

Effect of Meloxicam on Postoperative Pain Relief after Inguinal Hernia Repair with Local Anaesthesia

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ABSTRACT

Aim: To investigate the effect of the administration of a single dose of meloxicam pre-emptively on postoperative pain management in patients who underwent inguinal hernia repair under local anaesthesia.

Subjects and Method: Fifty patients who underwent inguinal hernia repair under local anaesthesia during the period November 2005 to May 2006 were recruited into the study prospectively. The patients were randomized to two groups regarding administration and non-administration of pre-emptive meloxicam. The postoperative visual analogue pain scale (VAS) values at 4, 8, 12 and 24 hours and analgesic needs of the patients were recorded.

Results: No difference was found between the groups in terms of age, gender, hernia localization and type. The VAS values of the patients regarding their pain severity were evaluated at 4, 8, 12 and 24 hours and were significantly lower in the group which received meloxicam pre-emptively ($p = 0.001$, 0.0001 , 0.003 and 0.0001 respectively). The need for non-steroidal anti-inflammatory drug was also found to be significantly lower ($p = 0.0001$).

Conclusion: Postoperative pain severity and hence analgesic requirement were significantly decreased in the patients who received meloxicam pre-emptively. Single dose pre-emptive meloxicam seems to be an effective analgesic therapy for patients undergoing inguinal hernia repair under local anaesthesia. It thereby improves patients comfort and should be considered for use in outpatient surgery.

Efecto del Meloxicam en el Alivio del Dolor Postoperatorio tras la Reparación de una Hernia Inguinal con Anestesia Local

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RESUMEN

Objetivo: Investigar el efecto de la administración de una dosis de meloxicam de forma preventiva en el tratamiento del dolor postoperatorio en pacientes sometidos a una reparación quirúrgica de hernia inguinal bajo anestesia local.

Sujetos y Métodos: Cincuenta pacientes que tuvieron una reparación de hernia inguinal bajo anestesia local durante el período de noviembre de 2005 a mayo de 2006, fueron reclutados para el estudio de modo prospectivo. Los pacientes fueron divididos aleatoriamente en dos grupos, partiendo del criterio de la administración o no administración de meloxicam de modo preventivo. Se registraron los valores de la escala visual-analógica (EVA) para el dolor postoperatorio a las 4, 8, 12 y 14 horas, así como las necesidades analgésicas de los pacientes.

Resultados: No se hallaron diferencias entre los grupos en relación con la edad, el género, la localización y el tipo de hernia. Los valores de la EVA de los pacientes con respecto a la severidad de su dolor, fueron evaluados a las 4, 8, 12 y 24 horas, y resultaron ser significativamente más bajos en el grupo que recibió meloxicam de forma preventiva ($p = 0.001$, 0.0001 , 0.003 y 0.0001 respectivamente). También se halló que la necesidad de un medicamento anti-inflamatorio no esteroidal era significativamente más baja ($p = 0.0001$).

Conclusión: La severidad del dolor postoperatorio y por lo tanto la necesidad de analgésicos, experimentaron una disminución significativa en los pacientes que recibieron meloxicam de forma

preventiva. La dosis sencilla de meloxicam de forma preventiva parece ser una terapia analgésica efectiva para pacientes que han sido sometidos a reparación quirúrgica inguinal con anestesia local. Su aplicación mejora el alivio de los pacientes, y debe tenerse en cuenta su uso para la cirugía ambulatoria.

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INTRODUCTION

Postoperative pain is a considerable problem faced following a hernia operation (1, 2). Many studies have been performed in order to reduce postoperative pain. Pre-emptive analgesia, a concept first introduced at the beginning of the 20th century, is defined as an anti-nociceptive treatment that prevents establishment of altered central processing of afferent input due to injuries and starts before surgery (2–6). Postoperative pain may be reduced more considerably by analgesics administered in anti-nociceptive dose before the surgical procedure compared to post-procedure analgesics (7, 8). Many drugs such as systemic opioids, non-steroidal anti-inflammatory drugs (NSAIDs) and neuroaxial blocking agents have been assessed in various studies (4). Opioids have significant adverse effects such as respiratory depression, nausea, vomiting, constipation and urinary retention. Both pre-operative and postoperative administration of COX-2 inhibitors seem to exert significant opioid-sparing effect. The studies regarding the use of COX-2 inhibitors suggest that they improve the quality of recovery and patient satisfaction with post-operative pain management (4).

Non-steroidal anti-inflammatory drugs have been widely used, following surgical interventions, for reducing pain and the need for opioid (9, 10). They inhibit the activity of cyclo-oxygenases (COX). While clearly known side effects of NSAIDs are thought to be due to COX-1 inhibition, its analgesic and antipyretic effects are believed to be due to COX-2 inhibition (11). These assumptions constitute the main reason for the development of selective COX-2 inhibitors (12).

Inguinal hernia operations are performed under local anaesthesia in many clinics and most of these patients are discharged home within a few hours postoperatively. Reduction or prevention of postoperative pain is important for patient comfort and to allow early discharge. In this study, the effect of pre-emptive meloxicam therapy on postoperative pain and analgesic need was investigated in patients who underwent inguinal hernia repair under local anaesthesia.

SUBJECTS AND METHODS

This prospective and randomized study included 50 patients who underwent inguinal hernia repair under local anaesthesia between November 2005 and May 2006. The study was approved by Gazi University Ethical Committee. Age, hernia type, hernia localization (left/right) and gender of each patient were recorded. Hernia types were classified according to Gilberts' classification (Table 1). Lichtenstein tension free inguinal hernia repair was performed in all patients. Patients

Table 1: Modified Gilberts' Classification by Rutkow and Robbins (34)

Type 1	Indirect inguinal hernia, tight internal ring through which passes a peritoneal sac of any size
Type 2	Indirect inguinal hernia, moderately enlarged internal ring that measures no more than 4 cm
Type 3	Indirect inguinal hernia, patulous internal ring of more than 4 cm
Type 4	Direct inguinal hernia, essentially the entire floor of the inguinal canal is defective
Type 5	Direct inguinal hernia, diverticular defect of no more than 1 cm or 2 cm in diameter
Type 6	Both indirect and direct inguinal hernia (Pantaloon hernias)
Type 7	Femoral hernia

were divided into two groups in terms of pre-operative pre-emptive meloxicam usage. Patients in group I received no pre-emptive analgesia while those in group II received meloxicam (15 mg orally) 30 minutes before the operation. All patients were sedated with 2 mg intravenous midazolam at the beginning of the procedure and received another 2 mg as needed. The content of the local anaesthetic infiltrated was 4 mls of 1% lidocaine, 1 ml of lidocaine containing 1:200 000 epinephrine and 5 mls of 0.5% bupivacaine. General anaesthesia was not required for any patient. All the patients were hospitalized for 24 hours following the operation in order to determine their postoperative pain levels and analgesic needs. Postoperative pain of each patient was evaluated at 4, 8, 12 and 24 hours following the procedure.

Pain scores were evaluated using the visual analogue pain scale (VAS). Patients were asked to score their pain with a number between 0 and 10 (0 for no pain and 10 for extremely severe pain). A single dose of non-selective NSAID (Diclofenac sodium 75 mg) was administered intravenously to patients whose VAS was >3 in the postoperative period. Patients whose VAS remained above 3 in spite of the single dose of non-selective NSAID, received parenteral (IM) meperidine HCl at 0.5 mg/kg.

The data were evaluated by Chi-square and Mann Whitney test using SPSS 11.0 version; $p < 0.05$ was accepted as significant.

RESULTS

The distribution of patients in terms of age, hernia localization and hernia types is given in Table 2. All of the patients were male. No difference was found between the groups.

Table 2: Demographic characteristics of the patients

	Group I	Group II	p-value
Age (years)	51.4 ± 12.5	50.5 ± 19.7	NS
Left : Right	16 : 9	13: 12	NS
Gilbert's classification			
1	–	–	NS
2	–	–	
3	1	–	
4	5	7	
5	4	2	
6	15	16	

NS: Not significant

However, when the postoperative pain scores were evaluated, a significant difference was found in terms of VAS values at 4, 8, 12 and 24 hours between two groups (Table 3). The VAS values in Group I at 4, 8, 12 and 24 hours were 2.3, 2.6,

Table 3: Postoperative pain scores of the patients

VAS	Group I	Group II	p-value
VAS 4 (Mean ± SE)	2.3 ± 0.3	0.8 ± 0.3	0.0001
VAS 8 (Mean ± SE)	2.6 ± 0.3	0.7 ± 0.3	0.0001
VAS 12 (Mean ± SE)	2 ± 0.3	0.9 ± 0.2	0.003
VAS 24 (Mean ± SE)	1 ± 0.2	0.3 ± 0.1	0.0001

VAS: Visual analogue pain score

2.0 and 1.0 respectively. The values found in Group II were 0.8, 0.7, 0.9 and 0.3 respectively. However, the values of VAS at 8 hours in group I and that at 12 hours in group II were higher than other VAS values. These were the times at which patients required analgesia. The need for analgesia was observed to be lower in the patients in group II who received meloxicam. In Group I, 22 patients (88%) were given NSAID postoperatively while only 9 (36%) patients in Group II received NSAID and the difference was statistically significant ($p = 0.001$) (Table 4). Meperidine was not needed in any of the patients in group II, while 10 (40%) of those in

Table 4: Postoperative analgesic and opioid requirements of the patients

	Group I	Group II	p-value
nsNSAID			
Number received (r): not received (nr)	22:3	9:16	0.001
Opioid			
Number received (r): not received (nr)	10:15	0:25	0.0001

nsNSAID = Non-selective non-steroidal anti-inflammatory drug

group I required it ($p = 0.0001$) (Table 4). Early postoperative complications such as haematoma, seroma and superficial wound site infection were not seen in any of the

patients included in this study. No side effects such as nausea, vomiting or gastric intolerance were observed.

DISCUSSION

Many inflammatory mediators including prostanoids are released as a result of the surgical trauma. These mediators display their effects on pain development by either changing the firing threshold or by direct stimulation of the nociceptors (13). Non-steroidal anti-inflammatory drugs block the prostaglandin (PG) synthesis especially PGE by inhibiting cyclooxygenase enzyme which decreases the production of mediators occurring as a response to an acute injury. Many studies have shown that NSAIDs reduce pain and the need for opioids during the postoperative period (14–16). Non-steroidal anti-inflammatory drugs inhibit both COX I and II. Unwanted side effects which arise due to COX-I inhibition occur along with the anti-inflammatory and anti-pyretic activity (11, 12). Preferential COX-2 inhibitor drugs are used as non-opioid agents for pain control. Pre-operative and postoperative usage of preferential COX-2 inhibitor drugs decrease the side effects of opioids and make the postoperative period for surgical patients more comfortable (4, 17). Meloxicam is one of the NSAIDs which preferentially inhibits the COX-2 enzyme (18–20). The relative ratio of COX-1:COX-2 inhibition of meloxicam on humans was shown to be 1:10–13 (20, 21). Since the half life of meloxicam is approximately 20–22 hours, it can be administered – as a single dose therapy per day. Therefore, meloxicam was chosen as the pre-emptive agent in this study. The recommended daily adult dose is 7.5–15 mg (22). Pre-operative meloxicam usage was shown to be efficient and safe for postoperative pain management in studies performed in animals (23).

COX-2 inhibitors were found to cause less gastric erosion in patients with osteoarthritis and rheumatoid arthritis compared to the non-selective NSAIDs (24, 25). Gastrointestinal side effects arising from chronic use of meloxicam were investigated and it was found to cause less gastrointestinal side effects in patients with osteoarthritis as compared to the non-selective NSAIDs (26). Because meloxicam causes less inhibition of gastric mucosal PGE synthesis, gastric mucosa is minimally disturbed and gastric tolerance towards the drug is very high (27, 28). Several studies have shown that meloxicam does not impair platelet function or alter tromboxane levels (29, 30). In the present study, no early complications, such as seroma or haematoma at the wound site, that would indicate thrombocyte disturbance, had occurred. Also, none of the patients experienced gastrointestinal side effects such as epigastric pain, nausea and vomiting.

Studies which focussed on the effectiveness of non-selective NSAIDs on postoperative pain showed that most of these agents reduced postoperative pain and hence the need for opioids. Nevertheless, this effect varies according to the

chosen drug, dosage and the type of surgical procedure (31, 32). In one study, the average morphine dose required for analgesia was reduced in subjects treated with a pre-emptive analgesic approach (32). In a study using Rofecoxib, less pain and decreased opioid needs were observed in the patients who received pre-emptive analgesia as compared to those who did not (33). In another study, VAS values and morphine usage were found to be decreased by pre-operative meloxicam administration in patients who underwent abdominal hysterectomy (32). That study also showed significantly lower VAS scores throughout the postoperative period in patients who received pre-emptive meloxicam as compared to those who did not. In Group I, 22 patients (88%) required NSAID postoperatively, while in Group II it was 9 (36%, $p = 0.001$). As shown in Table 4, meperidine was not required in any patients in Group II, 10 patients in Group I were given meperidine ($p = 0.0001$).

Pre-emptive analgesia was shown to reduce post-operative pain following hernia repair performed under local anaesthesia and increased patient comfort in the post-operative period.

This study confirms that pre-emptive analgesia with a single dose of 15 mg meloxicam reduces postoperative pain and increases patients' comfort following Lichtenstein tension free hernia repair under local anaesthesia.

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