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CHOLECYSTECTOMY IN THE ERA OF LAPAROSCOPE IN OUR HOSPITALS

By

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Background*: In the early 1990s Laparoscopic cholecystectomy (LC) was practiced in many centers in our country. Laparoscopic cholecystectomy, an extension of short-incision cholecystectomy, with a completely new Concept into abdominal surgery, was Popularized by Dubois et al.[1], and Reddic and Olsen [2] - Tough, the procedure of LC was widely spreading, the Prospective audits reported a four fold to eight fold increase in biliary complications compared with those seen in open cholecystectomy (OC)[3-4]. Whether this is related to the technique per se or is merely associated with a surgical learning curve has not been established. However , as the experience with this procedure accumulates, sporadic reports of non biliary complications, have been published[5].*

Objective: *To assess the change in concept of cholecystectomy procedure and to determine outcomes, safety, frequency and obstacles of LC versus OC at multiple open staff hospitals with multiple surgeons.*

Patients and Methods: *The clinical records of 572 patients who underwent cholecystectomies between January 2001 to December 2002 at author's hospitals were re-evaluated with regard to history, physical examination, investigations, type of operation, grade of surgeon, length of incision, rate of conversion and its cause, operation time, concurrent procedures, postoperative analgesia, hospital stay and sick leave, over all complications and mortality.*

Results: *Compared with LC, OC was more frequent 385/572 (67.3%) in whom short- incision cholecystectomy was 326/385 (84.7 %) predominate. LC performed in 187/572 (32.7 %) in whom conversion rate was 21/187(11%) and perforation of the gallbladder and spillage of gallstones into the peritoneal cavity occurred in 32/187 (17 %). Laparoscopic Cholecystectomy took significantly longer operative time (66 min verus 104 min) and less postoperative analgesic consumption in the first and second postoperative days. LC has no significant difference over OC in operative and postoperative complications apart from significant reduction in postoperative pulmonary complications (2.1 in LC vs 4.1 in OC) and wound infection (2.7 vs 3.8). Both techniques showed no significant difference in hospital stay, but sick leave is more longer for OC.*

Conclusion: *This retrospective study showed that LC is the preferred procedure for elective cholecystectomy but its frequency is related to the availalbility of equipments and facilities. Short- incision OC was the practical choice, in case of unavailability of facilities for LC, and commonly performed as current surgical trainees are adept at this procedure. Conventional OC, "gold standard" , remains frequent and applicable to difficult or complicated cases and when additional procedure is required.*

Key words: Cholecystectomy, open cholecystectmy (OC), Laparoscopic cholecystomy (LC), Short- incision cholecystectomy.

INTRODUCTION

Upper abdominal surgery is associated with severe postoperative pain and a concomitant vulnerability to a troublesome postoperative period. During the 1980s and in the early 1990s , it was shown that the conventional large subcostal incision in cholecystectomy could be replaced by a much smaller incision giving a shorter convalescence [6-7].

This conclusion was later supported by results in other randomized controlled trails[8-9]. The incision used for open cholecystectomy (OC) has been getting smaller over

the past decade, with an attendant reduction in postoperative morbidity.

Before mini- cholecystectomy could be established in surgical practice laparoscopic cholecystectomy (LC) was introduced and rapidly became popular despite early concerns about its safety.

The introduction of laparoscopic cholecystectomy (LC) has been a major breakthrough in endoscopic microsurgery, and important milestones in the history of surgery, it has rekindled the interest in laparoscopy, marking the beginning of a new era of minimally access surgery (MAS).

Laparoscopic cholecystectomy was first performed by Mouret in France in 1987, and was developed in that country during 1988 and 1989[1]. Twelve months after its introduction into the u k in june 1990, this technique has come close to replacing standard open cholecystectomy (OC) as the procedure of choice for elective surgical management of gallstones[9].

At the present time the majority of elective cholecystectomies are carried out by the laparoscopic route, but open cholecystectomy is still commonly performed in developing Countries and also in difficult or complicated cases [10]. The earlier lists of absolute contraindications to LC have mostly been reduced to relative contraindications as surgical expertise and equipment have improved[11]. However, prospective audits reported a fourfold to eight fold increase in biliary complications compared with those seen in the open era. The reported data most likely underestimate the complication rates for LC more than for OC. Whether this is related to the technique per se or is merely associated with a surgical learning curve has not been established[3-4].

Open cholecystectomy remains a safe and effective procedure for the treatment of patients with symptomatic gallstones and applicable to almost all patients and considered as a gold standard.

In this study we reviewed our hospitals' experience with cholecystectomy procedures since LC became the preferred choice.

The purpose of this study was to determine outcomes, safety frequency and obstacles of LC versus OC at multiple open staff hospitals with multiple surgeons.

PATIENTS AND METHODS

We retrospectively reviewed the records of surgical units of Mansheiyet El-Bakry General Hospital, Ahmed Maher teaching Hospital and Bolak El-Dakrour General Hospital to identify patients who underwent cholecystectomy between January 2001 to December 2002. We identify 572 patient's records presented with symptomatic gallstones, underwent cholecystectomy, of which 385 underwent open cholecystectomy (OC) and 187 underwent attempted laparoscopic cholecystectomy (LC).

History, Physical Examination and Investigations:

All charts were examined for history of jaundice, acute pancreatitis, previous upper abdominal incision, age, sex , mode of presentation, abdominal ultrasonography, preoperative work-up and ERCP.

Management of Patients:

All records were examined for grade of surgeon, type of operation, length of incision in case of OC rate of conversion in case of LC, its cause, operation time, concurrent procedures, postoperative analgesia, reoperation, hospital stay and sick leave, complications and mortality.

Short-incision cholecystectomy= Length of incision 10cm or less.

Conventional cholecystectomy= length of incision more than 10cm.

Duration of hospital stay was counted from the first day after operation including the day of discharge.

Sick leave included the day of admission to the day of return to work.

ERCP performed on suspicion of common bile duct stones based on history, physical examination and investigations.

RESULTS

We reviewed 572 cholecystectomy record for patients presented with symptomatic gallstones in our hospitals.

Twenty- six surgerons of different grades from our hospitals were involved in the surgical procedures in this study as shown in (Table 1).

Demographic data, mode of presentation and associated systemic diseases were shown in (Table 2) . The mean age of patients requiring emergency open cholecystectomy 67 (+8) years and open cholecystectomy with bile duct exploration 65.8 (+6) years was older than those undergoing laparoscopic cholecystectomy 39.5 (+ 14.2) or short-incision cholecystectomy 42.6 (+ 12.7). The sex ratios were similar in older groups 1:2 (males: Females) and 1:4 in younger groups.

Of 572 patients, ERCP was attempted preoperatively

in 74 (12.9 %) in whom common bile duct stones were found in 49/74 (66%) and were cleared successfully in 36/49 (74.5 %) , who underwent elective cholecystectomy later on, either laparoscopically or through short incision route. Elective conventional cholecystectomy and bile duct exploration was performed in the remaining 13 in whom calculi were large or impacted.

Analysis of operative procedures, operating time, hospital stay, postoperative analgesic consumption and sick leave were shown in (Table 3).

Of 572 cholecystectomies, 326 (57.1 %) were performed electively via open route through small-incision. The median incision length was 8.5 (6.5-10) cm. In 8 out of 326 (2.5 %) extension of incision was needed for safe exposure . Of 572 cholecystectomies, 14 (2.4 %) were performed as an emergency via conventional open route, 45 (7.7 %) were performed with additional procedure via conventional open roure , 166 (29.1%) were performed successfully via laparoscopic route and 21 (3.7%) were attempted laparoscopically and converted to open route which represent 11% of the attempted laparoscopic cholecystectomies. The indications for conversion were bleeding(4), dense adhesions[4], severe inflammation[3], neck of the gallbladder adherent to the hepatic duct[1], and equipment failure [4].

In 14 emergency open cholecystectomies, operative findings were severe acute cholecystitis[5], perforated gallbladder[4], empyema[3], liver abscess[1] and cholangitis[1].

In 45 patients, additional procedures were added to cholecystectomy via standard open route, common bile duct exploration[13], appendicectomy[23] and repair of paraumbilical hernia[9].

Comparing laparoscopic cholecystectomy and open cholecystectomy; operating time was significantly longer for LC 104 min versus 66 min for OC as shown in (Table 3).

No significant difference in hospital stay between LC 2.4 (+3) nights versus 2.7 (+3.1) night for OC shown in (Table 3).

There is a significant difference in the mean length of sick leave , 15 (+11.2) days for LC versus 20 (+9.4) days for OC (Table 3). Also, there is a significant difference in the consumption of analgesics (pethedin) in the first and second postoperative days, 180 (+23) mg & 50 (+35) mg versus 380 (+47) mg & 150 (+35) mg for LC and OC respectively (Table 3). No significant difference in the over all postoperative complication rates between LC 8.6% and OC 9% (Table 4).

But there is a significant difference in pulmonary complications 2.1% in LC versus 4.1% in OC and also minor wound infection 2.7% in LC and 3.8% in OC.

Table (1): ***Number of procedures performed by different grades of surgeon***

Grade of principal surgeon	*Number of surgeons*	*Number of Laparoscopic cholecystectomies*	*Number of open cholecystectomies*
Sinior resident	9	27	102
Specialist	11	63	213
Consultant	6	97	70
Total	26	187	385

Table (2): ***patient Demographics and presentations***

Patient data	*(LC)*	*Open Cholecystectomy (Oc)*			
	Elective Laparoscopic cholecystectomy	*Elective short – incison*	*Conventional*		
			Emergency	*Common Bile duct Exploratin*	*Other additional procedures*
Number	187 (32.7 %)	326 (57.1%)	14(2.4%)	13 (2.3%)	32 (5.5%)
Gender (mal: Femal)	36:151 1:4	64 : 262 1:4	5 : 9 1:2	4 : 9 1:2	6 : 26 1:4
Mean age	39.5 (+14.2)	42.6 (±12.7)	67 (±8)	65.8 (±6)	38.8 (±7)
Median age(range)	36 (18-58)	3805 (22-63)	65 (45-75)	62 (36 -71)	35 (17 -46)
Associated systemic diseases Hypertension	11	25	5	4	-
Diabetes	8	24	6	3	2

Table (3)*: Analysis of Procdures and follow-up*

Cholecystectomy Procedures	*LC 187 (32.7%)*		*OC 385 (67.3%)*					
	Succ. 166 (88.8%)	Conv. 21 (11.2%)	Short – incision Oc 396 (84.7%)			Long- incison OC 59 (15.3%)		
			Succ 318 (97.5%)	Extended 8 (2.5 %)	Emergency 14 (13.7%)	Additional procedures 45 (76.3%) CBDE 13.(28.9)	CBDE 13.(28.9)	CBDE 13.(28.9)
Operative time : mean	104 (±31)		66 (±23)					
median (range)	93 (50-173)		62 (45-105)					
Hospital stay mean	2.4 (+3)		2.7 (± 301)					
Median (range)	2.3 (1-5)		2.1 (1-6)					
Analgesic	180 (±23)		380 (±47)					
cansumpation	50(±35)		150 (± 35)					
Mean in : 1-st 24 hours								
2-nd 24 hours								
Sick leave	15 (±11.2)		20 (±9.4)					
Mean	14 (10-30)		18 (13-32)					
Medien (rang)								

LC= laparoscopic cholecystectomy , OC= Open cholecystectomy , succ.=successful, con.= converted
CBDE=comm. blide duct exploration; PUHR= paraumbitical hernia repair.

Table (4): *Postoperative complications*

	Bile leak	*Wound infection*	*Chest infection*	*UTT*	*Perctonitis*	*Hernia*	*Over all*
Open	3	13	16	3	-	-%	35 / 385
Cholecystectomy	0.8 %	3.8%	4.1 %	0.8	0%	0%	9%
Laparoscopic	2	5	4	2	1	2	16/187
Cholecystectomy	1.1%	2.7%	2.1 %	101%	0.5 %	1.1%	8.6%

DISCUSSION

Minimal access surgery is surgery intended to cause the least anatomical, physiological and psychological trauma to the patient. The rapid advancements in this type of surgery since the late 1980s have seen the dawning of an age of surgical technological innovation. Much of the morbidity associated with a conventional cholecystectomy arises from the abdominal wound[12]. Before small-incision cholecystectomy could be established in surgical practice, laparoscopic cholecystectomy was introduced and rapidly became popular[3]. This procedure was popularized in community practice and gained acceptance in the academic centers. Now more then 75% of cholecystectomies are performed laparoscopically[10].Both mini-cholecystectomy[13] and laparoscopic cholecystectomy[14] have been shown to offer advantages over conventional long- incision cholecystectomy .

Unforluately, these minimally invasive techniques have implications for economics of hospitals offering survaces. As regard laparoscopic cholecystectomy, Capital equipment is expensive and requires regular surfacing to ensure good warking standards. Consumables are particularly expensive and reusing equipment may prejudice performance. Theater times are increased initially, although they decrease as the surgeon gain experience. All members of the surgical team need adequate training in the techniques and care of the equipments.

On the other hand, small- incision cholecystectomy has the disadvantage of the need for special instruments and illumination.

In this study, frequency of performing laparoscopic cholecystectomy was 32.7% (187/572) is much lower than reported in other publications (upts 94%). Delay in replacing the corrupted instruments, lack of regular surfacing of the capital equipment, unavailability of regional training centres and deficient financial support were the obstacling factors that inhibit the surge of enthusiasm of current surgical trainees. Patient, also, must share in the cost of the procedure. Attitude and temper of senior surgeons prefer to teach the junior grades open cholecystectomy until they sufficiently competent to perform the procedure as the principle surgeon first.

In this study, the conversion rate from LC to OC was 11.2% is similar to that reported in other publications [11-13-15]. The open operations were difficult in patients converted.

There was a significant increase in frequency of short-

incision cholecystectomy 57%. The incision length was tailored to the individual patient and kept to the minimum necessary to allow safe and adequate access to the gallbladder. If safety is questioned the mini-incision should be converted to a formal incision. This occurred in (2.5%) 8/326 in whom dense adhesion, obesity and abnormal anatomy were the cause.

Conventional open cholecystectomy remains frequent, safe and effective procedure applicable to almost all patients and extensive experience with this time-honored operation makes it the standard with which all other procedures must be compared. Its frequency in this study was 15.4% (88/572) and it was performed in certain situations: emergency [14], Converted cases (21+8) and when additional procedure was added (common bile duct exploration [13], appendectomy [23] and repair of Para umbilical hernia [9]. Thus we are in agreement with other studies [12-13-15-] that conventional cholecystectomy still the procedure of choice in difficult or complicated cases. Common bile duct exploration is attempted laparoscopically in some untis[16]. However, this not our hospital's practice because endoscopic clearance is successful in most of cases (36/49) 73.5 %, with few complications similar to that reported in other studies [15-17]. Correction of Mirizzi's Syndrome is technically difficult and, although Laparoscopic methods have been described [18], few surgeons are likely to attempt it.

The mean operating time of Laparoscopic cholecystectomy (104 minutes) was significantly longer than for open cholecystectomy (66 minutes). It was also apparent that the variability in operating time was considerably greater for laparoscopic (range 50:175) than for open surgery (rang 45-105).

However, most of these procedures were used to teach junior grades at multiple open staff hospitals with multiple senior surgeons. These findings are in agreement with other studies[14-19].The duration of hospitalization and sick leave varies because of factors such as concomitant disease, tradation, attitude of the patient and economic incentives. The hospital stay after conventional cholecystectomy was 6.1 days in the USA[20], reduced to 3.1 days with a mini-Laparotomy technique[19-21], but some studies, surprisingly, reported 2.3 days after conventional cholecystectomy[12]. Hospitalization after laparoscopic cholecystectomy was 3 days in large European series[22 although editorials in surgical journals[23] amd media publicity have led to impression that most patients undergoing LC are go to home the next day after surgery.

In this study, the mean time of hospital stay was 2.4 nights in LC versus 2.7 nights in open cholecystectomy.

Determinants of return to work are subjective and influenced by the attitudes of patients. Sick leave period (18.6 days) has been reported with minilaparotomy technique[13-19]. Sick leave could probably be further reduced with laparoscopic operation to about one week[2]. The mean duration of sick leave in this study was significantly less (14 days) after LC versus 20 days of after open cholecystectomy (which is statistically signifnicant.) This may be due to inclusion of cases underwent conventional cholecystectomy. The postoperative demand for analgesics shows substantial reduction after LC versus OC as reported in many publications[12-21-24]. In this study , there was a significant reducatin of pethidine consumption after LC versus OC in the 1st and 2nd 24-h hours postoperatively.

Unfortunately, LC is associated with a higher incidence of bile duct injury [25]. However the incidence of bile duct injury is strongly related to the experience and recently a decrease in bile duct injury has been reported [23]. In the present study, biliary complications with LC or OC were in agreement with other publications [12-21-24]. There was no significant difference in the overall Postoperative complications between LC (8.6%) and OC (9%) apart from significant reduction in pulmonary complicatiens after LC (4.1%) versus (2.1%) after OC. It has been postulated that less wound discomfort might result in better postoperative pulmonarary function after LC [24]

Intraoperative gallbladder rupture occurred in 17% (32/187) of patients underwent LC with no harmful sequelae. The spillage and loss of gallstones into the peritoneal cavity is a relatively common event occurring during LC and has generally been thought to be of the consequence. However as the experience with LC accumulates, Sporadic reports of non biliary complications have been established.

Graham et al[26] reported a case of abdominal wall sinus formation secondary to gallbladder perforation and stone spillage occurring duing LC.

Posta[27] reported a case of postoperative gangrenous peritonitis after LC, a new complication for a new technique.

Lutkin at al., [28] reported a rare complication in a patient with a persistent uracus who, 9 months after LC with intraperitoneal spillage, started to pass gallstones when urinating. Vadlamudi et al[29]. reported cholelithiasis of the overy in a 30 year – old women, who underwent diagnostic laparoscopy for infertility 20 months following LC.

Petit et al., [30] reported the first case of obstructive cholangitis after LC related to intra peritoneal retained gallstones. We conclude that efforts should be concentrated on avoiding the spillage of stones during surgery.

CONCLUSION

This retrospective study showed there is a change in the concept of cholecystectomy procedure, from conventional open route to safe minimal access routes, among surgeons of different grades in different hospitals. The preferred choice was laparoscopic route, but unavailability of equipments and facilities, regional training units and financial support sometimes inhibit the enthusiasm of current surgical trainees for laparoscopic route. Its frequency was gradually increasing.

The practical choice was " short- incision open Route" which was regarded as a good ulternative of laparoscopic route in case of unavailability of equipments and facilities. It was the commonest procedure in our hospitals Conventional open route, "Gold standard", remains frequent ,more safe, applicable to almost all cases particularly (in this study) difficult or complicated cases, emergency, converted cases and when additional procedure was planned.

Laparoscopic route appears to be superior to small incision route in elective cholecystectomy in termes of less postoperatve pain (assissted by analgesic consumption) early convalescence and less pulmonary complications.

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