

Original Research Article

Open versus laparoscopic cholecystectomy: a comparative study on patient parameters

Anurag Pateriya, Mathura Prasad Agrawal, Surendra Kumar Samar*

Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India

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*Correspondence:

Dr. Surendra Kumar Samar,

E-mail: drsuresndrasamar@gmail.com

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ABSTRACT

Background: The advent of laparoscopic surgeries have heralded a giant leap for minimally invasive surgeries and are now being used as a primary modality due to its various benefits. The use of laparoscopic surgeries has been limited only by patient related factors and in certain scenarios by lack of infrastructure availability. The present study aimed to provide a comparative review of the traditional and minimally invasive modalities.

Methods: The study employed a comparative prospective randomized study model with 100 subjects divided in two groups based on modality employed. The operative and post-operative parameters were noted and presented.

Results: The study displayed that the advent of post-operative complications as well as hospital stay duration was higher in traditional laparoscopic cholecystectomy cases.

Conclusions: The study reiterated the long known fact that laparoscopic surgeries in gall stones is favorable from the patient perspective but is riddled with unavailability due to financial and infrastructure based concerns.

Keywords: Comparative, Cholecystectomy, Laparoscopic, Open method

INTRODUCTION

Cholecystectomy is the process of surgical removal of the gallbladder indicated by reason of symptomatic gallstones and other gallbladder conditions. It was Carl Johann August Langenbuch who performed the first cholecystectomy procedure in 1882 on a 43 year old man who was diagnosed with gallstones since almost 16 years and established cholecystectomy as an accepted modality for management.¹ From then onwards, open cholecystectomy (OC) was considered as the best treatment modality along surgical lines for gall stones till the late 1980s, when a French researcher, Philip Mouret successfully performed the first laparoscopic cholecystectomy (LC) on an adult subject in 1987.²

Presently, LC enjoys the status of being a safe, reliable and routine procedure, preferred by both surgeons and patients due to its minimal access technique which includes reduced postoperative pain, faster mobilization

of the patient, reduced hospital stay and better cosmetic results as compared to the open technique, which have further increased its applications.³

Epidemiologically speaking an estimated 20 million people in the United States of America have gallstones. Among these individuals, there are roughly 3 lakh cholecystectomies performed annually. An estimated 10% to 15% of the affected population round the world has asymptomatic gallstone disease which either remains hidden or manifests as an accidental finding. Among the 20% cases which are symptomatic, an estimated 1% to 4% will display complications associated with gallstones, such as cholecystitis, gallstone pancreatitis, choledocholithiasis, gallstone ileus etc.⁴

The incidence of gallstones is known to increase with an increase in age and demographic studies have demonstrated that females are more likely to have gallstones compared to males. It is estimated that

approximately 20% of women and 5% of men in the age bracket of 50 to 65 years have gallstones. Overall, 75% of gallstones are composed of cholesterol and the other 25% are pigmented. Despite the differences in composition of gallstones and the variance among genders, the clinical signs and symptoms of the disease manifest similarly.⁵

Despite its widely propagated advantages, the pitfalls of LC are also well known. The lack of three dimensional imaging can lead to a limited surgical view and a lower discrimination of organelles. It is an obvious contra indication for patients who cannot sustain or are permitted general anaesthesia. In patients with cardiac illnesses, the carbon dioxide insufflation can induce arrhythmias. Also the poor structural visualization can lead to the increased risk of hemorrhage and bile duct damage or leakage. Coupled with the elevated cost of equipment, the use of laparoscopic procedures in poorer set ups is a troublesome task.⁶⁻⁸

This led to the formulation of a plan for the present study, which aims to compare the LC and OC in parameters such as duration of procedure, blood loss and requirements, post-operative pain and analgesia, duration of hospital stay, financial load on patient and finally patient response. We hope to provide a conclusion that will advise on the effectiveness and possible use of a particular procedure, LC or OC as preferential for patients.

METHODS

The present study was a comparative prospective randomized study done in a period of one year from September 2019 to September 2020 in the department of general surgery of Pacific institute of medical sciences, Udaipur, Rajasthan. The research proposal was submitted and approved by research committee and institutional ethics committee prior to commencing the study.

The study was done among the outpatient and inpatient wards of the hospital.

Inclusion criteria

Inclusion criteria for the study was age above 20 and below 70 years, radiological confirmation of gall bladder calculi done by ultrasonography, individuals who have provided a written valid consent for inclusion in the study. Only elective cases were included.

Exclusion criteria

Individuals refusing consent or unable to provide valid consent, emergency cases requiring surgery, cases with history of previous abdominal surgery in past year, individuals with associated co morbidities like cancers, oesophageal strictures which can impair pain assessment were excluded from the study.

The subjects who consented to inclusion in the study were provided with a detailed participation information sheet explaining the need for the study and that their refusal for participation at any stage will not affect their treatment. The subjects were subjected to thorough history taking and general examination process. The routine investigations as well as radiology imaging were performed prior to the surgery. Other protocols were followed as per standardized regulations prevailing in the institution.

The study pool comprised of 100 subjects, divided in two groups of 50 subjects each. The division was done on the basis of the procedure to be employed for cholecystectomy viz LC or OC. Pre-operative checkups and admission were similar for both cases.

The duration of surgery was noted as the time from initiation of skin incision, up to the time till final closure of sutures. Pain was measured using a visual analog scale (VAS). Blood loss was calculated using gravimetric method by swab weighing. In LC it was measured by the volume of irrigation fluids and subtracted from volume from the fluid collected in suction bottles to estimate the final blood loss.

The details of the study parameters were filled in a MS excel sheet and subjected to statistical analysis in consultation with institutional statistician using SPSS version 12 software.

RESULTS

The study sample comprised of 100 adult subjects including 61 males and 39 females. The average age of the study subjects was 45.21 ± 14.6 years. There were statistically significant differences among the average age between males and females of the study population. The majority of the individuals ($n=72$) were from a rural residential area, while the rest of the subjects ($n=28$) were from urban area. The predominant occupation among the study subjects were agriculture and livestock related. Other professions included shopkeepers, mine workers and housewives or unemployed. Educational qualifications were predominantly high school level ($n=52$), with 27 subjects holding bachelor's degrees, while 21 were school dropouts.

The clinical presenting complaints of subjects was varied. Maximum had a chief presenting complaint of abdominal pain or discomfort, followed by nausea/vomiting, indigestion and dyspepsia (Figure 1). There was no statistical difference in the chief complaints between the two groups.

In terms of operative characteristics, it was evident that the blood loss was statistically higher in open cholecystectomy cases (Figure 2). The same was seen in total duration of stay and average pain scores among the subjects.

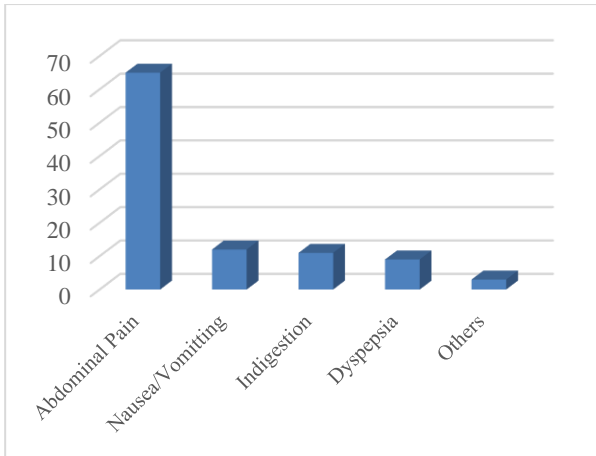


Figure 1: Chief complaints.

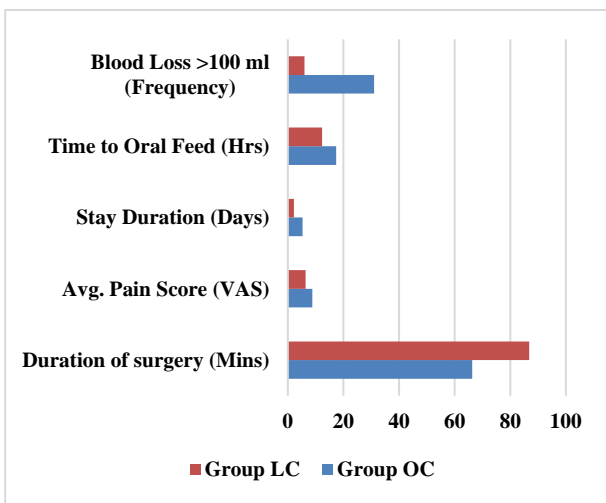


Figure 2: Operative parameters.

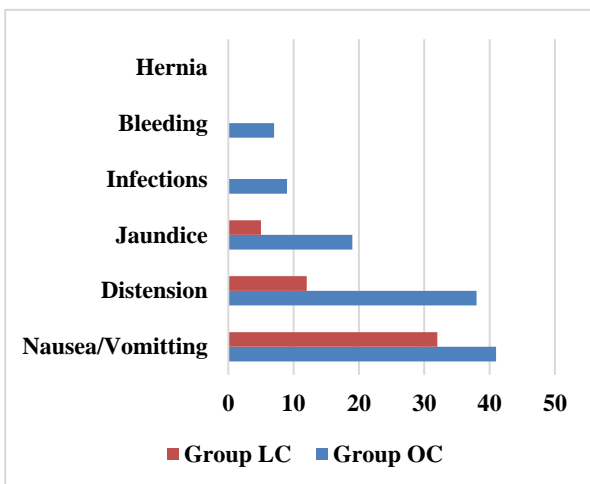


Figure 3: Post-operative complications.

The commonest post-operative complication observed was nausea and vomiting, followed by abdominal distension, jaundice, wound infection and bleeding. There was a statistically significant difference seen between

both the groups in the study. The complications were higher among the open cholecystectomy cases (Figure 3).

Financially, the cumulative average cost of OC was lower with a value of ₹12,145 as compared to LC having an average cost of ₹14,230. This was statistically significant. Patient response was variable as regards to the procedure. All patients were asked to submit a response on their operative and post-operative care and none of the subjects reported any adverse comments.

DISCUSSION

The present study was conducted with a study population of 100 subjects which were dominantly male. The disparity was due to the fact that in the study duration, the authors had a lower female turnout in outpatient wards. The mean age of the subjects was 45.21 years. This is in concurrence to studies reported by Doke et al and Shukla et al wherein the authors had a similar age group in their study sample.^{9,10} The notable difference is the fact that they had a more uniform distribution of males and females.

The commonest presenting complaint was abdominal pain and discomfort in both the groups. There was no statistically significant difference in the chief presenting complaints in our study. This is similar to studies by various authors, wherein the commonest complaints are abdominal pain and distension.⁸⁻¹²

The present study comprised mostly of individuals from a rural household, owing to the location of the institution, which is on the outskirts of the city and caters to the large rural populace in the vicinity.

The mean duration of surgery in the LC group was 86.8 minutes as compared to a lower time for open surgery which held at 66.3 minutes by average. This difference was statistically significant. The study shows a lower time in OC cases and is similar to studies by Doke et al, Shukla et al and Chattopadhyay et al wherein the authors reported a lower duration of surgery thought the difference in duration was varied.^{9,10,13} This variance can be attributed to surgeon skill and anaesthetic requirements. However the common denominator exists that all OC cases take a relatively lower time.

The average blood loss in OC cases was higher, with 31 subjects reporting a loss of over 100 ml blood compared to only 6 cases in LC group. This is in concurrence with studies by Shukla et al, Sheikh et al and Poggio et al.^{10,14,15} The authors in their studies reported a lower loss of blood. This is attributed to the fact that laparoscopy being a minimally invasive procedure is likely to have a lower blood loss.

The pain in the post-operative period was lower in LC groups as compared to the OC group, owing to the fact that being a minimally invasive procedure, the likelihood

of tissue damage is less. This in turn leads to lower pain score and reduces usage of analgesics as well as hastens recovery time. These parameters are consistent with studies by Doke et al, Shukla et al, Chattopadhyay and Karim et al who reported that the mean pain score, recovery time and time for resumption of normal activities was lower in case of LC as compared to traditional method.^{8,9,13,16}

The number of subjects with postoperative complications was higher in OC group in the present study. The commonest complication was nausea and vomiting, followed by distension and jaundice. The limiting factor was the fact that only OC group had features or complaints of wound infection. This is similar to studies by Anmol et al and Coccolini et al where the authors concluded that post-operative complications and morbidity was significantly lower in case of laparoscopic cholecystectomy as compared with the traditional open method.^{17,18}

CONCLUSION

The aim of the study was achieved in the fact that we were able to determine that despite the advantage of a lower cost and less surgical time, OC is not a very patient friendly procedure. With a higher rate of complications, an enhanced duration of stay, and more time required for resuming normal activities, this is definitely not a feasible option for many individuals. However, its necessity does arise in cases where access to minimally invasive surgery is hampered owing to infrastructural and skill availability issues. In rural India, access of high end healthcare is limited and if available is expensive. Here the OC does play a role in imparting a substitute.

Our study does suffer from limitations. Firstly the demographic sample is skewed in favor of males. Secondly, it would not be a true representative sample owing to its limited sample size, which we intend to overcome by undertaking a longer more substantive study with a broader sample size.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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