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Original Article

Comparison of Standard Analgesia versus Intra-Operative Local Anesthesia in Postoperative Pain Management Among Patients Undergoing Laparoscopic Cholecystectomy

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ABSTRACT

Objective: To compare standard analgesia alone versus addition of intra-operative local anesthesia in postoperative pain management among patients undergoing laparoscopic cholecystectomy.
Study Design: Quasi experimental study.
Place and Duration of Study: Combined Military Hospital, Multan Pakistan, from Jul 2022 to Apr 2023.
Methodology: Eighty (n=80) patients were divided in two equal groups by draws method (Group A and B). Group A was managed by standard analgesia plus intra–operative local anesthesia while group B was managed by only standard analgesia. Post-operative pain assessment was done using visual analogue scale after every hour for 24hours. SPSS version 23 was used to analyze the data. Mean pain score in both groups was compared by applying independent sample t-test at 0.05 level of significance.
Results; A total of eight variables were compared in the two groups. Variables like age (p=0.333), gender (p=0.817), residential status (p=0.464), socioeconomic status (p=0.803) and associated comorbid like diabetes Mellitus (p=0.554), hypertension (p=0.488) and obesity (p=0.791) were comparable in both the groups. However, Median Pain Score (visual analogue scale) was significantly lower (p=0.001) in group A compared to group B.

Conclusion; Addition of local anesthesia in group A patients resulted in less postoperative pain as compared to group B patients receiving standard analgesia only. Hence all clinicians treating such patients should employ intra–operative local anesthesia for better postoperative pain management.

Keywords: Cholelithiasis, Laparoscopic Cholecystectomy, Postoperative Pain.

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INTRODUCTION

Cholelithiasis remains one of the commonest diseases of digestive tract and constitutes significant health concerns in developing and developed countries.[1,2] Epidemiological data have indicated that Cholelithiasis is major global indication for abdominal surgeries and approximately 10–15% American adult population is reported to harbor the burden of disease.[3] Recent data from Pakistan indicate that its prevalence increases with increased age, female gender and in married people.[4]

Besides health related issues, gallstone disease has significant impact on healthcare expenditures, approximately 6.2 million dollars every year in United States.[3] Local studies have indicated cholelithiasis being the most common cause for hospital admissions among surgical patients[5] and ratio of conversion from laparoscopic to open cholecystectomy in Pakistan varies from 4.9-20% as reported by Amin A *et al*.,[6] and Waleed *et al*.[7] In recent decades, Laparoscopic cholecystectomy has become gold standard in the treatment of benign gallbladder stones and lesions and current literature has documented several advantages of laparoscopic cholecystectomy and conventional open cholecystectomy has been widely replaced by laparoscopic cholecystectomy.[8,9]

Pain that is specific to a particular surgical procedure is typically most intense in the first three days following the operation. To reduce pain and speed up recovery, various methods have been employed, such as injecting local anesthetic into the incision site, minimizing remaining air in the abdominal cavity, administering regional anesthesia (such as an epidural), and using a combination of nonsteroidal anti-inflammatory drugs (NSAIDs) and narcotic painkillers.[1-10] Although, the pain experienced after laparoscopic cholecystectomy is much less severe than that of open cholecystectomy, there is still room

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for improvement in the early post-operative pain outcome.

Laparoscopic Cholecystectomy related pain is a complex and multi-faceted concern that arises from various sources, such as surgical tissue damage, dissection of the gallbladder from the hepatic cystic plate, irritation of peri-portal nerves, irritation of the diaphragm, chemical and mechanical interaction between insufflated gas and peritoneum, and incisions made at the port site, among others. Studies have suggested two primary mechanisms for LC-related pain: somatic pain (related to the parietal region) and visceral pain. Visceral pain is the primary mechanism for early pain following LC, and peri-portal nerve stimulation is believed to contribute to this pain. It has been shown that the intra-peritoneal injection of local anesthetics is safe and effective in reducing pain associated with gynecological surgery. Therefore, it was hypothesized that blocking post-operative visceral pain after LC via intraperitoneal local anesthetic infiltration could help to reduce early post-operative pain and improve overall recovery time. Several studies have examined the effectiveness of intra-peritoneal local anesthetic infiltration, combined with port-site injection of various types of long-acting local anesthetics.[11,12]

METHODOLOGY

This Quasi experimental study was conducted at Department of General Surgery, Combined Military Hospital, Multan from July 2022 to April 2023 using non–probability purposive sampling technique. A total sample size of 80 patients was calculated with 40 patients in each group using WHO sample size calculator 7.4a with mean pain score in local anaesthesia group 4.83±2.33 and in standard analgesia group 6.80±1.87,[12] level of significance 5% and power of test at 90%.The sample was divided into two equal groups (Group A and Group B) by draws method.

Inclusion Criteria: Patients of either gender with age ranging from 20 to 70 years presenting in outpatient department with symptomatic gall stones and willing to undergo laparoscopic cholecystectomy were included in our study.

Exclusion Criteria: Pregnant females, patients with ischemic heart disease, chronic lung/kidney disease, bleeding disorders, known allergy to lignocaine or bupivacaine and those having gallbladder malignancies were excluded from the study.

Symptomatic Cholelithiasis was defined by the presence of moderate to severe pain (assessed on visual analogue scale) in the right upper abdomen, positive Murphy sign and ultrasonography revealing posterior acoustic shadow and moveable echogenic structures in gallbladder lumen. Institutional Ethical Review Board (IERB) had granted the permission to conduct this study (ERC No. 12/2022 dated 1 April 2022). Group A contained 40 patients and postoperative pain was managed by standard analgesia (Inj Ketorolac 30mg IV 8hrly, Inj Paracetamol infusion 1gram IV 8hrly) plus intra–operative local anesthesia using 1% lignocaine with adrenaline at port sites and onto the cystic plate area while group B also having 40 patients were managed by only standard analgesia (Figure-1). Under the same antibiotics (third generation cephalosporin), surgery was performed using conventional four ports (umbilical port, port below xiphoid, and two ports below right costal margin) method and pain assessment was done using visual analogue scale (VAS) after every hour for 24hours.

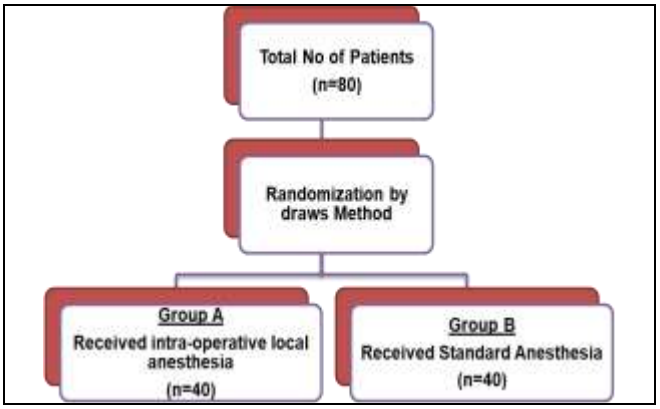

Figure-1: Patient Flow Diagram (n=80)

Statistical Package for Social Sciences (SPSS) version 23 was used to analyze the data and calculate mean and standard deviation for age and pain score. Age was further categorized into two groups (upto 50 years and over 50 years). Categorical variables like the age group, gender, residential status, socioeconomic status and associated comorbids like diabetes Mellitus, hypertension and obesity were computed for frequencies and percentages. Mann whitney U test was applied to compare the median pain score between the two groups. A *p*-value of ≤0.05 was considered significant.

RESULTS

This study included 80 patients with symptomatic cholelithiasis undergoing laparoscopic cholecystectomy, of which 43.75%(n=35) were male

patients and 56.25%(n=45) were female patients. Mean age of these patients was 48.19±7.19 years (range; 38 years to 69 years) and 66.25%(n=53) were aged up to 50 years. Twenty seven (33.75%) were from rural areas while 66.25%(n=53) were from urban areas, 28.75%(n=23) were from poor families and 71.25%(n=57) were from middle income families. Fourteen (18.4%) were Diabetic, 43.75%(n=35) were hypertensive and 25.0%(n=20) were obese. Mean duration of surgery was 55.23±11.31 minutes. Both groups were comparable in terms of baseline characteristics (Table-I). Median pain score (VAS) in group A was noted to be 4 with an Interquartile range (IQR) of (4–3) while it was 6 with an Interquartile range (IQR) of (6–5) in group B. Median Pain Score (VAS) was significantly lower (p=0.001) in group A compared to group B. (Table-II).

Table-I: Baseline Characteristics in Both Groups (n=80)

Characteristics	Groups		*p*-value
	Group A (n=40)	Group B (n=40)	
Gender			
Male (n=35)	17(42.5%)	18(45%)	0.817
Female (n=45)	23(57.5%)	22(55%)	
Age groups			
Up to 50 Years (n=53)	24(60%)	29(72.5%)	0.333
> 50 Years (n=27)	16(40%)	11(27.5%)	
Residential status			
Rural (n=27)	15(37.5%)	12(30%)	0.464
Urban (n=53)	25(62.5%)	28(70%)	
Socioeconomic status			
Poor (n=23)	11(27.5%)	12(30%)	0.803
Middle Income (n=57)	29(72.5%)	28(70%)	
Diabetes			
Yes (n=14)	08(20%)	06(15%)	0.554
No (n=66)	32(80%)	34(85%)	
Hypertension			
Yes (n=35)	19(47.5%)	16(40%)	0.488
No (n=45)	21(52.5%)	24(60%)	
Obesity			
Yes (n=20)	10(25%)	10(25%)	0.791
No (n=60)	30(75%)	30(75%)	

Table-II: Distribution of Median Pain Score in Both Groups (n=80)

	Groups		*p*-value
	Group A(n=40) Median (IQR)	Group B(n=40) Median (IQR)	
Visual Analogue Score	4(4-3)	6(6-5)	0.001

DISCUSSION

Laparoscopic cholecystectomy is widely regarded as gold standard procedure for management of gallbladder stones and lesions since its inception in 1987. Laparoscopic cholecystectomy has undergone a series of advancements and automations which have improved this procedure with increasing skills and experience of surgical team; however this procedure still involves postoperative issues such as postoperative pain issues.[13] Hence laparoscopic cholecystectomy has undergone many modifications and researchers have tried different management techniques to overcome this issue. Different anesthetic agents are being introduced and being reported to combat postoperative pain issues.[14]

Our study had 80 patients with cholelithiasis undergoing laparoscopic cholecystectomy, of which 43.75%(n=35) were male patients and 56.25%(n=45) were female patients. Ozkardeş *et al.*,[15] Ahmed W *et al.*,[16] and Nasir A *et al.*,[3] also reported high prevalence of gall stone disease in female gender, similar to our study results. Al-Salamah *et al.*,[17] from Saudi Arabia has also reported female gender predominance in cholelithiasis with 4.5:1 ratio. A study conducted by Saeed *et al.*,[18] from Abbottabad also reported 90% female gender preponderance, similar to our results. Soomro *et al.*,[19] from Larkana also reported 73% female gender predominance associated with cholelithiasis, similar to our results. Mohammad *et al.*,[20] also reported female gender predominance with female to male ratio of 4:1, similar to our study results. Memon *et al.*,[21] from Sukkur reported 70% female patients with acute cholelithiasis, close to our study results.

Mean age of these patients was 48.19±7.19 years (range; 28 years to 69 years) and 66.3%(n=53) were aged up to 50 years. Ozkardeş *et al.*,[15] reported 58.03±10.44 years mean age of the patients with cholelithiasis, similar to our results. Al-Salamah *et al.*,[17] reported 43.7 years mean age of the patients with cholelithiasis, close to our results. Saeed *et al.*,[18] from Abbottabad has also reported similar results. Mohammad *et al.*,[20] from Larkana reported 45.75 years mean age of the patients undergoing laparoscopic cholecystectomy, similar to our results. Memon *et al.*,[21] also reported 45 years mean age of the patients with cholelithiasis, similar to our results.

Majority of the patients in our study belonged to urban areas (66.3%) and from middle income families (71.3%). Study done by Naeem M *et al.*,[22] at Karachi revealed a positive relation between decrease intake of dietary fiber and calcium, and high intake of saturated fat with the gallstone disease. This may explain high prevalence of disease in urban areas.

Postoperative pain after laparoscopic cholecystectomy is usually managed with IV paracetamol and NSAID. Liu YY *et al.*,[23] observed that addition of wound Infiltration with local anaesthetic agent was superior to standard analgesia(paracetamol and NSAID) alone in reducing pain up to 24hrs. In our study, Mean pain score (VAS) in group A was noted to be 3.45±0.79 versus 5.61±0.82 in group B (p<0.001). A Serbian study conducted by Protic *et al.*,[12] has also reported mean pain score with intra–operative local anesthesia was 4.83±2.33 while in standard analgesia mean VAS score was 6.80±1.87, these results are close to our results. Similarly, Rafique K *et al.*,[24,] Sharmin I *et al.*,[25] and Başkent A *et al.*,[26] compared bupivacaine infiltration at port sites with that of opioids and NSAID administration to compare the postoperative pain relief in laparoscopic cholecystectomy patients and found that patients receiving bupivacaine at port sites experienced less pain at postoperative period and needed less analgesic medications.

CONCLUSION

Our study results support use of intra–operative local anesthesia in laparoscopic cholecystectomy as compared with standard analgesia. Mean visual analogue score was significantly less in interventional group as compared with standard analgesia. Hence all clinicians treating such patients should employ intra–operative local anesthesia for proper pain management and to improve standard of care and expertise of their surgical team.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MAR & SAA: Data acquisition, data analysis, critical review, approval of the final version to be published.

SK & ASA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

FM & SR: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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