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A comparative study between laparoscopic and open cholecystectomy in cases of cholecystitis with cholelithiasis: one year experience in tertiary care center

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ABSTRACT

Background: Gall stones are a major cause of morbidity all over the world. Until the end of 1980's, open cholecystectomy was the gold standard for treatment of stones in the gall bladder. Laparoscopy has revolutionized surgery causing a re-evaluation of treatment strategies including cholecystectomy, however, it is not completely devoid of pitfalls. This study was undertaken to determine whether laparoscopic cholecystectomy can be recommended over open cholecystectomy as the procedure of choice for the treatment of cholecystitis with cholelithiasis.

Methods: This study included a total of 100 patients in the age group 20-70 years diagnosed as calculous cholecystitis on ultrasonography and admitted to the surgical wards of Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India between November 2014 to October 2015. They were divided into two groups. Group I (n = 50) who underwent laparoscopic cholecystectomy and Group II (n = 50) who underwent open cholecystectomy. **Results:** A comparison of the two groups showed that the duration of surgery was significantly more in Group I (mean 52.32 minutes) as compared to Group II (mean 37.66 minutes) (p <0.001). There was <100 ml blood loss in the majority of Group I cases (94%), however, in Group II, majority had blood loss ≥100 ml (96%) (p <0.001). Mean duration of post-operative pain was 14.68 hours in group I and 27.92 hours in group II (p <0.001). Time taken to restoration of oral feeds, was less in group I (mean 11.68 hours) as compared to group II (mean 17.24 hours). Post-operative hospital stay was a mean of 1.18±0.52 days in Group I and a mean of 4.78±1.42 days in Group II (p<0.001). The time taken for resumption of normal activity was two days and three days (p <0.001) in group I and II respectively. In Group I, average cost of treatment was rupees 10870, but in Group II it was significantly more at

Conclusions: Laparoscopic cholecystectomy as a surgical procedure can be recommended over open cholecystectomy in carefully selected patients of gall stone disease.

Keywords: Calculous cholecystitis, Laparoscopic chlolecystectomy, Open cholecystectomy

INTRODUCTION

rupees 12152 (p = 0.007).

Prevalence of gallstone ranges from 10 to 20% in India.¹ It affects nearly 4.3% of the population.² Earlier open cholecystectomy was the gold standard for treatment of

stones in the gall bladder. Most studies now suggest that laparoscopic cholecystectomy is the standard surgery for symptomatic gall stone disease. It has improved patient satisfaction in terms of early post-operative pain relief, need for post-operative analgesia, hospital stay, total cost and return to normal activity when compared to open cholecystectomy.³

However, there are certain pitfalls of laparoscopic cholecystectomy. Three-dimensional depth perception are limited by the two-dimensional monocular image. It is more difficult to control significant hemorrhage in the surgical field.⁴ There is less discrimination of structures using laparoscopic instruments as compared to direct digital palpation during open cholecystectomy.⁵ A number of studies have reported that laparoscopic cholecystectomy takes a longer time to complete than open surgery.6 In cardiac patients or in those where anesthesia general is contra indicated. cholecystectomy can be carried out in regional anesthesia. Carbon dioxide insufflation in such patients may cause cardiac arrhythmias.7 The most troublesome complication in laparoscopic cholecystectomy continues to be bile leak and bile duct injuries. The success rate of laparoscopic procedures is directly proportional to the learning curve of the operating surgeon. Laparoscopic procedures also require a higher cost setup as compared to open procedures and warrant precise knowledge and expertise.8 Thus in many low resource settings and at grass route levels especially in countries like India open cholecystectomy is still the preferred approach.9

With this knowledge of advantages and disadvantages of laparoscopic cholecystectomy and open chlolecystectomy in symptomatic cholelithiasis, further studies are necessary to provide conclusion as to which method is safer, cost effective and provides better patient satisfaction. The present study was carried out for this very purpose. Aim of the study was to make a comparison between laparoscopic cholecystectomy and open chlolecystectomy in symptomatic cholelithiasis in respect to duration of surgery, blood loss during surgery, post-operative discomfort and pain, period of hospitalization, cost effectiveness and patient satisfaction.

METHODS

This study included all symptomatic patients in the age group 20-70 years diagnosed as calculous cholecystitis on ultrasonography admitted to the surgical wards of Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India from November 2014 to October 2015 and who underwent laparoscopic or open chlolecystectomy for the same.

All patients were interviewed for a detailed clinical history. Physical examination was conducted according to a definite proforma. Patients were investigated by a complete blood count, urine examination, liver function tests, X-ray chest and abdominal ultrasonography.

The total of 100 patients enrolled in this study were divided into two groups. Group I (n=50) being patients who underwent laparoscopic cholecystectomy and Group II (n=50) being patients who underwent open

cholecystectomy. All patients were operated under general anesthesia. Patient were informed and detailed about both the procedures and were free to choose any procedure. This study was approved by Institutional Ethical Committee. Informed consent was obtained from all the participants.

Inclusion criteria

Symptomatic patients with cholelithiasis diagnosed on ultrasonography, in the age group 20 to 70 years, who underwent laparoscopic or open cholecystectomy for the same.

Exclusion criteria

Patient's age below 20 years and those above 70 years, History or investigations suggesting choledocholithiasis, gall bladder mass, mucocele, empyema, portal hypertension, cirrhosis of the liver, history of coagulopathy, pregnancy, patients who were converted from laparoscopic to open cholecystectomy.

Outcome variables of interest

Duration of surgery: Total duration from making the skin incision to closure of the incision.

Blood loss during surgery: Blood loss during open cholecystectomy was estimated by gravimetric method by swab weighing. In laparoscopic cholecystectomy we first measured the volume of irrigation fluids and subtracted this volume from the fluid collected in suction bottles to estimate the final blood loss.

Post-operative pain: Post-operatively each patient was given similar analgesics and the duration of pain was calculated in hours.

Period of hospitalisation-in days

Cost factor involved: The cost factor included cost of investigations, operative charges, and medication expenses till the time of discharge.

Patient satisfaction: Patient's satisfaction was assessed on the following points: Post-operative pain, complications, duration of hospital stay, total expenses, and return to normal work.

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 22.0 statistical analysis software. The values were represented in number, percentage (%) and means.

RESULTS

Age of patients ranged from 20 to 70 years. The mean age was 41.30±12.01 years in both the groups. Majority of patients were females (82%), from rural areas (81%)

and were housewives (80%). Statistically, there was no significant difference between the two groups with

respect to any of the demographic characteristics (p>0.05) Table 1.

Table 1: Demographic profile of patients in the two groups.

Characteristic	Mean±SD	Group	I(n = 50)	Group	II $(n = 50)$	Statistical	significance	
		Mean±	Mean±SD		Mean±SD		'р'	
Age in years	41.30±12.01	39.16±	39.16±11.43 43.44±12.31		12.31	t = 1.802; $p = 0.075$		
Residence	No. and %	Group I (n = 50)		Group II (n = 50)		Statistical significance		
		No.	%	No.	%	χ^2	'р'	
Rural	81(81%)	38	76.0	43	86.0	1.624	0.202	
Urban	19(19%)	12	24.0	7	14.0	1.624	0.202	
Gender	No. and %	Group	Group I $(n = 50)$		Group II $(n = 50)$		Statistical significance	
		No.	%	No.	%	χ^2	' р'	
Male	18(18%)	11	22.0	7	14.0	01.004	0.20	
Female	82(82%)	39	78.0	43	86.0	81.084	0.29	

Table 2: Comparison of duration of procedure in the two groups.

Group	Minimum	Marinum	Maan (minutas)	SD	Statisti	Statistical Significance	
		Maximum	Mean (minutes)		't'	'р'	
I(n = 50)	30 min.	90 min.	52.32	13.33	7.31	<0.001	
II $(n = 50)$	35 min.	56 min.	37.66	4.94	7.51	< 0.001	

Table 3: Comparison of outcome variables between the two groups.

Outcome variables	Group I (n = 50) mean	Group II (n = 50) mean	Statistical significance	
Post- op pain (hours)	14.68	27.92	t = 8.566	P = 0.001
Duration of hospital stay (days)	1.18	4.78	t = 16.24	< 0.001
Average expenses (rupees)	10870	12152	t =- 3.817	< 0.001
Return to work (days)	2.76	6.32	t = 9.509	< 0.001

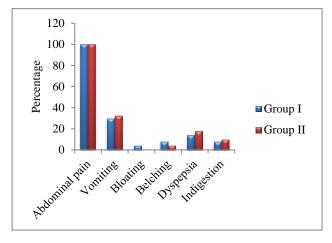


Figure 1: Presenting complaints of patients in the two groups.

Abdominal pain was the most common presenting complaint (100%) followed by vomiting (31%), dyspepsia (16%), indigestion (9%) and belching (6%). There were two (2%) patients who complained of bloating. Statistically, there was no significant difference

between the two groups with respect to complaints (p>0.05) Figure 1.

All the liver function parameters were equally matched between the two groups and did not show any significant difference (p >0.05). Duration of the procedures ranged from 35 to 90 min in group I (mean 52.32 ± 13.33) and 30 to 56 min (mean 37.66 ± 4.94) in-group II. Statistically, this difference was significant (p <0.001) Table 2. There was<100 ml blood loss in 94% of Group I cases; however, in Group II, 96% had blood loss \geq 100 ml (96%). This difference was also statistically significant (p <0.001). Mean duration of post-operative pain was 14.68 ± 6.14 hours in Group I and 27.92 ± 9.04 hours in Group II. (p<0.001). The mean time taken to restore oral feeds was 11.68 ± 2.98 hours in Group I and 17.24 ± 5.85 hours in Group II (p <0.001).

Postoperative complaints of abdominal distension, vomiting, jaundice and wound infection were documented in both the groups. These complaints were considerably less in Group I with a significant statistical difference (p <0.01) Figure 2.

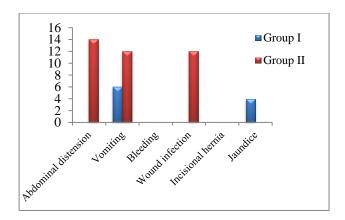


Figure 2: Post-operative complications.

In Group I, 64% of patients returned to normal work within 2 days, (mean being 2.76 days) but in group II, the mean was 6.32 days. Statistically, this difference was also significant (p <0.001). In Group I, the average cost of treatment was rupees 10870, but in Group II the average cost was rupees 12152. Statistically, this difference was significant (p = 0.007).

DISCUSSION

In the present study, the mean age of the patients was 41.3 years and the majority of the patients were females (82%) from rural areas (81%). Housewives accounted for (80%) of all female patients. The age and gender profile of patients enrolled in the present study resembled that reported by Al- Otibi and Al-Junaid who reported the mean age of patients to be 46.1 years and found that 81% of their patients were women. 10 The higher proportion of rural patients in the present study might be attributed to the geographical location of our hospital rather than epidemiological differences. As far as distribution of patients was concerned the two groups were matched statistically, thus demographic profile had no perceived confounding effect on the study outcome. Statistically there was no significant difference between the two groups with respect to hemodynamic and hematological profile.In the present study, mean duration of the procedure was shorter in the open (37.66±4.94 min) group compared to that in the laparoscopic cholecystectomy group (52.32±13.33 min). In a study conducted by Karim T et al. on 100 patients of cholelithiasis aged between 25 years to 65 years, the mean operating time of 103.98 minutes for laparoscopic cholecystectomy was significantly greater than a mean of 70minutes for open cholecystectomy (P < 0.001).¹¹

A majority of cases in the laparoscopic surgery group had <100 ml blood loss (94%), whereas a majority of cases in the open surgery group had blood loss ≥100 ml (96%). Laparoscopic cholecystectomy, owing to its minimal invasive nature has less blood loss during the procedure. These findings are also consistent with the study conducted by Poggio JL et al on 100 patients who underwent cholecystectomy for treatment of symptomatic

gallstones by either of the two methods, Intra-operative bleeding was higher in the open group when compared with the laparoscopic group (p = 0.043).¹²

In the present study duration of post-operative pain was 14.68±6.14 hours in Group I and 27.92±9.04 hours in significantly less in laparoscopic II, cholecystectomy. Laparoscopic surgery being minimally invasive procedure affects a limited tissue area and hence resultant pain is less. Almost all the studies reported lesser pain in laparoscopic surgery as compared to open surgery. In a study, Doke A, Gadekar N et al found that the need for analgesics was more in open cholecystectomy than in laparoscopic cholecystectomy.¹³ Similar results were demonstrated by Karim T et al in over 100 patient of cholecystectomy. In our study, postoperative duration of hospital stay was 1.18±0.52 days in Group I as compared to 4.78±1.42 days in Group II. Statistically, this difference was significant. Shorter hospital stay remains the main advantage of the laparoscopic cholecystectomy procedure. A study conducted by Anmol N et al showed the same results. 14 In this study the median duration of hospital stay was three days for laparoscopic cholecystectomy group and seven days for open cholecystectomy group. Proportion of patients with wound infection and abdominal distension was significantly higher in open surgery as compared to laparoscopic surgery. In previous studies too, postoperative morbidity rates were reported to be higher in open surgery as compared to laparoscopic surgery. A study by Coccolini et al on over 1248 patients 677 of laparoscopic and 697 of open cholecystectomy reported that the post-operative morbidity rate was half for laparoscopic cholecystectomy compared to open cholecystectomy. 15 Early return to normal occupational activities has been reported to be a key characteristic of laparoscopic surgery in different studies. Our studies was similar to studies conducted by Antoniou SA, Koch OO et al and Saeed T, Zarin Met et al who found that patients who underwent laparoscopic cholecystectomy could return to their routine faster (3.12±0.48 days) when compared to the open procedure (6.86±1.62 days). 16,17 In the present study, mean cost of treatment was significantly higher in the open group compared to laparoscopic group. Fajardo R et al and Solanki et al in their study also found laparoscopic cholecystectomy to be more cost effective. 18,19 The variability in costeffectiveness in different studies might be attributed to difference in structure of indirect costs. These indirect costs include factors such as, per day bed cost of hospital, cost of absenteeism from occupation, cost of attendant and caregivers and cost of post-operative medication. These costs vary substantially in different environments. The level of satisfaction was significantly higher in the laparoscopic cholecystectomy group. This higher patients satisfaction of in the laparoscopic chlolecystectomy group is attributable to shorter duration of hospital stay, lower rate of complications, early return to work and routine activities.

The findings in the present study showed that in a strictly controlled sampling frame, laparoscopic cholecystectomy is a viable, less complicated, more effective and more satisfactory procedure that shortens the hospital stay and assures early return to work. However, the usefulness of laparoscopic surgery in a variable profile of patients needs to be evaluated further.

CONCLUSION

The present study was carried out with an aim to determine which of the two procedures laparoscopic cholecystectomy or open cholecystectomy is more effective in the treatment of calculous cholecystitis. On the basis of the above results, it could be concluded that laparoscopic cholecystectomy is an easy to perform, less time-consuming procedure, with low complication rates as compared to open cholecystectomy. It also confers an advantage of a shorter hospital stay and early return to work as compared to the open procedure. Hence laparoscopic cholecystectomy as a surgical procedure can be recommended over open cholecystectomy operation in carefully selected patients of gall stone disease.

Limitation in the study that, it was conducted in patients of gall stone disease using strict inclusion criteria and therefore not representative of the entire spectrum of patients with the disease.

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Ethical approval: The study was approved by the

 $institutional\ ethics\ committee$

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