15(55.5%) and bile leak as 12(44.4%). In our study the incidence of bile leak was more as compared to other author studies, because in our study four criteria are attributing to biliary leak whereas other single criteria. A wide range of complication rate has been documented by various authors. Dubois et al (1990) reported a complication rate of 6%. Najningier B et al (1997) reported a serious complication rate of 2.9%. Vogelback P et al (1992) reported no major complication. The Southern Surgeon Club (1991) reported a complication rate of 5.1%.

Maximum number of the leakage is observed between the age group of 30-40 and 40-50, 5 (41.6%) and 3 (23%) respectively, as the gall stone disease is common in the age group of 30-50. Thus, after cholecystectomy, biliary leakage has been observed maximum between the age group of 30-50. In our studies biliary leak was higher in comparison to other studies as we took four criteria which attributing leak in comparison to single criteria.

Maximum number of leakage was observed in female patients (66%). On 100 cases who underwent cholecystectomy, 80 cases were female and biliary leakage observed was 8 (66.6%) and 20 cases were male in which biliary leakage was observed in 4 (33.3%). Though the percentage of leak was more in female as surgery was indicated four times more compare to male but in 20 male cases, 4 (33.3%) leak was observed. This complication is more as compare to female because more anatomical variations, deep liver bed and difficulty in dissection of Calot's triangle is more common in male. Kayaalp C et al (2002) reported 40% biliary leakage in male. Norrby et al (1983) reported 66% female and 24% male in his series.

The above data shows that maximum number of the leak was observed in acute cholecystitis 7(58.3%), chronic cholecystitis 3 (25.3%) and other 2 (16.6%). This observation shows that anatomy of the Calot's triangle was not clear, inflammation of gall bladder and adhesion to the neighbouring structures was more observed in acute cholecystitis causing difficulty in performing cholecystectomy leading to more biliary leakage as in the form of bile duct injury, cystic duct stump, oozing from liver bed and undiagnosed causes.

On 100 cases, total 27 cases were observed as the complications due to haemorrhage and bile leak, 15 and 12 cases respectively. The causes for biliary leak in our study was observed as slipping of ligature of cystic duct stump, CBD injury, liver bed injury and undiagnosed causes and the percentage of incidence of above causes being 2 (16.6%), 3 (25%), 5 (41.6%) and 2 (16.6%) respectively. Other studies, where the rate bile duct injury after laparoscopic cholecystectomy and open cholecystectomy was noted between 0.4% to 0.6% and 0.1% to 0.2% respectively.

The incidence of biliary leakage in our study is more because there are four criteria attributing to the biliary leakage rather than one criterion. The incidence of bile duct injury is 3% as the cholecystectomy is performed in the learning institute.

Most of the biliary leakage patients were managed conservatively 9 (75%) and very few through surgical intervention like Roux-en-y, choledochodudonostomy and primary repairing. Southern surgeon club (1991) reported CBD or hepatic duct injury 0.5%. Wise JN et al (2005) reported major bile leak occurred in 3% of patient and minor leak occurred with equal frequency. 2% mortality was observed in our study. Wilson P et al (1991), Spangerberger et al (1990), Cushier et al (1991) reported zero mortality. But some author documented some mortality during cholecystectomy such as Linderberg F et al (1997) reported a mortality rate of 0.08%, Mc burry et al (1991) also reported mortality rate of 1.7%.

V. Conclusion

Biliary leakage remains a dreaded complication. The incidence would naturally higher in learning institutes. Incidence of biliary leakage at our institution is higher in comparison to similar studies. In our study, biliary leakage was more due to injury to the liver bed which was managed conservatively.

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References

- [1]. Adamsen S, et al, 1997: Bile duct injury during laparoscopic cholecystectomy: a prospective nationwide series. *J Am CollSurg* 184:571-578.
- [2]. Anand. Profile of bile duct injury occurring as a complication of laparoscopic / open bile duct injury. 2011.
- [3]. Andersson R, Tranberg KG, Bengmark S. Isolated intraperitoneal accumulation of bile after surgical or diagnostic procedures. 1988 May-Jun;154(5-6):375-7.
- [4]. Balija M, Huis M, Nikolić V, Štulhofer M. Laparoscopic visualization of the cystic artery anatomy. *World J Surg* 1999;23:703-707.
- [5]. Bismuth H, 1982: Postoperative strictures of the bile duct. In Blumgaart LH (ed) : the biliary tract : clinical surgery international. Edingburgh, Churchill Livingstone, pp 209-218.
- [6]. Björn Törnqvist. Iatrogenic bile duct injury during cholecystectomy, 2013.
- [7]. Braasch JW. Congenital anomalies of the gallbladder and bile ducts. *SurgClin North Am* 1958:38-627.
- [8]. Brooks DC, et al, 1993: management of bile leaks following laparoscopic cholecystectomy. *SurgEndosc* 7:292-295.
- [9]. Calot JF. De la cholécystectomie. (Thesis) Paris, 1890, No. 25, p. 50.
- [10]. Carroll BJ, et al 1996: Routine cholangiography reduces sequelae of common bile duct injuries. *Surg endoscopic* 10:1194-1197
- [11]. Chapman WC, et al, 1995: postcholecystectomy bile duct strictures. *Arch Surg* 130:597-604
- [12]. Chow S, Bosco JJ, Heiss FW, Shea JA, Qaseem T, Howell D. Successful treatment of post-cholecystectomy bile leaks using nasobiliary tube drainage and sphincterotomy. 1997 Oct;92(10):1839-43.
- [13]. Chow S, Bosco JJ, Heiss FW, Shea JA, Qaseem T, Howell D. Successful treatment of post-cholecystectomy bile leaks using nasobiliary tube drainage and sphincterotomy. 1997 Oct;92(10):1839-43.
- [14]. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, Trede M, Troidl H. The European experience with laparoscopic cholecystectomy. 1991 Mar;161(3):385-7.
- [15]. Davidoff AM, et al, 1992: Mechanisms of major biliary injury during laparoscopic cholecystectomy: *Ann Surg* 215:196-208.
- [16]. Deziel DJ, et al, 1993: Complications of laparoscopic cholecystectomy: a national survey of 4,292 hospitals and an analysis of 77,604 cases. *J Am CollSurg* 165:9-14.
- [17]. Flum DR, Cheadle A, Prela C, et al. Bile duct injury during cholecystectomy and survival in Medicare beneficiaries. *JAMA* 2003;290(16):2168-73.

- [18]. G Tzovaras, P Peyser, and J Toouli. Minimally invasive management of bile leak after laparoscopic cholecystectomy. 2001.
- [19]. Gigot J, et al 1997: The dramatic reality of biliary tract injury during laparoscopic cholecystectomy: an anonymous multicentre Belgian survey of 65 patients. *SurgEndosc* 11: 1171-1178.
- [20]. Healey JE Jr, Schroy PC. Anatomy of the biliary ducts within the human liver: analysis of the prevailing pattern of branching and the major variations of the biliary ducts. *Arch Surg* 1953;66:599.
- [21]. Hemant Sharma, George Bird. Endoscopic Management of Postcholecystectomy Biliary Leaks. Disclosures 2011.
- [22]. Hermann RE. Manual of Surgery of the Gallbladder, Bile Duct and Endocrine Pancreas. New York: Springer-Verlag, 1979.
- [23]. Kum CK, et al,1996: Laparoscopic cholecystectomy for acute cholecystitis: is it really safe? *World J Surg* 20:43-49.
- [24]. LillemoeKD,et al,1997: major bile duct injuries during laparoscopic cholecystectomy: follow up after combined surgical and radiological management. *Ann Surg* 225:459-471.
- [25]. MacFadyen JB, et al, 1998: Bile duct injury after laparoscopic cholecystectomy: the United States experience. *SurgEndosc* 12:315-321.
- [26]. Mc Mohan AJ, et al, 1995: bile duct injury and bile leakage in laparoscopic cholecystectomy. *Br J Surg* 82:307-313.
- [27]. Michels NA. Blood Supply and Anatomy of the Upper Abdominal Organs. Philadelphia: Lippincott, 1955.
- [28]. Moosman DA, Collier FA. Prevention of traumatic injury to the bile ducts: a study of the structures of the cystohepatic angle encountered in cholecystectomy and supraduodenalcholedochostomy. *Am J Surg* 1951;32:132.
- [29]. Moosman DA. Where and how to find the cystic artery during cholecystectomy. *SurgGynecolObstet* 1975;141:769
- [30]. Morgenstern L, Wong L, BerciG. Twelve hundred open cholecystectomies before the laparoscopic era. A standard for comparison. 1992 Apr;127(4):400-3.
- [31]. Neidich R, Soper N, Edmundowicz S, Chokshi H, Aliperti G. Endoscopic management of bile duct leaks after attempted laparoscopic cholecystectomy. 1996 Oct;6(5):348-54.
- [32]. Newman HF, Northrup JD. Extrahepatic biliary tract anatomy. *West J SurgObstetGynecol* 1963:71-59.
- [33]. Nikolić V. Arterecystiquerecurrente. *Bull AssocAnat* 1967;136: 739.
- [34]. Northover JMA, Terblanche J, 1979: A new look at the arterial blood supply of the bile duct in man and its surgical implications. *Br J Surg* 66:379-384.
- [35]. Olsen D,1997: Bile duct injury during laparoscopic cholecystectomy. *SurgEndosc* 11:133-138.
- [36]. Ooi LL, Goh YC, Chew SP, et al. Bile duct injuries during laparoscopic cholecystectomy: a collective experience of four teaching hospitals and results of repair. *Aust N Z J Surg* 1999;69(12):844-6.
- [37]. Parke WW, Michels NA, Ghosh GM. Blood supply of the common bile duct. *SurgGynecolObstet* 1963:117:47.
- [38]. Pitt HA, et al, 1989: benign postoperative biliary strictures: operate or dilate? *Ann Surg* 210:417-425.
- [39]. Ray CE Jr, Hibbeln JF, Wilbur AC. Complications after laparoscopic cholecystectomy: imaging findings. 1993 May;160(5):1029-32.
- [40]. Richardson MC, et al, 1996: Incidence and nature of bile duct injuries following laparoscopic cholecystectomy: an audit of 5913 cases. West of Scotland Laparoscopic Cholecystectomy Audit Group. *Br J Surg* 83:1356-1360.
- [41]. Roslyn JJ, et al, 1993: Open cholecystectomy: a contemporary analysis of 42,474 patients. *Ann Surg* 218:129-137.
- [42]. Rossi RL, Tsao JI, 1994: *Surg Clin N Am* 74:825-841.
- [43]. Russell JC, et al 1996: Bile duct injuries,1989-1993. astatewide experience. Connecticut laparoscopic cholecystectomy registry. *Arch Surg* 131:382-388.
- [44]. Savader SJ, et al, 1997: laparoscopic cholecystectomy - related bile duct injuries: a health and financial disaster. *Ann Surg* 225:268-273.
- [45]. Shea JA, Healey MJ, Berlin JA, Clarke JR, Malet PF, Staroscik RN, Schwartz JS, Williams SV. Mortality and complications associated with laparoscopic cholecystectomy. A meta-analysis. 1996 Nov;224(5):609-20.
- [46]. Sheng R, Sammon JK, Zajko AB, Campbell WL. Bile leak after hepatic transplantation: cholangiographic features, prevalence, and clinical outcome. 1994 Aug;192(2):413-6.
- [47]. Sicklick JK, Camp MS, Lillemoe KD, et al: Surgical management of bile duct injuries sustained during laparoscopic cholecystectomy: perioperative results in 200 patients. *Ann Surg* 2005;241(5):786-792.
- [48]. Stewart L, Way LW, 1995: Bile duct injuries during laparoscopic cholecystectomy: factors that influence the result of treatment. *Arch Surg* 130:1123-1129.
- [49]. Strasberg SM, et al, 1995: An analysis of the problem of biliary injury during laparoscopic cholecystectomy. *J Am CollSurg* 180:101-125.
- [50]. Stremple JF. The need for careful operative dissection in Moosman's area during cholecystectomy. *SurgGynecolObstet* 1986; 163:169.
- [51]. Suzuki T, Nakayasu A, Kauabe K, Takeda H, Honjo I. Surgical significance of anatomic variations of the hepatic artery. *Am J Surg* 1971;122:505
- [52]. The Southern Surgeons Club, 1991: A prospective analysis of 1,518 laparoscopic cholecystectomies performed by southern US surgeons. *N Eng J Med* 324:1073-1078.
- [53]. Tocchi A, et al, 196: the long term outcome of hepaticojejunostomy in the treatment of benign bile duct strictures. *Ann Surg* 224:162-167.
- [54]. Van Damme JP, Bonte J. The branches of the celiac trunk. *ActaAnat* 1985;122:110.
- [55]. Van Damme JP. Behavioral anatomy of the abdominal arteries. *SurgClin North Am* 73(4):699-725, 1993.
- [56]. Vitellas KM, El-Dieb A, Vaswani K, Bennett WF, Fromkes J, Steinberg S, Bova JG. Detection of bile duct leaks using MR cholangiography with mangfodipirtrisodium (Teslascan). 2001 Jan-Feb;25(1):102-5.
- [57]. Waage A, Nilsson M. Iatrogenic bile duct injury: a population based study of 152 776 cholecystectomies in the Swedish Inpatient Registry. *Arch Surg* 2006;141(12):1207-13
- [58]. Waage A, Nilsson M. Iatrogenic bile duct injury: a population based study of 152 776 cholecystectomies in the Swedish Inpatient Registry. *Arch Surg* 2006;141(12):1207-13
- [59]. Walsh RM,et al 1998:Trends in bile duct injuries from laparoscopic cholecystectomy. *J GastrointestSurg* 2:458-462.
- [60]. Way LW, Stewart L, Gantert W, et al. causes and prevention of laparoscopic bile duct injuries. *Ann Surg* 2003;237:462.
- [61]. Wherry DC, et al, 1996: An external audit of laparoscopic cholecystectomy in the steady state performed in medical treatment facilities of the department of defence. *Ann Surg* 224:145-154.
- [62]. Woods MS, et al, 1994: Characteristics of biliary tract complications during laparoscopic cholecystectomy: a multi-institutional study. *Am J Surg* 167:27-34.
- [63]. Wu JS, Dunnegan DL, Luttmann DR, Soper NJ. The evolution and maturation of laparoscopic cholecystectomy in an academic practice.