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A STUDY ON SAFETY AND EFFICACY OF LAPAROSCOPIC CHOLECYSTECTOMY IN COMPARISON TO OPEN CHOLECYSTECTOMY

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ABSTRACT: INTRODUCTION: After the introduction of laparoscopic cholecystectomy it has become the procedure of choice for the removal of gall bladder. The advantages of laparoscopic cholecystectomy cited were the avoidance of large incision, shortened hospital stay and earlier return to work. **AIM:** This study was conducted in an effort to determine if these proposed advantages could be achieved in practice and also to compare duration of surgery, complications, postoperative recovery, hospital stay and patient satisfaction in both groups. **MATERIALS AND METHODS:** This was a prospective clinical study done in our rural hospital consisting of 60 patients undergoing cholecystectomy randomized in two groups – 30 patients in group A (Laparoscopic cholecystectomy) and 30 patients in group B (Open cholecystectomy) is undertaken to compare efficacy, safety and patient satisfaction between these two procedures. The statistical analysis used was Chi-square test, Fischer Exact test and student 't' test wherever applicable. **RESULTS:** Females were the main sufferers of gallbladder disease in our study. The duration of surgery was almost equal in both groups in our study. Though overall complications were more in the open group there was one case of bile duct injury in the laparoscopic group and one case was converted to open due to major bleeding. The postoperative pain was less and patients tolerated orally earlier when compared to open group. The patients undergoing laparoscopic cholecystectomy were discharged earlier and resumed their normal work earlier when compared to open cholecystectomy group. **CONCLUSION:** The study supports the view that laparoscopic cholecystectomy is safer and efficacious and offers definitive advantages over open cholecystectomy and should be the available option for all patients requiring elective cholecystectomy.

KEYWORDS: Open cholecystectomy; Laparoscopic cholecystectomy; Bile duct injuries; Resumption of oral intake; Duration of surgery; Hospital stay; Return to work.

INTRODUCTION: Benign diseases of the biliary tract are one of the most common surgical problems in the world. Gallstones especially, affect millions.¹ Surgery plays an important part in the treatment and over half a million cholecystectomies are performed worldwide.²

Cholecystectomy was the universal standard for the treatment of symptomatic cholelithiasis. The first open cholecystectomy was performed in 1882. The operation became the most common surgical treatment performed for calculous biliary tract disease because it alone ensures permanent cure.

Since its introduction in France, laparoscopic cholecystectomy has become the treatment of choice for symptomatic cholelithiasis.³ This postulated advantages of laparoscopic cholecystectomy are the avoidance of large incision, shortened hospital stay and earlier return to work.⁴

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Our purpose in this study is to compare results after cholecystectomy using a laparoscope to that using standard open technique, in an effort to determine if these proposed advantages could be achieved in practice.

MATERIALS AND METHODS: This was a prospective study of 60 patients treated with cholecystectomy (30-open and 30-laparoscopic) in our rural hospital. All patients with acute cholecystitis, chronic cholecystitis, cholelithiasis, empyema, mucocele and gangrenous gallbladder were included in the study. Patients with choledocholithiasis, carcinoma of gallbladder, perforated gallbladder were excluded from the study.

All the patients were admitted and a detailed history and clinical examination was carried out. The choice of operation in each case is decided by patient's choice by explaining both procedures and the preference of the surgeon in each case. Patients opting for laparoscopic cholecystectomy were explained the possibility of conversion to open cholecystectomy. Cases that had encountered difficulty during laparoscopic cholecystectomy were converted to open but were included into laparoscopic group.

Preoperatively patient's history was assessed and careful emphasis was given to record the physical findings, particularly icterus, tenderness in right hypochondrium and gallbladder lump. Laboratory testing and USG of gallbladder and CBD was done. CBD stone was ruled out by USG.

A thorough preoperative anesthetic evaluation was done and patient fitness for general anesthesia assessed. A dose of antibiotics (usually a cephalosporin with Metronidazole) was given 4 hours before surgery. A nasogastric tube and Foley's catheter were inserted routinely. Operative step, duration, intra and postoperative complications were noted in detail and tabulated.

Injectable antibiotics and analgesics were given for 2-3 days postoperatively. Then they were given orally for another 3 days. Patient was started orally between 24-48 hours post-surgery in most cases. Sutures were removed usually by the 7th or 8th day. The patient was reviewed on the 7th day and 21st day after discharge. Follow up was done for a period of 6 months whenever possible.

At the end of the study, comparison of results was made between open and laparoscopic cholecystectomy.

RESULTS: A comparative clinical study of 60 patients with biliary tract symptoms who were admitted to the surgical inpatient ward in our hospital underwent cholecystectomy.

Total no. of cases – 60

No. of laparoscopic cholecystectomy – 30 (group A)

No. of open cholecystectomy– 30 (group B)

Comparison was made between open and laparoscopic cholecystectomy regarding:

- Criteria for selection and indication for surgery
- Duration of surgery
- Complications
- Resumption of oral intake
- Hospital stay
- Return to normal work
- Patient satisfaction

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The results were analyzed and conclusions were drawn.

The peak age group affected with gallbladder disease is in the 3rd, 4th and 5th decades of life in both groups accounting for nearly 66% of the cases. The mean age of patients in both groups was around 44 years (Fig. 1). There was a female preponderance in both groups with 60% of patients being female in Group A and 73.3% patients being female in group B (Fig. 2).

Fig. 1: Age distribution chart

Fig. 2: Sex distribution chart

The most common indication for open cholecystectomy was cholelithiasis (53.3%). In the laparoscopic group both cholelithiasis and acute calculous cholecystitis were the most common causes (Table 1). The duration of procedure in laparoscopic group is counted from insertion of Veress needle to the port site suturing and in open cholecystectomy group from skin incision to skin suturing. The duration of procedure ranged from 50-65 min in both groups with a mean duration of surgery slightly more in open group with no statistical significance (Fig. 3)

Diagnosis	Group A (n=30)	Group B (n=30)
A. Acute Calculous cholecystitis	12	9
B. Cholelithiasis	12	16
C. Acalculous cholecystitis	1	1
D. Chronic cholecystitis	5	3
E. Mucocele	-	1

Table 1: Indication for Cholecystectomy

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Fig. 3: Duration of surgery in minutes

Overall increased percentage of complications are present in the Group B with $p=0.080$. Bile duct injuries were seen in group A and minor complications namely chest and wound infections are more common in Group B. One case was converted to open in Group A due to major bleeding. There was one case of bile duct injury in Group A (laparoscopic group) which was later explored and successfully managed by hepatico-jejunostomy (Table 2).

Complications	Group A (n=30)	Group B (n=30)
Absent	25 (83.3)	19 (63.3)
Present	5 (16.7)	11 (36.7)
Major complications		
Bile duct injuries	1 (3.3)	-
Major bleeding	1 (3.3)	1 (3.3)
Minor complications		
Chest infection	1 (3.3)	5 (16.7)
Gallstone spillage	1 (3.3)	-
Wound infection	1 (3.3)	5 (16.7)

Table 2: Complications

More than 50% of the patients in open cholecystectomy group had moderate to severe postoperative pain, whereas most of the patients in the laparoscopic cholecystectomy had mild pain (Table 3).

Post-op pain	Group A (n=30)	Group B (n=30)	p value
Mild	19 (63.3)	12 (40.0)	0.071
Moderate	9 (30.0)	14 (46.7)	0.184
Severe	2 (6.7)	4 (13.3)	0.389

Table 3: Post-operative pain

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Resumption of oral intake was significantly earlier in group A when compared to group B (Fig. 4). Patient's in group A had significantly shorter stay in hospital and were able to resume their normal work earlier when compared to patients in group B with $p < 0.05$ (Table 4). Significant number of patients responded with good to excellent grading ($>75\%$) in terms of satisfaction when compared to those patients in group B (56.7%) (Fig. 5).

Fig. 4: Resumption of oral intake

Hospital stay / return to normal work	Group A (n=30) (Mean $\pm$ SD)	Group B (n=30) (Mean $\pm$ SD)	p value
Hospital stay in days	4.27 $\pm$ 1.55	7.33 $\pm$ 3.69	0.000**
Return to normal work in days	4.27 $\pm$ 4.21	12.07 $\pm$ 4.79	0.000**

Table 4: Hospital stay and return to normal work

Fig. 5: Patient's Satisfaction

DISCUSSION: Cholelithiasis has plagued mankind for over 2000 years.⁵ Nonetheless, the treatment for symptomatic gallstone disease remained relatively primitive and ineffective until the late 1800s.⁶ Traditionally, open cholecystectomy has been the gold standard for all patients with symptomatic gallstone disease.⁷

In 1882, Karl Langenbunch, a noted German surgeon performed the first successful cholecystectomy.⁸ In 1987, Philippe Mouret performed the first laparoscopic cholecystectomy in a

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human.^{9,10} Almost simultaneously Mc Kernan and Saye performed the first laparoscopic cholecystectomy in the United States in 1988.¹¹ The first laparoscopic cholecystectomy in India was performed in 1990 at the JJ Hospital, Mumbai, followed by few months later in Pune by Dr. Jyotsna Kulkarni.¹²

Within a short span of five years laparoscopic cholecystectomy has surpassed conventional cholecystectomy as procedure of choice for diseases of gallbladder.¹³

The main sufferers of gallbladder disease in our study were females as compared to males due to the fact that pregnancy and childbirth acting by causal stasis as well as weight gain and hypercholesterolemia. Out of total 60 cases, 20 cases were males, which are very much similar to those observed by Fraze and others⁷ and U. Berggren and others.¹⁴

No age is said to be immune to gallbladder disease, however they were more common in the third, fourth and fifth decades of life as 60% of the cases belonged to these decades. Workers like Thomas B Hugh et al,¹⁵ R Schmitz et al¹⁶ have reported a similar peak incidence in the 4th and 5th decade.

The duration of surgery was almost equal at 58.83 minutes in laparoscopic group compared with 59.17 minutes in open group. Other studies quoted Sooper et al¹⁷ 95 minutes for laparoscopic and 122 min for open.

The overall rates of complications were more in the open group. The most common complications found were wound and chest infections (seen almost exclusively in open group). But major complication like bile duct injury was seen in laparoscopic group. Major bleeding was seen in one case each of open and laparoscopic group. No mortality was seen in our study in both groups. Comparison of complications with other studies is mentioned below.

	Bile duct injuries	Major bleeding	Chest infection	Wound infection	Vomiting	Fever
Our study						
Open	-	1 (3.3%)	5 (16.7%)	5 (16.7%)	-	2(6.7%)
Laparoscopic	1 (3.3%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	3 (10%)	
Alfred Cuschieri et al¹⁸						
Open	-	5%	2%	1%		
Laparoscopic	10.1%	4%				
Hieronimos PJD et al¹⁹						
Open			4%	9%		
Laparoscopic			1%			
Luster F Williams et al²⁰						
Open			12%	7%		
Laparoscopic	3%		0.5%	1%		
Jerry M Gilliland et al²¹						
Open			2%	9%		
Laparoscopic			0.5%	1%		
Bruce M Wolfe²²						
Open			5%	2%		
Laparoscopic	2%	1%				

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Patients undergoing laparoscopic cholecystectomy had less postoperative pain (mild to moderate) when compared to those undergoing open cholecystectomy (moderate to severe). In a similar study conducted by Hieronymus PJD et al²³ similar findings were seen.

Compared to our series, the study conducted by U. Bergen et al and Sooper et al showed a postoperative hospital stay of 1.8 days and 1 day respectively which is much shorter than seen in our study. Studies by Jeffrey S Berken,²⁴ Ahmed Assalea,²⁵ A W Majeed et al²⁶ and Tuula Kivilvoto et al²⁷ also showed a much shorter stay in both groups. The reason for longer stay in our hospital could be that even though many of our patients could have been suggested discharge earlier, because most of our patients were from rural background they insisted on staying till sutures were removed and hence majority of cases discharged after a week. Another important reason could be postoperative wound infection.

Only one case was converted into open surgery making it comparable with the conversion rate in other studies. The main reason for this could be that the surgeons doing laparoscopic surgeries in our hospital have been doing it for the past 3-5 years.

Fig. 6: Subcostal incision in open

Fig. 7: Exposure of gallbladder cholecystectomy

Fig. 8: Ligation of cystic duct

Fig. 9: Ligation of cystic artery

Fig. 10: Insertion of ports in laparoscopic cholecystectomy

Fig. 11: Transection of cystic duct

Fig. 12: Gallbladder after cholecystectomy

CONCLUSION: The results support the view that laparoscopic cholecystectomy is a safe and justified replacement for open cholecystectomy. There is a definite learning curve for surgeons who are newly exposed. The complication rate reduced as the surgeons become more experienced in this procedure comparable with that of open cholecystectomy.

Laparoscopic cholecystectomy was safe with less postoperative morbidity associated with faster patient recovery and satisfaction as documented by less postoperative pain, earlier resumption of oral feeds, earlier full mobilization and discharge home, as well as early return to work.

In conclusion, the study supports the view that laparoscopic cholecystectomy is safer and efficacious and offers definitive advantages over open cholecystectomy and should be an available option for all patients requiring elective cholecystectomy.

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