

# Mini Cholecystectomy versus Conventional Cholecystectomy: A Comparative Interventional Study among Cholelithiasis Patients Operated at DHQ Teaching Hospital, Dera Ghazi Khan

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**Abstract: Background:** Gall-bladder-associated diseases, specifically Cholelithiasis, is among the most common Hepatobiliary tract disorders, and hence, cholecystectomy remains the most frequently performed surgical procedure worldwide, many incisional approaches for cholecystectomy have been demonstrated.

**Objective:** To compare the surgical outcomes of mini cholecystectomy with conventional cholecystectomy in the management of Cholelithiasis.

**Materials and Methods:** This comparative interventional study was conducted at the Department of Surgery in Allama Iqbal Teaching Hospital, Dera Ghazi Khan, from Feb 2022 to Jan 2023. A total of 100 Cholelithiasis patients were included and randomly assigned to the treatment groups (A and B) in equal proportion. Group A patients were treated with Mini-cholecystectomy, while in group B, conventional open cholecystectomy was performed. The patients of both treatment groups were followed up a day after surgery (24 hrs.) for pain assessment via visual analogue scale (VAS), and SOS analgesic consumption was also monitored. The 2<sup>nd</sup> follow-up was planned on the 10th postoperative day for the assessment of wound infection.

**Result:** The mean age of patients in group A (Mini Cholecystectomy) and group B (Conventional Cholecystectomy) was 44.92±11.16 and 45.64±9.79 years, respectively. Females represented 77% of the study population. There was a significant difference in the mean hospital stay among group A and B patients, i.e. 1.22±0.42 days vs. 1.5±0.5 days (p=0.026). Furthermore, 7% of patients in group A and 14% of group B had wound infections. It was also observed that moderate to severe pain was reported in 6% and 17% of group A and B patients respectively, while no pain was reported among 68% and 58%, respectively.

**Conclusion:** Mini cholecystectomy is a better and more reliable approach than conventional cholecystectomy in terms of decreased post-operative pain, hospital stay and lesser chances of wound infection.

**Keywords:** Cholelithiasis, Cholecystectomy, Post-operative pain, Ultrasonography, Diabetes, Hypertension.

## INTRODUCTION

Gall-bladder-associated diseases, specifically Cholelithiasis, is among the most common hepatobiliary tract disorders, and hence, cholecystectomy remains the most frequently performed surgical procedure worldwide [1]. Historical evidence reveals Carl Langenbuch performed first successful cholecystectomy on a middle-aged man by a T-shaped 7-10 cm incision that cuts most of the rectus muscle fibers [2]. After that, many incisional approaches for cholecystectomy have been demonstrated. The most popular is Kocher's subcostal incision which starts at the midline, one to two inches below the xiphoid process and extends downwards, outwards and parallel to about one inch below the costal margin [3]. This incision gives generous exposure to the gall bladder area, calot's triangle and also access to the liver bed. Moreover, a portion of the common hepatic duct and common bile duct is also accessible from this incision [2]. The small eight thoracic nerves are also divided many times during this approach. Although exposure is extremely good but

the cosmetic results are poor, along with pain and prolonged hospital stay [4].

Keeping in view of the problems described above, many surgeons tried some modifications in traditional incisions. One of the commonly accepted approaches named Mini-cholecystectomy was first demonstrated by Dubois and Bertheol [5]. During the procedure, a transverse incision 4 to 8 cm in length is placed over the right rectus muscle, approximately two inches below the xiphoid process; the muscle is split longitudinally after the transverse cutting of the anterior rectus sheath. The posterior rectus sheath is also cut transversely. This incision causes less post-operative pain, which is also comparable to the gold standard laparoscopic cholecystectomy [5, 6]. In comparison to the conventional incision, the hospital stay is significantly less, and it ensures good cosmetic results, but the only disadvantage is poor exposure [7, 8].

For a long in history, there have been different opinions regarding the approaches used for cholecystectomy [9]. However, many researchers have described traditional right subcostal Kocher incision as for the gold standard therapeutic modality as it pro-

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vides great exposure and incorporates minimal complications. But a few studies favor the opinion that mini cholecystectomy should be the new gold standard for open cholecystectomy as it ensures reduced post-operative pain, good cosmetic results, shorter hospital stay, cost-effectiveness, safer and can be performed even in the setting where no laparoscopic facilities are available [10,11].

The rationale of this study was to compare the difference between the post-operative outcomes in terms of post-operative pain, wound infection and hospital stay among the Cholelithiasis patients treated with mini cholecystectomy vs. conventional open cholecystectomy.

## MATERIALS AND METHODS

This comparative interventional study was conducted at the Surgery Department of Allama Iqbal Teaching Hospital in Dera Ghazi Khan for a period of one year, from Feb 2022 to Jan 2023. The study protocol was approved by the ethical review committee (No. 32/MED/DGKMC, dated 28 January 2022) and written informed consent was obtained from each patient before inclusion. A total of 100 patients, including both genders, aged between 20 to 70 years with a diagnosis of cholelithiasis (diagnosed based on history and examination and confirmed on Ultrasonography for having cholelithiasis, and the patient was declared fit for anesthesia for surgery), were considered eligible for inclusion in the study. While patients aged < 20 or > 70 years, patients presenting with common bile duct stones, uncontrolled diabetes, hypertension and pregnancy were excluded from this study.

Out of the total sample, 50 were assigned to each study group through a random lottery method. In group A, Mini-cholecystectomy was performed through a right sub-costal incision transverse 5 cm in length 3 cm to the right of midline and 3 cm below the right costal margin or less rectus muscle sparing. While in group B, Conventional open cholecystectomy was performed through the right subcostal conventional Kocher's incision with rectus muscle fibers transection. All procedures were performed by an experienced team of surgeons (two consultants and two senior residents); a standard regimen of analgesics including diclofenac sodium injection (75 mg) IM twice daily and tramadol (100 mg) infusion twice daily were prescribed for the patients of both groups; SOS analgesics were also prescribed as paracetamol infusion, upon requirement.

The patients were discharged on a similar antibiotic regimen including ciprofloxacin 500mg twice daily for five days, and their duration of hospital stay was noted. First follow up was done approximately 24 hours after surgery and pain assessment using visual analog scale was done. The consumption of analgesic like paracetamol infusion 1000mg iv on SOS basis was also noted down. Second follow-up was made on the 10-12th post-operative day, and their wounds were assessed for signs of inflammation, discharge and any incident for early stitch removal due to abscess were labelled as wound infection.

## STATISTICAL ANALYSIS

Demographics, data regarding wound infection, post-operative pain and duration of hospital stay were recorded using a structured questionnaire and analyzed on SPSS version 20.0. Mean and standard deviation was calculated for quantitative variables, like age and duration of hospital stay. While frequency and percentages were used to present qualitative variables like gender, wound infections and post-operative pain (VAS score). Independent sample t-test and Chi-square were used for the comparison of study variables between the study groups. A p-value < 0.05 was considered significant.

## RESULT

The mean age of the group A and B patients was  $44.92 \pm 11.16$  and  $45.64 \pm 9.79$  years, respectively. Furthermore, there was an overall female majority (n=77), 39(78%) of group A and 38(76%) of group B were female patients (Table 1).

**Table 1.** Patient Characteristics with Respect to the Procedure Performed.

Variable		Group A (n=50)	Group B (n=50)
Age (year)		44.92±11.16	45.64±9.79
Gender	Male	11 (22%)	12 (24%)
	Female	39 (78%)	38 (76%)
Wound Infection	Infected	4 (8%)	7 (14%)
	Healthy	46 (92%)	43 (86%)

The mean duration of post-operative hospital stay among group A patients was significantly less than group B (p=0.026). At 1<sup>st</sup> post-operative visit, 4(8%) patients of group A and 7(14%) from group B had wound infection. Post-operative pain was also assessed on 1<sup>st</sup> post-operative day (24 hrs after surgery), 34(68%) and 29(58%) of group A and B patients reported no pain, while 0(0%) and 1(2%) reported severe pain, respectively. The p-value was 0.002 and significant (Table 2).

## DISCUSSION

Mini cholecystectomy and laparoscopic cholecystectomy have completely taken over the traditional cholecystectomy with a big incision, as it is a minimally invasive procedure [12]. Several randomized controlled trials have further compared the two currently used techniques (Mini cholecystectomy and laparoscopic cholecystectomy); several studies report minimal complications, safety, and effectiveness favoring Mini cholecystectomy [13]. While a few also suggest that laparoscopic cholecystectomy ensures shorter hospital stay and mini cholecystectomy ensures shorter operative duration [14].

Concerning the patient's baseline characteristics, we need to first recall that female gender, obesity, increasing age, high parity smoking and decreased physical activity, etc, are described as the

**Table 2.** Patient Characteristics with Respect to duration of Post-operative Hospital Stay.

Variable		Group A	Group B	P* Value
		(n=50)	(n=50)	
Pain on 1 <sup>st</sup> Post-Operative Day (24 <sup>th</sup> Hours after surgery)  Assessed by VAS	No Pain	34 (68%)	29 (58%)	0.002
	Mild Pain	13 (26%)	13 (26%)	
	Moderate Pain	3 (6%)	7 (14%)	
	Severe Pain	0 (0%)	1 (2%)	
Post-operative Hospital Stay(days)		1.22±0.42	1.5±0.58	0.026
Group A-Mini Cholecystectomy; Group B-Kocher's/ conventional Cholecystectomy.				
*p<0.05 is considered statistically significant.				
VAS visual analogue scale.				

major risk factors, increasing vulnerability [15], where female gender and advancing age are considered as the non-modifiable risk factors [16]. The major reasons for an increased female to male ratio for cholelithiasis are the surge of estrogen, pregnancy, and use of oral contraceptives, etc. Our findings were also parallel to this; most of the cholelithiasis patients enrolled during the study period were females [17].

A study from Pakistan reported that the mean hospital stay among the patients treated with mini cholecystectomy was 2 days3, which is comparable to the present study outcomes, i.e. the observed mean post-operative hospital stay was 1.22 ± 0.42 days as compared to standard open method, i.e. 1.5 ± 0.5 days (p=0.026). Another similar local study reported a relatively longer mean hospital stay in the Mini Cholecystectomy group (3.02 ± 0.58 days) [13] than observed in the present study. Furthermore, the traditional open cholecystectomy extends the hospital stay up to 8.66 days (6-10 days), which, when compared to mini cholecystectomy, is reduced to 5.33 days (1-3 days) on average [18, 19].

Among the procedural complications, 7% of patients of group A, while 14% of group B experienced wound infections. Other studies reported an infection rate of 3.33% in the group treated with mini cholecystectomy compared to 13.3% in those treated with standard open procedure, which is comparatively less than reported in the present study [20, 21]. Likewise, a study also reported a wound infection rate of 2.8% with the use of Mini-cholecystectomy [22]. A more recent study with follow-up visits reported infections in only 2% and 28% of patients treated with Mini Cholecystectomy and Conventional Cholecystectomy at visit 1, respectively. In comparison, it was 6% and 16% in the two groups by the 2<sup>nd</sup> visit [12].

The pain was assessed post-operatively; 68% of patients from group A and 58% from group B had no pain, while 0% and 2% of patients reported severe pain, respectively. A study also reported a difference in the occurrence of pain post-operatively using the mini and open Cholecystectomy technique, i.e. 56% of the patients treated with open cholecystectomy experienced severe pain while in mini cholecystectomy only 16% reported that they had severe pain [23]. A local study from Pakistan also con-

cluded that mini-cholecystectomy is superior to the conventional approach in terms of less post-operative pain [3]. There was no statistically significant difference in the operating times between the two groups (p>0.05). In this regard, conflicting findings have been documented in the literature.

A few research have shown that the mean operating time in the four-port group was marginally shorter than in the three-port group. This is likely because the fourth port makes the Calot's triangle easier to dissect because it is more exposed as a result of the gall bladder being laterally retracted. According to some authors [24,25], the three-port technique takes less time than the four-port procedure because the additional port was established and closed more quickly. Similar results were reported by one of the study who found no statistically significant difference in the mean operative time between the three port group (31.1±9.1) and the four port group (31.6±7.6 minutes) [26-28]. The two groups' overall rates of complications and the contributing factors to them were similar [29]. Concerns regarding the safety of the three-port procedure have been raised by certain surgeons, who claim that a larger rate of bile duct damage could result from using it. If the gallbladder is grasped at the infundibulum, retracted laterally, and dissected at the infundibulum-cystic duct junction as opposed to the cystic duct-common bile duct junction, bile duct damage can be prevented [30]. In terms of complication rates, this study's results are comparable to those published by some authors [30-32].

Although mini cholecystectomy is not superior to laparoscopic cholecystectomy because of small incisions, vast exposure, reduced post-operative pain, rapid return to full activity and shorter hospital stay. But, due to the fact that facility for laparoscopy in a middle-income country like Pakistan is not available in every healthcare facility. Therefore, mini cholecystectomy is a good and reliable approach, offering less tissue trauma leading to less post-operative pain, short hospital stays and fewer chances of wound infection.

## CONCLUSION

The presented data has indicated less hospital stay, reduced post-operative pain and risk of complication in mini cholecystec-

tomy group, therefore we conclude that Mini Cholecystectomy is an effective alternative method of surgery for cholelithiasis in terms of less post-operative pain, hospital stay and chances of wound infection as compared to conventional open cholecystectomy.

#### AUTHORS' CONTRIBUTION

- **Muhammad Rizwan Anwar:** Objective, Surgery, Data collection.
- **Muhammad Asim Bhatti:** Manuscript write-up, Data analysis.
- **Uzair Qaisrani:** Data interpretation, Patient enrollment.

#### CONFLICT OF INTEREST

Declared none.

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