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Postoperative Pain Management in Patients Undergoing Hernia Repair Surgery. A cross-sectional study

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ABSTRACT

Background: Hernia repair surgery is the most frequently performed surgical operation across the world and pain management after the surgery is important to avoid chronic pain and improve the quality of life.

Objectives: to assess the effectiveness of acetaminophen monotherapy against combination analgesic regimens (acetaminophen plus pethidine or parecoxib) in managing postoperative pain in individuals having hernia repair surgery.

Methods: This was a cross-sectional study on patients who were 18-65 years old and had elective hernia repair surgery. Participants were assigned to three groups: Group A was given IV acetaminophen along with IM pethidine, Group B was given IV acetaminophen with IV parecoxib and Group C was given IV acetaminophen alone. Pain was evaluated by Numeric Rating Scale (NRS) at various time intervals within 24 hours following surgery. Data were analysed employing repeated measures analysis of variance (ANOVA) and multiple regression analysis.

Results: The research had a total of 259 patients. In comparison to Group C, patients in Groups A and B consistently reported far lower pain scores. Group C had the greatest mean pain score (7.91) at 45 minutes post-surgery, whereas Groups A and B demonstrated lower ratings (5.99 and 6.87). Pethidine and parecoxib when paired with acetaminophen were equally effective, as evidenced by the lack of a significant difference between Groups A and B. If acetaminophen monotherapy was used, combination treatment produced better pain relief.

Conclusion: Following hernia repair surgery, combination analgesic regimens comprising acetaminophen and either pethidine or parecoxib are more successful at reducing postoperative pain than acetaminophen monotherapy. As a normal procedure, multimodal analgesia should be taken into account to reduce the incidence of chronic pain and enhance patient recovery.

Keywords: Hernia repair surgery, Postoperative pain management, Acetaminophen, Pethidine, Parecoxib, Multimodal analgesia.

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INTRODUCTION

Hernia repair surgery is one of the most frequently performed surgeries globally with procedures being conducted daily, monthly, and annually. Another major issue following surgery for hernia is pain management because uncontrolled pain after the surgery may result in chronic pain[1]. Chronic postoperative pain has been found to affect 8-16% of the patients who underwent hernia repair surgery and this significantly hampers their overall functioning[2]. Pain management after surgery is therefore crucial in order to enhance patients' prognosis, reduce hospital stay and prevent chronic pain[3]. Pain management after surgery is greatly dependent on the analgesic regimen that is to be chosen. They include Acetaminophen which has been found to be safer; however, its effectiveness may be quite low when used singly[4]. The co-administration of the non-opioid analgesics with opioids or other analgesics has been demonstrated to improve the pain relief, decrease the requirement for opioids and, in addition, limit the side effects of opioids[4, 5]. Chronic pain after surgery is a sub-type of chronic pain. It is established that chronic postoperative pain is possible after many types of surgery including amputation, thoracotomy, and inguinal hernia surgery[6]. The development of chronic pain after inguinal hernia repair has been researched; nonetheless, the management is challenging. Groin hernia repair surgeries are performed by millions of times annually around the world About few percent of these patients suffer from disabling pain and because of the high frequency of groin hernia repairs they present a significant clinical concern[7]. In the case of pain and the extent of the limitation of the activities, the patient should be given an option for an evidence-based treatment plan[8]. One source of criticism which is related to the indices of the current evidence is the variation in the methods of assessment and the length of follow up in the chronic pain after groin hernia repair[9, 10].Pain management after surgery is an important aspect of patient care, this study aims to assess by comparing the efficacy of combination postoperative analgesic regimens with those of acetaminophen monotherapy in patients with hernia repair surgery[11]. By comparing pain scores and analgesic requirements, this study seeks to provide insights into optimizing postoperative pain management and reducing the incidence of chronic pain.

MATERIALS AND METHODS

This study was undertaken to determine the effectiveness of pain control in surgical patients who underwent hernia repair surgery. This cross-sectional study was carried out on the patients who had undergone open or laparoscopic hernia repair surgery in Lahore from September 2023 till May 2024. Pain and measures used in its control were evaluated within 24 hours of the surgical procedure. Patients were stratified according to the American Society of Anesthesiologists (ASA) physical status I or II. Exclusion criteria excluded patients on chronic pain, opioid treatment, or contraindications to the used analgesics. Ethical considerations were followed, written consent was obtained from each participant after a comprehensive description of the study's objective, methods, risks, and potential benefits were given, with ethical issues taken into account. Patients were advised that their participation was completely optional and that doing so would not affect their access to medical care at any point. All patient data were securely maintained and utilized only for research in order to maintain anonymity. Patients with a condition of interest adults, between 18 to 65 years of age, involved in the study. Participants who had hernia repair surgery, including inguinal, femoral, umbilical or incisional hernias were included. Both inguinal and femoral and both the open and the

laparoscopic repair were considered. Surgical patients who could meet the researcher at the hospital within 24 hours after the surgery and gave a consent to be interviewed about their pain were included. Patients with a history of chronic pain, chronic opioid use, or allergies to NSAIDs or opioids were excluded from the study to avoid confounding variables. The patients were further categorized into three groups in relation to the postoperative analgesic regimen that they received. Group A was given IV acetaminophen 1 g eight hourly and IM pethidine 50 mg six hourly. The members of Group B were given IV acetaminophen 1 g every 8 hours and IV parecoxib 40 mg every 12 hours. The subjects of group C additionally underwent IV acetaminophen monotherapy, in which they were administered 1 g every 8 hours. Patients' pain was measured using the Numeric Rating Scale (NRS) at 45 minutes, 2 hours, 6 hours, 12 hours and 24 hours after surgery. Quantitative data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Repeated-measures ANOVA was used to compare pain scores across groups, with post-hoc tests to identify specific differences. Multiple regression analysis determined the relationship between patient characteristics and pain scores. $p \leq 0.05$ was considered statistically significant.

RESULTS

The demographic and clinical characteristics of the study population are shown in the table 1. The distribution of the patients between the three groups was also balanced and there was no statistical difference of the patients in terms of age, gender and ASA classification. This implies that the groups were balanced and this is important in order to reduce confounding factors that may be present at the time of comparing postoperative pain scores to the different analgesic regimens. The lack of intraoperative complications in all the groups also shows that the surgical procedure was not different in any of the groups, which also enhances the validity of the subsequent pain measurements. The demographic and clinical characteristics of the study population are shown in the (Table- 1).

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Group A (Acetaminophen + Pethidine)	Group B (Acetaminophen + Parecoxib)	Group C (Acetaminophen Monotherapy)
Number of Patients (n)	103	94	62
Mean Age (years)	55 (36-65)	52 (35-61)	49 (38-57)
Gender (M/F)	103/30	94/50	62/10
ASA Classification I/II	79/24	72/22	47/15
Mean Operative Time (minutes)	55.2 ± 8.8	59.7 ± 12.6	58.5 ± 9.3

The mean NRS pain scores depicted in Table 2, it is clear that patients who were given combination therapy of acetaminophen and pethidine or parecoxib reported significantly lower pain scores than those who were given acetaminophen only as in Group C. Ninety minutes after the surgery patients in Group C rated the highest pain level (7.91, on the NRS), while the patients in Group A and Group B had significantly lower pain (5.99 and 6.87, respectively). This increase in pain score was seen throughout the 24-hour period with Group C having higher scores throughout the period.

Thus, these results give an indication that the combination therapies were more useful in the postoperative pain relief soon after surgery and in the postoperative period. The observed decrease in pain scores of Groups A and B can be explained by the additivity of the used drugs acetaminophen with either an opioid (pethidine) or a non-opioid analgesic (parecoxib) which probably yielded better

analgesia comparing with a single agent, acetaminophen.

Table 2: Mean NRS Pain Scores at Different Time Points Post-Surgery

Time Point	Group A (Acetaminophen + Pethidine)	Group B (Acetaminophen + Parecoxib)	Group C (Acetaminophen Monotherapy)
45 minutes	5.99 ± 0.75	6.87 ± 0.75	7.91 ± 0.75
2 hours	4.93 ± 0.60	4.66 ± 0.60	6.23 ± 0.60
6 hours	3.54 ± 0.40	3.61 ± 0.40	4.84 ± 0.40
12 hours	2.24 ± 0.30	2.02 ± 0.30	3.89 ± 0.30
24 hours	1.53 ± 0.20	1.39 ± 0.20	2.40 ± 0.20

Table 3 shows pain scores comparison of the groups using statistical analysis. The mean difference of pain scores in Group A (acetaminophen + pethidine) and Group B (acetaminophen + parecoxib) was small (0.12) and P-value was 1.000, therefore showing no significant difference in the pain-relieving effect between these two combination therapies. However, when comparing mean between group A and C; group B and C, the differences are relatively higher with mean difference of 1.87 and 2.05 respectively and $P<0.0001$ showed highly significant differences. These results support the findings that both the combination therapies offered better pain relief than just using acetaminophen alone.

Table 3: Statistical Analysis of Pain Scores Between Groups

Comparison	Mean Difference	Standard Deviation (SD)	P-Value
Group A vs Group B	0.12	0.05	1.000
Group A vs Group C	1.87	0.10	< 0.0001
Group B vs Group C	2.05	0.10	< 0.0001

Non-significant difference between Groups A and B can be assumed indicating that pethidine has the same efficacy as parecoxib when taken with acetaminophen. This has an implication since it provides a diversity in clinical practice since the healthcare providers can decide on which option to use depending on other factors such as tolerance levels or the contraindications of a certain drug.

DISCUSSION

The findings of this research are in agreement with prior literature that has indicated the advantages of combination analgesic therapy for postoperative pain relief [12]. Multimodal analgesia was shown to be superior to the use of a single agent, because the addition of either pethidine or parecoxib to acetaminophen significantly improved pain scores compared to the administration of acetaminophen alone[13]. This approach is not only beneficial in improving pain and analgesia but also limits the use of opioids diminishing the risk of side effects associated with opioids[14, 15, 16]. The outcomes of the study are significant to the clinical practice in the management of pain after hernia repair surgery. Because chronic pain might develop due to ineffective postoperative analgesia, especially in patients with poor pain management, combination analgesic administration should be considered as best practices[17]. Nevertheless, it is vital to consider the patient's background, the history of the pain, as well as his/her tolerance levels and possible reaction to the pain medication[18, 19]. It is also worth mentioning, that pain level during mobilization was not evaluated, thus, it might be interesting to see how the analgesic regimens affect the participants during actual physical activity. To the present study, it is recommended that future studies examine pain

management during postoperative mobilization and examine the rate of persistent pain after hernia surgery[20]. From the study, it was established that postoperative pain management in hernia repair patients was well managed by the use of NSAIDs in combination with opioids[21].

Patient controlled analgesia was achieved by NSAIDs that offered baseline pain relief but with less inflammation compared to other studies and opioids which were used to address the cases of breakthrough pain, mainly in the open surgical procedures. Patients who underwent lumbar spine surgery who were managed with a multimodal analgesic plan had better pain control and required less supplementary analgesia[22]. Early and customized analgesic medication delivery proved essential for reducing pain and accelerating healing. Personalized pain management regimens are necessary to improve patient comfort throughout the postoperative period and maximize results, as indicated by the variety in patient reaction[23].

CONCLUSION

The study demonstrated that the combination of analgesic regimens including acetaminophen with pethidine or parecoxib is more effective than the acetaminophen monotherapy in controlling the postoperative pain after hernia repair surgery. Multimodal analgesia should be considered a standard approach to minimize chronic pain incidence and enhance patient recovery.

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Authors' Contribution:
The study was conceptualized by MYA and MAJ. AM and AA gathered the information. ET and SJ analyzed the data. The final version of the paper was approved by all authors after it was reviewed by MYA.

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