

Comparison of Efficacy of Morphine and Sodium Diclofenac Suppository for Analgesia after Appendectomy and Inguinal Hernia Surgery

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Authors' contributions

This work was carried out in collaboration between all authors. Authors GAA and AG designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author AG managed the analyses of the study. Author TM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Pain is caused after tissue damage, it is one of the problems of clinical cares after surgery. Analgesia is important for the recovery acceleration of patients after surgery. In this study, the efficacy of morphine and diclofenac sodium suppository for analgesia after appendectomy and inguinal hernia surgery were evaluated.

Methods: This study is a double-blind clinical trial study, about 75 patients (Range age 18-70years) with appendicitis and inguinal hernia were assessed. They were randomized into three equal groups. The pain score of patients, according to Visual Analogue Scale (VAS), was measured by scale ruler of 0-10 cm.

Results: The mean visual analogue scores of pain were in the morphine group respectively 4.56, 4.40, 3.68, and 3.36 for 2, 6, 12, 24 hours. Also, mean scores were in the group receiving

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diclofenac suppository respectively 4.36, 3.84, 3.12, 2.44 and in the control group 6.52, 6.68, 6.28, and 5.84 for these hours. The VAS mean scores were significantly lower in the both groups receiving diclofenac and morphine suppository Compared to control group ($p < 0.001$).

Conclusion: Sodium diclofenac suppository caused more analgesia than morphine suppository after appendectomy and inguinal hernia surgery.

Keywords: Morphine suppository; sodium diclofenac suppository; analgesia; appendectomy; inguinal hernia.

1. INTRODUCTION

Pain in the postoperative period is a critical factor that impedes recovery from surgery and anesthesia. Surgical injury can be followed by nausea, vomiting, and pain. Development of short-acting and safe anesthetics improved pain relief by early intervention with analgesia. B-blockade or glucocorticoids have provided major possibilities for increased recovery. When these methods are combined with a change in peri-operative care, a noticeable increase of recovery and decrease in hospital stay can be achieved [1,2].

The anesthetist has a major role in acceleration early postoperative recovery by the provision of pain relief, and by collaborating with surgical nurses, and surgeons to reduce risk and pain. The alleviation of postoperative pain is central to the role of the anesthetist, and can include interventional and pharmacological techniques-provided before, and after surgery. Pain treatment should decrease anxiety and provide comfort. Furthermore, effective analgesia might help to blunt somatic and autonomic reflex responses and therefore restore organ functions and enable mobilization, thereby helping to improve postoperative outcome [3,4].

Opioid analgesics such as morphine are often given routinely despite their side-effects. The use of morphine may be restricted to situations where suitable alternatives are not available. The gastrointestinal side-effects of morphine mean that this drug is less than ideal after abdominal surgery and should possibly only be allowed when non-opioid drugs provide insufficient analgesia [5]. Morphine is considered the first choice for the relief of severe pain due to its convenience and cost-effectiveness. Common reasons for the use of alternate routes of morphine administration include dysphagia, severe nausea or vomiting, severe confusion, and bowel obstruction. Morphine suppositories are available in immediate-release formulations, which necessitate an every-4-hour dosing

schedule to maintain optimal analgesia in chronic pains. A range of morphine suppository formulations have been developed that indicate controlled release characteristics in dissolution studies, when compared with controlled-release morphine tablets. The suppository has been evaluated in single dose and steady-state pharmacokinetic studies, and has shown excellent controlled-release characteristics, consistent with at least every- 12-hour dosing [6,7].

Non-steroidal anti-inflammatory drugs (NSAID), and cyclo-oxygenase (COX)-2 inhibitors have been robustly documented as effective for postoperative analgesia, with few side-effects during short-term treatment. NSAIDs, such as diclofenac, are effective in the treatment of postoperative pain. If given with opioids, the amount of opioid required is decreased with a consequent reduction in side effects. Postoperative pain control using diclofenac suppository may decrease peritoneal inflammation and pain. The diclofenac suppository has a rapid onset of effect [8, 9]. Absorption of the suppository form is complete in 4.5 hours. The maximal plasma level occurs within 1 to 2 hours, and this plasma concentration elevation can be maintained for up to 12 hours. The half-life of diclofenac in plasma is 1 to 2 hours. About 60% of the drug and its metabolites are eliminated in the urine [10-12].

Thus, for the facilitation of postoperative recovery by the provision of pain relief, in this study we compared the analgesic efficacy of rectally administered diclofenac and morphine after surgery on postoperative pain following appendectomy and inguinal hernia surgery.

2. MATERIALS AND METHODS

This study is a double-blind clinical trial study, about 75 patients (Range age 18-70 years) with appendicitis and inguinal hernia were assessed in Dr. Fatemi hospital of Ardabil University of Medical Sciences in 2013. Patients with history

of anal or rectal bleeding (Hemorrhoids), seizures and epilepsy, severe lung disease, defect in liver, acute and chronic renal failure, and patients who are addicted to opiate were excluded in this study.

The patients were anaesthetized with spinal or general anesthetics [13], and were randomized into three equal groups of 25 patients each (n=25). The first group or Control group, when the patient had a pain score above 4, pethidine 50 mg (intramuscular) was used to control pain. In both groups, pethidine 50 mg was administered as PRN in the VAS above 4.

The second group received diclofenac 100 mg suppository postoperative at hours 2, 6, 12 and 24 after surgery, and the third group received 10 mg morphine suppository at these hours postoperative. The patients did not know suppository type (single-blind). Also, the collaborator nurse who evaluated the outcomes of pain, nausea and vomiting was not aware of suppository type (double-blind). The patients received no drugs for pain control before anesthesia.

The pain score of patients, according to Visual Analogue Scale (VAS), was measured by scale ruler of 0-10 cm and recorded [14]. The rate of nausea and vomiting was measured by a scale (N & V Score) and recorded in the related forms. The patients were charged no fees. The study was approved by the University's Ethics Committee (arums.rec.1392.7). Intelligently, all patients were satisfied with the study process.

2.1 Statistical Analysis

All the data are presented as mean \pm standard deviation (M \pm SD). Significance testing between groups was performed using one-way analysis of variance (ANOVA) with SPSS Version 20 and multiple comparison post hoc test to determine significant differences between groups. A P-value of less than 0.05 was considered statistically significant.

3. RESULTS

The mean age of patients in the diclofenac suppository group was 39.16 ± 24.58 , in the receiving group of morphine suppository was 35.36 ± 17.14 and in the control group was 28 ± 11.42 years. Sexual distribution of patients in the diclofenac suppository group was 40% female and 60% male, in the receiving group of

morphine suppository was 40% female and 60% male, and in the pethidine group (control) was 44% female and 56% male. There was no significant difference of the sex distribution among the study groups. There were 14 patients with appendicitis and 11 patients with hernia in control group, also, there were 16 patients with appendicitis and 9 patients with hernia in morphine suppository group, and there were 11 patients with appendicitis and 14 patients with hernia in diclofenac group. There was no significant difference between intervention and control groups in the type of anesthesia.

The efficacy of morphine and sodium diclofenac suppository for analgesia after appendectomy and inguinal hernia surgery was investigated in 2, 6, 12, 24 hours postoperative and results are outlined in Tables 1, 2 and 3.

Table 1. VAS mean pain score of patients in different times

Postoperative hours	Control group	Diclofenac group	Morphine group
2	6.52 \pm 1.32	4.36 \pm 1.03 ^a	4.56 \pm 1.15 ^a
6	6.68 \pm 1.14	3.84 \pm 1.17 ^b	4.40 \pm 1.08 ^b
12	6.28 \pm 1.24	3.12 \pm 1.01 ^c	3.68 \pm 1.21 ^c
24	5.84 \pm 1.65	2.44 \pm 1.19 ^d	3.36 \pm 1.11 ^d

^a Significantly decreased when compared with control group, $P < 0.001$.

^b Significantly decreased when compared with control group, $P < 0.001$.

^c Significantly decreased when compared with control group, $P < 0.001$.

^d Significantly decreased when compared with control group, $P < 0.001$.

It was shown that in the patients administrated diclofenac suppository, the administrated dosage of pethidine was lower than the morphine group.

In this study, vomiting and nausea rate were evaluated in the patients. In the diclofenac group, the patients had no nausea and vomiting compared with control and morphine groups and their score was lower than in the diclofenac group compared with morphine and control groups, but it was not statistically significant. Also, side effects were evaluated in patients. Complications such as headache, dizziness, hypotension and urinary retention were evaluated. The results indicated that the most complications were observed in the control group, but there was no significant difference between the groups.

4. DISCUSSION

Today, analgesic administration after surgery has become a routine procedure. The specialty of anesthesia has seen important advances thanks to the development of pain management, improved knowledge of pain physiology and safer anesthetic agents, and incorporation of a better understanding of postoperative pathophysiology into postoperative care. Also, development of minimally invasive surgery has further decreased pain and stress responses, thereby providing potential for increased recovery [15].

In this study, a significant difference was found in the pain relief of the patients in the groups under study. Both drug, morphine and sodium diclofenac suppository, could cause a significant rate of decrease pain compared to the control group. It is showed that the intensity of pain during the considered points of time in diclofenac suppository group was remarkably lower than that of the other group. Two hours after the surgery, the patients in diclofenac-receiving group had more desirable scores than those of the morphine-receiving group, also, the diclofenac group had less nausea and vomiting [16,17].

Abbasalizadeh et al. [18] demonstrated that the pain intensity in diclofenac group during 8, 16, and 24 times was lower than that in morphine-

receiving group. Thus, efficiency of diclophenac for the pain relief after Caesarean surgery was more than morphine suppository [19]. McEvoy [20] showed that the degree of pain in morphine group was significantly more than the other group after surgery. Bruera et al. [21] demonstrated that the amount of the decrease pain in morphine suppository form was more than that in (subcutaneously) injected form it. In Zahiri [22] it was found that pain relief in diclophenac suppository group was significantly more than that in pethidine receiving group.

After analyzing the results, we found that there was no significant difference between diclophenac suppository and morphine with regard to the degree of relieving effect. However, there was a statistically significant difference between the morphine suppository group with control at hours 2, 6, and 12 and also diclophenacsuppository group with control at hours 6 and 12. Bruera et al. [21] showed that there was no significant difference between the two prescription methods of medicine (morphine suppository or injection form) for the sedation of the patients. Khalili et al. [23] indicated that the incidence of nausea and vomiting in the diclofenac group was higher than the morphine group, also, In the study of Karbasi et al. [24] was shown intercostal block with morphine infusion, it severely decreases patient pain after cholecystectomy.

Table 2. Frequency of administrated pethidine in the groups

P value	Control group		Diclofenac group		Morphine group		Frequency of administrated pethidine
	Percent	Frequency	Percent	Frequency	Percent	Frequency	
0.002	12	3	56	14	44	11	Not received
	36	9	32	8	36	9	Once
	48	12	12	3	12	3	Twice
	4	1	0	0	8	2	Three times and more
	100	25	100	25	100	25	Total

Table 3. The nausea and vomiting score of patients in different times

Control & diclofenac group	Control & morphine group	Diclofenac & morphine group	Postoperative hours
0.001	0.013	0.309	2
0.088	0.044	0.527	6
0.002	0.010	0.312	12
0.149	0.221	0.312	24

The P values were presented in above table, and the groups were compared with each other

In the present study, Sodium diclofenac suppository caused more analgesia than morphine suppository, this is due to sodium diclofenac is a non-steroid anti-inflammatory agents, which has analgesic and anti-inflammatory effect. It is assumed to be associated with inhibition of prostaglandin (PG) synthesis, PG is formed as a response to trauma or surgery through cyclooxygenase enzymes which causes inflammation and pain.

5. CONCLUSION

This study is the study that compares sodium diclofenac and morphine suppository for analgesia after appendectomy and inguinal hernia surgery. Morphine suppository 10 mg and Sodium diclofenac suppository 100mg provided analgesia effects after surgery. Both diclofenac and morphine suppositories were effective in control of postoperative pain and decrease of the amount of received pethidine and complications of narcotic drugs. In general, Sodium diclofenac suppository caused more analgesia than morphine suppository after appendectomy and inguinal hernia surgery, and can be well tolerated without resulting in any adverse effect in patients. Also, the patients had been discharged few days after surgery. Further studies are necessary to evaluate the adverse effects of both drugs, particularly in elderly.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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