Surgery vs. endoscopy. Competitive or complementary tools for management of post cholecystectomy problems. 10 years' experience in major referral center.

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Abstract

Purpose: study and evaluate surgical and endoscopic techniques used in management of these problems.

Patients & Methods: A random sample of 630 patients (366 females and 264 males) were collected from general surgery department, and gastro-intestinal endoscopy unit, and managed accordingly using surgery in 143 patients, and endoscopy in 482 patients (plus percutaneous techniques in 25 patients).

Results: Endoscopy was very successful as an initial treatment of 457 patients (73%), as being less invasive, low morbidity and mortality, competitive to surgery in treatment of missed stone (88%), mild to moderate biliary leakage (82%), and biliary stricture (74%). Its success increased by addition of percutaneous techniques in 4%, 2.8% & 8.3% for missed stone, leakage, and stricture respectively. But endoscopy was somewhat complementary to surgery in major leakage, and massive stricture, and surgery was resold to in 15%, and 17% of cases.

Surgery remain as the treatment of choice in complex problems, and endoscopy play a complementary role in such cases of transection, ligation, combined problems of stones, stricture, and leakage (< 40%), compared to 60% for surgery. Bilio-enteric anastomosis was the procedure of choice, done in 86 cases, with stent splintage in unhealthy, or small sized ducts. And stricture complication was encountered in 6% of cases treated by percutaneous rout in 4, and redo surgery in1 case.

The learning curve seems influential in both endoscopy and surgery. The cumulative experience increase the success rate of endoscopy from initial 50% to 95%nowadays, also surgery improved with decreased morbidity and mortality

Conclusion: Endoscopy was competitive in simple problems and advised to be the initial treatment choice, but complementary in major leak, ligation, transection, and complex problems, where surgery plays the main role with its invasiveness, high morbidity and morbidity. Cumulative experience influence endoscopic and surgical treatment of such problems.

Keywords: post-cholecystectomy, ERCP, PTC, PTD, bilio-enteric anastomosis.

Introduction

Cholecystectomy has been the treatment of choice for symptomatic gallstones. Laparoscopic cholecystectomy (LC) has recently become the more preferred operation over open cholecystectomy (OC),

However, several studies report[1,2,3,4] that complications to the biliary tract are more common with LC (0.6% vs. 0.3%)[3], and leakage incidence of 1.1%[5] . Several authors[1,2] impute it to a ''learning curve phenomenon'', which frequently occurs after the introduction of any new procedure or technology, thus this is still a controversial data.

Post cholecystectomy problems are seen in as many as 20% of cases and manifested by symptoms of right hypochondrial pain, vomiting, or jaundice, otherwise biliary leakage and major biliary injuries[6].

Biliary injuries continue to be a significant problem following cholecystectomy[5], liver transplant[7], trauma[8], or infection[9]. Traditionally, surgery has been the gold standard for the management of biliary injuries. Recently, various endoscopic methods have been used as the preferred modalities of these patients[8,10], as it permitted a less invasive approach, with similar or reduced morbidity rates at surgical treatment[11,12], and since 1990s these endoscopic approaches nearly replaced surgical treatment[13].

Endoscopic intervention is a safe and effective method of treatment of post cholecystectomy biliary injuries as it can combine both the investigative and therapeutic arms in one common procedure[14]. However, management should be individualized based on factors such as outpatients or inpatients, presence of stone, stricture, ligature, or coagulopathy[15]. However, New endoscopic approaches allow less invasive treatment[16]; therefore, postponing or even avoiding surgical treatment[17], and should be the initial management of choice[18].

Surgical treatment still is the corner stone of treatment; it involves anastomosing an isolated loop of jejunum to the healthy, vascularized and unscarred part of the bile duct, as conventional surgical wisdom dictates avoiding the scarred and unhealthy part of the stricture for anastomosis. Roux-en-Y hepatico-jejunostomy is a one-time, proven effective and durable method of treating postoperative bile duct injuries, even for recurrent strictures, and has been shown to give good long-term results[19], sometimes with the use of trans-anastomotic stents according to the individual characteristics of each patient and the experience of each surgeon. But its use is recommended when unhealthy (ischemic, or scarred) and small ducts (<4mm) are found[20].

As compared to surgery, endoscopic treatment has the advantage of being less 'invasive' but it is less effective, sometime needs multiple sessions, and is certainly not suitable for all patients. In patients with strictures affecting the region of biliary bifurcation and in those with significant loss of length of bile duct, endoscopic stenting has a high chance of failure[21].

The aim of this work to emphasize, and evaluates the role of both endoscopy and surgery, whether it is competitive or complementary in management of each aspect of post cholecystectomy problems, respecting the experience curve for more than 10 years in this field in a major referral center in upper Egypt.

Patients and methods

Random sample of patients were incorporated in this study for about 10 years period from the surgery department, and gastro-intestinal endoscopy unit, Assuit University Hospitals (a major tertiary referral center in Upper Egypt). All patients complaining of post cholecystectomy problems (patients with non-biliary problems, or associated with vascular injuries are excluded), Patients was encountered with variable presentation, and timing from the surgical insult till referred to our center for management.

Cases were subjected to:

- Thorough detailed history taking.
- Meticulous clinical examination.
- Investigation needed to diagnose the problem as: Liver function tests and abdominal ultrasonography were done to all cases.
- CT or MRI was done in some cases.

- Cholangiogram was done in all cases (the gold standard evaluation of biliary injuries[14]) as trans-tube cholangiogram (with a T tube in place), endoscopic cholangiogram (ERCP) in most of cases, or percutaneous trans-hepatic cholangiogram (PTC) in some selected cases in which endoscopic approaches failed.

Patients were categorized according to the problem diagnosed by the previous tools into 4 categories:

1) Missed stone(s) group.
2) Biliary leakage group.
3) Biliary stricture group.
4) Complex biliary problems group includes a combination of problems.

Each group was managed according to its circumstances by a stepwise manner of treatment starting with minimally invasive tools (endoscopic treatment, alone or in addition to percutaneous manipulation in difficult cases), to more invasive tools (surgical approaches).

Endoscopic approaches: was done for most of our cases (510 patients) using side viewing Pentax video scope, using regular instruments, and blended current was used in sphincterotomy; however balloon sphincteroplasty was also used in some cases.

CBD stone(s) were treated by sphincterotomy and retrieval using basket, balloon extractor, or manual mechanical lithotripsy. However, Drainage was done in some cases with suspected cholangitis, or after failure of endoscopic techniques prior surgery by stents or nasal biliary catheter.

Biliary leakage was classified according to Strasburg, and Soper classification[22], and treated endoscopically by sphincterotomy in mild cases and/or stenting in moderate to major leakage, but endoscopic maneuvers failed in CBD transection injuries.

CBD stricture was categorized according to the Strasberg classification[22], and treated endoscopically by dilatation and stenting in repeated endoscopic sessions with upgrading of stents till reaching cure (after full dilatation of the stricture segment as evident by loss of the waist in cholangiogram, or after full dilation for 2 years from initial session).

Complex biliary injuries were treated accordingly with special attention to the learning curve and cumulative experience for about 10 years in management of such problems.

Percutaneous Manipulation: was done in cases of endoscopic failure to opacify the proximal biliary tree as in major CBD injuries, or ligation through percutaneous trans hepatic cholangiogram (PTC) prior surgery, percutaneous manipulations and guide wire deployment through the CBD prior combined procedures (Rendez vous technique), or percutaneous dilatation, and stenting for stricture, or injury.

Surgical approaches: was done for a small number of patients (85 cases) for the following maneuvers:

- Peritoneal lavage and drainage for biliary peritonitis.
- Choledocho-lithotomy procedure to extract CBD stone(s), followed by T tube drain placement.
- CBD repair on a T tube splint in minor laceration injury of CBD.
- Undo ligation with T-tube splint if CBD ligation was discovered very shortly after operation.
- Bilio-enteric shunt operation (with the use of Roux-en Y loop technique and choledocho-jejunostomy as the operation of choice), for CBD injury, massive stricture fibrosis, or bad patient compliance with repeated endoscopic session and stenting. The anastomotic line was splinted by stents in small, unhealthy ducts.

Follow up:

Parenteral antibiotics were prescribed for all cases (Ciprofloxacin).

Surgically treated cases were followed up for a variable period prior discharge (3-10 Days) with the appropriate treatment and follow up.

Endoscopically and percutaneously treated cases were discharged at the same day after assurance of the stable condition of the patient .

Data of all patients were collected, and categorized, with thorough discussion of the detailed results of treatment was done for each category to reach a consensus either endoscopic maneuvers can substitute surgery as a definitive treatment of such problem (a competitive treatment), or surgery still is needed for definitive treatment and these maneuvers are just a complementary tools prior surgery.

Results

From Mars 2000 to October 2009, 630 cases of post cholecystectomy problems were incorporated in this study, the mean age was 45.3 years with a range of 18-68 years, 350/630 were females, and only 50 cases (8%) of them were operated in our center. Cases included either presented early (within a month post operatively) in 288 cases, or late in 342 cases as shown in *tables 1, and 2*.

Most of our cases (490 cases about 78%) presented after open access approaches (cholecystectomy alone in 370 cases, and with CBD exploration in 120 cases), versus 140 cases presented after laparoscopic approaches (22%).

The learning experience of surgical treatment:

The learning curve of experience of surgical treatment also passed in a similar fashion with a cumulative manner for 10 years with treatment of such problems, with more than 86 operations of bilio-enteric shunt procedures in these challenging cases of relatively non-dilated biliary channels, with sepsis and fibrous scarring of the field. Variable techniques was practiced including end to side, versus side to side procedures, splinted versus non splinted anastomotic stoma, inside stent versus trans hepatic percutaneous catheter splint, interrupted versus continuous sutures anastomosis, depending on patient circumstances, but generally anastomosis is done as Roux-en-Y loop Choledocho-jujenostomy end to side, single interrupted layer of 3/0, or 4/0 Vicryl sutures, tension free, mucosa to mucosa, 2-3 cm stoma, splinted in very small ducts by biliary stent.

These cumulative experience was revealed as decreasing number of morbidity following these major surgeries, and also the resulting complications especially stricture at the anastomotic line. 5 out of 86 cases suffers from stricture of the stoma (5.8%), most of them belongs to early cases in initial experience, and due to cumulative experience in treatment of such cases percutaneous treatment was adopted and only 1/5 cases needed redo-surgery for refashioning of the anastomosis.

Discussion:

The incidence of post cholecystectomy problems in this work was higher after conventional open cholecystectomy (490 cases) more than laparoscopic cholecystectomy (140 cases). In contrary to the generally accepted higher incidence after laparoscopic cholecystectomy (0.6%) more than open cholecystectomy (0.3%)[3], and this may be attributed to the low incidence and affinity for laparoscopic procedures in Upper Egypt locality.

Choledocholithiasis **(213 patients)** were successfully treated endoscopically in 88% of cases to extract the stone(s) that increased to 92% with the addition of rendez-vous techniques (197/213). The failure rate of endoscopic treatment detected was 12% (25/213), but it was reduced by addition of rendez vous

technique to become 7.5% (16/213), in contrary to other authors incidence that increased up to 20% failure rate[23] ,and this may be explained by the fact that most of the stones encountered in this work was soft, or easily crushed improving the success rate. For those cases with endoscopic failure, drainage by biliary stenting was done prior surgery[24]. Moreover endoscopic CBD clearance rate of stone(s) in those patients reached 100% as evident by post ERCP follow up diagnostic tools.

Only 7.5% of cases (16/213) underwent surgical treatment by choledocholithotomy procedure, preceded by MRCP in 5 cases, and other pre requisites and preoperative assessment as surgery is invasive tool, with long hospital admission period, higher coast, and high morbidity and mortality rates, *So, endoscopic treatment substituted surgery in all those 197 cases (92%) as a competitive definitive treatment for missed stone(s)[14,17], moreover it has the superiority as regard less invasiveness[8,11,16], less coasty, without hospital admission (outpatient techniques), with a very low if absent morbidity and mortality rates[12,13].*

Bile leakage was common among our patients (145 cases= 23%) seen as bile leakage in 139 patients, or bile fistula in 6 patients[5], usually leakage originated from the liver bed or biliary injury[25], as the sphincter of Oddi creates a pressure gradient that result in bile spillage to outside rather than into the duodenum[26]. leakage was demonstrated by cholangiogram in most of cases (126/ 145), however the spillage was very mild and not evident by contrast injection in 19 cases, such mild cases of biliary leak may resolve spontaneously[27].

Endoscopic treatment was based on the degree of leakage. Patients with mild degree leakage (Cystic duct stump leak, IHBD, lateral section of CBD/RHD, gall bladder bed) was treated efficiently by endoscopic sphincterotomy and stenting for at least a month[11,28,29,30,31], subsequently leakage ceased within 3-5 days in almost all cases (19/19, and 75/80) with success rate of 100%, 94% respectively, as endoscopic treatment accelerates the healing period by decompressing the biliary system in addition, close the defect physically and act as a bridge at the site of extravasation for major leakages. Stenting also acts as a mold and prevents stricture formation during the recovery period, and should be the preferred treatment[31].

In major leakage *(type B, C, D, and E Strasberg & Soper classification*), endoscopic treatment with sphincterotomy and stenting was successful in only 67% of cases (31/46)[28,32,33,34], moreover another session of ERCP and stenting were needed to dilate a resulting stricture and upgrade stenting at a later date in 12 out of 31 patients treated, this results is comparable with literature results[31].

Surgery was done in 22 cases (15.2%), 5 mild, 15 severe cases, and 2 patients with bad compliance to endoscopy, by CBD repair over a T- tube splint in 7 cases, and bilio enteric anastomosis in 15 cases splinted with biliary stent in 5 cases and trans-hepatic pigtail catheter in 2 cases. *So, endoscopic treatment substituted surgery in all mild leakage cases as a competitive definitive treatment (19/19& 75/80), with 100%, and 94% success rates respectively. Unfortunately endoscopic approaches failed to substitutes surgery as a definitive treatment in cases of major leakage (31/46 cases) with only 67% success rate, and play a major complementary role with other additional tools.* Thus surgery was resold to as the treatment of choice in spite of being used in only 15.2% of cases; without doubt it has its associated morbidity and mortality, pre-requisites, and necessary facilities.

Biliary stricture {121 cases} Endoscopic treatment was successful in 105 patients (87%) with dilation and stenting, with multiple sessions ERCP to substitute or upgrade stent then after, in agreement with literatures that ERCP and stenting has comparable efficacy with surgery with lower rates of morbidity and mortality[32,33,34], so endoscopy is the preferable initial therapy[35,36], but it needs a long period (About 24 months), and repeated endoscopic sessions[28], moreover Davis et al., reported equal relapses of 17% for

both treatment[37]. Surgery was resold to in 21 cases (17.4 %), by Choledocho-jejunostomy preceded by P.T.C. in 6 cases, MRCP in 10 cases, or endoscopic treatment in 5 cases with bad compliance,

*So Endoscopic treatment can substitute's surgery as competitive treatment in initial stricture management in most of cases (87%), h*owever it should be performed with progressive increment in the number of stents to better calibrates the stricture, stents should be replaced every 3 months before possible clogging could cause cholangitis, and inform the patient about the risk of stenting and the duration of treatment[38,39,40]. Otherwise surgery is indicated as the treatment of choice especially in surgically suitable patient[28].

Complex biliary problems {151 cases} the definitive treatment of such problems was mainly by surgical interference (56%), however endoscopy was a mandatory complementary tool in initial management either alone (40%), or with addition of percutaneous techniques (4.5%). So management of such problematic cases must be individualized[15], when the need for surgery becomes essential due to the nature of injury or to nonresponse to other forms of treatment, it should be undertaken in a specialized unit with expert surgeons as the results is affected greatly by the learning curve[14], and this was evident in this work by improvement of the results with time and experience accumulation in both endoscopy and surgery.

Endoscopy is the preferable initial treatment[18,35,36] that effectively managed most bile duct injuries[41], however its use is limited to incomplete biliary strictures[28], biliary leakage[31,32,34], and for surgically unsuitable patients[28], and if successfully done, its results are similar to surgical results[40], with less mortality[16]. But surgery remain the gold standard treatment especially in leakage with biliary peritonitis, ligated bile duct, complete biliary stricture, bile duct transection, or stricture after bilio-enteric anastomosis[15,42], as patients with total obstruction are not amenable to endoscopic approaches[16].

Good long-term surgical results are obtained with Roux-en-Y hepatico-jejunostomy[20,43,44,45,46]. In this work, it was done with mucosa to mucosa, tension free, 2cm stoma, single layer tecniques using Vicryl 2/0 or 3/0. Transanastomotic stents are selectively used with unhealthy (ischemic, or scarred), and small ducts (<4mm)[20,47,48], to guard against post-operative stricture complications that was encountered in 5/86 cases (5.8%) in our patients, as documented in literatures that stenosis can occurs in 10-30% of cases[20,37,43,47,49,50].

Post-operative anastomotic stricture was treated by percutaneous dilation and stenting in 4/5 cases as it is very beneficial in such cases[51,52], and redo surgery was resold to in only one patient.

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