



## MICRO-LAPAROTOMY CHOLECYSTECTOMY COMPARED WITH LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMIZED STUDY

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### ABSTRACT

**Introduction:** Cholelithiasis constitutes a major portion of biliary disorders with conventional cholecystectomy being the commonest surgery for it, but there is an attempt towards miniaturization. As a result, mini-laparotomy, micro-laparotomy and laparoscopic approaches have been evolved. By laparoscopic cholecystectomy there is less pain, shorter hospitalization, fast recovery and a small scar. Micro-laparotomy cholecystectomy is an effective alternative to it its advantages being, decreased postoperative morbidity, short hospital stay, and decreased rate of bile duct injury. Also it is more cost effective as it obviates the need for sophisticated equipment and specialized training.

**Objective:** The aim of the study was to compare micro-laparotomy and laparoscopic cholecystectomy in terms of duration of surgery, intra/post-operative complications rate, post-operative pain, duration of hospital stay and cost of surgery.

**Materials and Methods:** A total of 400 patients with symptomatic cholelithiasis, were randomly and blindly allocated to undergo Laparoscopic cholecystectomy or Micro-laparotomy cholecystectomy.

**Results:** The operative time for laparoscopic and micro-laparotomy cholecystectomy was 35 vs. 32 minutes. Intra-operative gall bladder perforation rate was 30 vs. 2. Bile duct injury rate was 2 vs. 0. Post-operative rescue analgesia was required in 131 vs. 99 cases. Post-operative complications rate was almost similar. Mean duration of hospital stay for laparoscopic and micro-laparotomy cholecystectomy was 2.1 days and 1.8 days respectively. The cost of surgery for LC vs MLC was Rs 12,000 vs 4000 (INR).

**Conclusion:** Intra-operative complications rate is lesser with Micro-laparotomy cholecystectomy and it does offer a safe, low cost alternative to laparoscopic cholecystectomy.

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### INTRODUCTION

Biliary diseases constitute a major portion of digestive tract disorders worldwide, Cholelithiasis is the fore runner amongst these. Open Cholecystectomy has been the treatment of choice for symptomatic gallstones for many years. The first ever open cholecystectomy was performed by Carl Langenbach, in 1882. Although conventional cholecystectomy is the commonest surgery for gall stones. But as an attempt towards miniaturization, there has been evolution of, mini-laparotomy cholecystectomy, micro-laparotomy cholecystectomy, and laparoscopic cholecystectomy. Modern day Laparoscopic Cholecystectomy was described by Reddick and Olsen<sup>[1]</sup> in 1988. In Laparoscopic cholecystectomy, laparoscope is used for surgery, advantages being, Usual incision is avoided, shorter hospitalization, fast recovery, very small scar. The risks associated with Laparoscopic cholecystectomy include, Injury to CBD / Intestine, Higher cost, Longer learning curve.

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The term Micro-laparotomy cholecystectomy was suggested by Rozsos I. Sebeszeti, Osztaly es Pecci *et al*<sup>[2]</sup> in 1992, for 2 to 4cm transverse incision in right subcostal area [Figure 2,3]. In contrast to conventional open procedure in which all three abdominal wall muscles, including neurovascular bundles coming on the way, are cut, Micro-laparotomy cholecystectomy technique involves cutting/retraction of the rectus abdominis muscle without cutting any of the major cutaneous nerves leading to less post-operative pain. Micro laparotomy cholecystectomy is an effective alternative to Laparoscopic cholecystectomy, especially in centres where laparoscopic facilities are not available.

Micro-laparotomy cholecystectomy<sup>[2]</sup> may confer certain advantages, such as decreases post-operative pain and morbidity and rapid return to normal life, which are similar to those of Laparoscopic cholecystectomy, while avoiding the increased rate of bile duct injury associated with LC<sup>[6]</sup>. In addition, “micro-laparotomy” cholecystectomy is more cost-effective<sup>[4]</sup> than LC, because it obviates the need for sophisticated equipment and specialized medical personnel<sup>[3,4]</sup>.

<sup>6]</sup>. The present study was designed to compare the results after Micro-laparotomy cholecystectomy with Laparoscopic Cholecystectomy.

**MATERIALS AND METHODS**

A total of 400 patients presenting with symptomatic cholelithiasis at the department of surgery, Indira Gandhi Medical College, Shimla were selected and divided into two groups of 200 each, and were randomly allocated to undergo laparoscopic cholecystectomy and micro- laparotomy cholecystectomy. The patients with Jaundice, Choledocholithiasis, suspected malignancy, Acute Pancreatitis, Obesity (BMI > 30) were excluded from the study. The patients were evaluated for, Duration of surgery, Intra operative complications (Gall bladder perforation, Spillage of stones, Injury to CBD/ Intestines/ vessels), Post-operative pain, Post-operative complications, (Wound infection, Paralytic ileus, Biliary peritonitis, Intra-abdominal collection), Total hospital stay, Total cost of surgery.

All procedures were elective. Patients were admitted one day prior to the surgery for pre-anaesthetic check-up. Patients were operated under General Anaesthesia. Parenteral antibiotic was given at the time of induction of anaesthesia. Laparoscopic cholecystectomy was done by standard four port using CO<sub>2</sub> to create pneumoperitoneum. In Micro-laparotomy Cholecystectomy, subcostal incision was made 1 cm away from midline and 3 cm below the right sub-costal margin, the length of incision was 2-4 cm [Figure 1].



Figure 1



Figure 2



Figure 3

If no peri-operative complications arose, patients were discharged 24 hours postoperatively. Post-operative management included analgesic medication for pain if needed. Patients were encouraged to resume their normal activities and no restrictions were imposed. Patients were reviewed by the same surgeon who performed the procedure and a comparative analysis was carried out with the Chi Square test. P< 0.05 was considered statistically significant.

**RESULTS**

Four hundred patients were recruited to participate in the study. Two hundred of these were allocated to Laparoscopic cholecystectomy group and two hundred to Micro-laparotomy cholecystectomy group.

**Patient characteristics**

The two groups were similar in terms of preoperative characteristics. Most patients were females in 4<sup>th</sup> decade of their life. (Table 1)

**Table 1** Comparison of study groups

	Micro-laparotomy cholecystectomy	laparoscopic cholecystectomy	p value
Age*	37 years	44 years	0.113
female sex	92%	92%	1.000

\*values expressed as mean.

**Operative results**

All the operations were carried out by one consultant surgeon. All patients were operated under General anesthesia. The mean duration of surgery for Micro-laparotomy cholecystectomy group was 32 minutes while for Laparoscopic cholecystectomy group, it was 35 minutes (P=0.61). [Table 2]

**Table 2** Operative time

	Micro-laparotomy cholecystectomy	laparoscopic cholecystectomy	p value
time	32 minutes	35 minutes	0.61

**Pain Scores and rescue analgesia**

Pain was measured by Four Point Scale and pain was assessed at 0, 2, 4, 6, 12, 24 hours. Time to first demand of rescue analgesia was noted. Mean pain score was 1.68 for MLC and 1.8 for LC (p=0.6385). Mean time interval of rescue analgesia post operatively was 8.32 hours for laparoscopic cholecystectomy group and 7.56 hours for micro-laparotomy cholecystectomy group. No. of cases in which post-operative rescue analgesia was required were 99 for MLC group and 131 for LC group (p=0.001). [Table 3]

**Complications**

Gall bladder perforation was seen in two patients in MLC group and thirteen patients in LC group. Spillage of stones was seen in one patient in MLC group and ten patients with LC group.

Injury to CBD occurred in two patients in Laparoscopic cholecystectomy group while none of the Micro-laparotomy cholecystectomy group underwent CBD injury. There were no post-operative complications. [Table 4]

**Table 3** Pain scores and rescue analgesia

	Micro-laparotomy cholecystectomy	laparoscopic cholecystectomy	p value
Pain score*	1.68	1.8	0.638
0	24	24	1.000
1	40	24	0.699
2	112	120	0.774
3	24	32	0.683
rescue analgesia	99	131	0.001

\*values expressed as mean.

**Table 4** Complications

	Micro-laparotomy cholecystectomy	laparoscopic cholecystectomy	p value
GB perforation	2	13	0.004
Spillage of stones	1	10	0.006
Cbd injury	0	2	0.15

Duration of hospital stay

Mean hospital stay for LC vs MLC was 2.1 vs 1.8 days (p=0.5).

#### **Cost of surgery**

The cost of surgery for LC vs MLC was app. Rs12,000 vs 4000 (INR).

## **DISCUSSION**

Since 1882, when Carl Langenbuch, performed first ever cholecystectomy, surgical removal of gall bladder has been the gold standard for treatment of symptomatic gall stones ensuing a permanent cure. The fear of disfiguring scars, prolonged recovery time, and associated pain has been the major concern for most patients undergoing cholecystectomy. Micro-laparotomy cholecystectomy was first described by Rozos I *et al* in 1992. It is associated with less post-operative pain and earlier recovery as compared to standard cholecystectomy. The Modern Day Laparoscopic Cholecystectomy was described by Reddick and Olsen in 1988. Currently laparoscopic cholecystectomy is considered the gold standard treatment for gall bladder surgery but cholecystectomy done through micro-laparotomy is an attractive procedure with being more cost effective, lesser intraoperative complications and equivalent post-operative recovery.

The aim of the study was to compare micro-laparotomy and laparoscopic cholecystectomy in terms of duration of surgery, intra/post-operative complications rate, post-operative pain, duration of hospital stay and cost of surgery. The results are discussed as follows.

**Age and Sex Distribution:** The age of patients included in this study ranged from 8 to 66 years. About half (48%) of patients belonged to age group 40-49 years. Mean age at presentation in micro-laparotomy cholecystectomy was 44 years and in laparoscopic cholecystectomy, it was 37 years, which was statistically insignificant. 92% of the patients included in the study were females which is consistent with the fact that gall stones occur more frequently in females.

**Duration of surgery:** The mean duration of surgery for Micro-laparotomy cholecystectomy group was 32 minutes while for Laparoscopic cholecystectomy group, it was 35 minutes which was statistically insignificant (P=0.61).

**Pain Scores and rescue analgesia:** Pain intensity in present study was 1.8 in laparoscopic cholecystectomy and 1.68 in micro-laparotomy cholecystectomy group according to four-point pain intensity scale which was statistically insignificant (p=0.638). Mean time interval of rescue analgesia post operatively was 8.32 hours for laparoscopic cholecystectomy group and 7.56 hours for micro-laparotomy cholecystectomy group. There was no statistically significant difference between the two groups in terms of total analgesic requirement post operatively. Post-operative pain in micro-laparotomy cholecystectomy is comparable to laparoscopic cholecystectomy because of the fact that as the incision length shortens, post-operative pain also decreases. No. of cases in which post-operative rescue analgesia was required were 99 for MLC group and 131 for LC group which was statistically significant (p=0.001). Analgesia requirement in laparoscopic cholecystectomy is mainly because of pain radiating to right

shoulder and irritation of nerve endings due to CO<sub>2</sub> insufflation to create pneumoperitoneum.

#### **Complications**

In our study complications noted were iatrogenic perforation of gall bladder with spillage of stones which occurred mainly in the laparoscopic cholecystectomy group which is statistically significant (p=0.004). Injury to CBD was seen in two patients in laparoscopic cholecystectomy group, with no such complication seen in micro-laparotomy cholecystectomy group, which is statistically significant (p=0.15). Accidental perforation of gall bladder during laparoscopic cholecystectomy is very common especially during dissection from its bed and during its extraction through the epigastric port. However, such complications are rarely seen with the micro-laparotomy approach. None of the cases in laparoscopic cholecystectomy were converted to open cholecystectomy. None of the cases in micro-laparotomy cholecystectomy required extension of the incision. In present study no significant post-operative complications were observed in either of the two groups.

#### **Hospital stay**

Mean hospital stay for Laparoscopic Cholecystectomy vs Micro-Laparotomy Cholecystectomy was 2.1 vs 1.8 days, which was statistically not significant (p=0.5).

#### **Cost of surgery**

The cost of surgery for Laparoscopic Cholecystectomy vs Micro-Laparotomy Cholecystectomy was approximately Rs 12,000 vs Rs 4000, with laparoscopic approach requiring four trocars for surgery and sophisticated equipment while Micro-Laparotomy Cholecystectomy can be done using a headlight costing around Rs 750 which can last for about 50 surgeries and routine surgical instruments without need for any specialized training and sophisticated instruments.

## **CONCLUSION**

The Micro-laparotomy cholecystectomy offers the same benefits as Laparoscopic cholecystectomy, with regards to duration of surgery, post-operative complications and hospital stay. However intra-operative complications rate and postoperative pain is lesser with it. The major advantage of Micro-laparotomy cholecystectomy is versatility, and ability to deal with unforeseen complications like Mirizzi's syndrome, or choledocholithiasis. It can be performed without high technology equipment, with no need for specialized training, and with complications rate equivalent to conventional open cholecystectomy and lower than laparoscopic cholecystectomy. Therefore it does offer a safe, low cost alternative to laparoscopic cholecystectomy, especially in a developing country like ours, at places where facilities of laparoscopic surgery are not available.

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