ORIGINAL ARTICLE

Intra-articular infiltration of bupivacaine in arthroscopic knee surgery: Dexamethasone versus magnesium sulfate as adjuncts

Infiltration intra-articulaire de bupivacaïne dans la chirurgie arthroscopique du genou: Dexamethasone versus sulfate de magnésium comme adjuvants

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Abstract

Introduction: Knee arthroscopy is a common procedure in orthopedics due to its minimally invasive nature. However, it often leads to moderate to severe postoperative pain, especially within the first 24 hours. Several studies demonstrated the efficiency of intra-articular infiltration of analgesics but the optimal infiltration mixture remains a topic of debate.

Aim: The aim of our study was to assess the analgesic role of Dexamethasone or Magnesium Sulfate as adjuncts to intra-articular Bupivacaine after knee arthroscopic surgery.

Methods: It was a prospective randomized double-blinded study including 75 adult patients classified according to the American Society of Anesthesiology (ASA) I-II and undergoing arthroscopic knee surgery under spinal analgesia. They were divided into three groups of 25 each. All patients received intra articular infiltration at the end of surgery: group B received 10 ml of saline solution with 10 ml of bupivacaine 0.5%, group D received 4 mg of dexamethasone in combination with bupivacaine and group Mg received 1.5 g of magnesium sulfate in combination with bupivacaine. Postoperative rescue analgesia was insured by a patient-controlled analgesia (PCA) morphine. The primary outcome was morphine consumption during the first 24 hours after surgery.

Results: The cumulative morphine dose was higher in group B compared to group D and Mg ($p=0.001$ and $p<0.001$, respectively). Group D and group Mg showed comparable cumulative morphine doses ($p=0.52$). At 24 hours postoperatively, static visual analog scale (VAS) scores were higher in the control group compared to group Mg and group D ($p=0.004$ and $p=0.019$, respectively).

Conclusion: The addition of dexamethasone and magnesium sulfate to bupivacaine in intra-articular infiltration improves the quality of postoperative analgesia.

Key-words: Analgesia, Knee joint, Arthroscopy, Intra-articular injection, Dexamethasone, Magnesium sulfate, Bupivacaine.

Résumé

Introduction: L'arthroscopie du genou est une procédure courante en orthopédie, souvent associée à des douleurs post-opératoires modérées à sévères. Récemment, l'infiltration intra-articulaire du genou a suscité un regain d'intérêt pour améliorer l'analgésie et la réhabilitation des patients après l'intervention. Cependant, les molécules à utiliser pour l'infiltration restent sujets à controverses.

Objectif : Évaluer l'efficacité de l'ajout de dexaméthasone ou de sulfate de magnésium à la bupivacaïne intra-articulaire pour améliorer l'analgésie postopératoire après une arthroscopie du genou.

Méthodes : Il s'agissait d'une étude prospective randomisée en double aveugle incluant 75 patients adultes, classés selon la société américaine d'anesthésiologie (ASA) I-II et proposés pour une chirurgie arthroscopique du genou sous rachianesthésie. Ils étaient répartis en trois groupes de 25 chacun. Tous les patients ont reçu une infiltration intra-articulaire en fin d'intervention : le groupe B a reçu 10 ml de sérum salé isotonique avec 10 ml de bupivacaïne isobare 0,5%, le groupe D a reçu 4 mg de dexaméthasone (10ml) associé à la bupivacaïne, et le groupe Mg a reçu 1,5 g de sulfate de magnésium (10ml) en association à la bupivacaïne. L'analgésie postopératoire de secours était assurée par une PCA (patient controlled analgesia) morphine. Le critère de jugement principal était la consommation de morphine dans les 24 heures suivant la chirurgie.

Résultats : La consommation de morphine était plus élevée dans le groupe B que dans les groupes D et Mg ($p=0,001$ et $p<0,001$, respectivement). Les groupes D et Mg étaient comparables ($p=0,52$). À 24 heures postopératoires, les scores EVA statiques étaient plus élevés dans le groupe B par rapport aux groupes Mg et D ($p=0,004$ et $p=0,019$).

Conclusion : L'utilisation d'un adjuvant à la bupivacaïne tel que la dexaméthasone ou le sulfate de magnésium en infiltration intra-articulaire améliore l'analgésie postopératoire après chirurgie arthroscopique du genou.

Mots-clés : Infiltration ; Analgésie ; Arthroscopie ; Dexaméthasone ; Sulfate de Magnésium ; Bupivacaïne.

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Introduction

Knee arthroscopy (KA) is commonly performed in orthopedic surgery due to its minimally invasive technique and low perioperative complication rates. However, patients frequently experience moderate to severe pain, particularly within the first 24 hours following the procedure [1]. Effective management of postoperative pain is essential to promote faster rehabilitation and reduce the overall care burden. Various pain control strategies have been implemented to manage postoperative discomfort after KA. Intra-articular infiltration (IAI) of analgesics has recently gained attention for its ability to enhance recovery, although there is still debate regarding the optimal infiltration mixture [2].
The aim of this study was to compare the effectiveness of adding dexamethasone or magnesium sulfate to bupivacaine, versus bupivacaine alone, for IAI after knee arthroscopy.

Methods

Type of study

It was a prospective, randomized, double-blinded study, conducted in the anesthesia and intensive care department and the orthopedics department of the Mongi Slim university Hospital of Tunis over a period of 5 months from January 2022 to May 2022. The study was approved by the local ethics committee.

Patients

We included all patients aged between 18 and 60 years who were scheduled for knee arthroscopy (ligamentoplasty and/or meniscal repair) under spinal anesthesia. Patients were classified as ASA I or II according to the American Society of Anesthesiologists classification. We did not include patients who refused spinal anesthesia or had contraindications to it, who had a known allergy to local anesthetics, who could not understand the visual analog pain scale (VAS) or the functioning of patient-controlled analgesia (PCA) with morphine, who were on long-term opioid therapy, who had contraindications to morphine, acetaminophen, or nefopam, and who were undergoing surgery for recurrent knee injury. Patients were excluded if they experienced a technical issue with the PCA morphine or if they required conversion to general anesthesia.

Outcomes

The primary outcome was cumulative morphine consumption during the first 24 hours after surgery.
The secondary outcomes were the values of the static and dynamic visual analog scale (VAS) scores at specific intervals: 1 hour (H1), H2, H4, H6, H12, and H24 post-surgery, time to first mobilization, satisfaction with postoperative analgesia (rated as satisfied, mildly satisfied, or not satisfied), and the adverse effects of local anesthetics or morphine (local anesthetic toxicity, nausea or vomiting, urinary retention).
Randomization and groups definition
Preoperatively, the randomization was performed using a software that generates a list of random numbers (Random Number Generator Pro). The preparation of the infiltrated solutions was carried out by an anesthesiologist different from the one who provides anesthesia and the one who collects the data postoperatively. The patient and the surgeon were blinded to the patient's group.
Patients were divided into 3 groups: Group B received 50 mg of bupivacaine (10 mL) with 10 mL of saline solution, group D received 50 mg of bupivacaine (10 mL) with 4 mg of dexamethasone (1 mL) and 9 mL of saline solution, and group Mg received 50 mg of bupivacaine (10 mL) with 1.5 g of magnesium sulfate (10 mL).

Study procedures

All patients were evaluated at the pre-anesthetic consultation. At this stage, the protocol was explained and patients' oral consent was obtained. The investigators also explained the assessment of pain according to the VAS as well as the use of PCA morphine.
In the operating room, the patient's anesthetic file was verified, and they were positioned in the supine position. Non-invasive monitoring of electrocardiogram, blood pressure, pulse, and oxygen saturation was conducted. An 18-gauge peripheral venous catheter was inserted in the upper limb, with a 500 ml crystalloid preload.
Under strict aseptic conditions, the L3/L4 or L4/L5 intervertebral space was located in the sitting position, and a spinal puncture was performed with a 25-gauge needle.
After obtaining clear cerebrospinal fluid, a standardized mixture of 12.5 mg of hyperbaric bupivacaine and 2.5 µg of sufentanil was injected. The patient was then placed in supine position and given 2 L/min of oxygen through a nasal cannula.
Before the surgery, the sensory block (at least T12) and motor block (modified Bromage score of at least 2) were confirmed. Sympathetic block was managed with crystalloid infusion and ephedrine boluses. The same orthopedic surgical team performed the procedure for all patients. At the end of the surgery, the surgeon administrated the intra articular solution through the trocars.
Postoperatively, patients were monitored in the recovery room and received intravenous analgesia with acetaminophen (1 g x 4/ 24 hours) and nefopam (20 mg x 4/ 24 hours). A PCA morphine pump was prescribed for 24 hours, with these parameters: morphine 1 mg/mL, bolus 1 mg, refractory period 15 minutes, and maximal dose 20 mg/4 hours.
Ondansetron (4 mg x 3) was administrated in case of nausea.

Statistical analysis

The sample size required for the study was calculated based on the article of Amer A et al [3]. The mean morphine consumption in the control group was 21 mg. In order to have a 20% reduction in morphine consumption in the test groups (D and Mg), with a risk of error 0.05 and a power of the study of 90 %, the necessary number of patients was 18 per group. To account for potential exclusions, we included 25 patients in each group.

We used IBM SPSS Statistics v.23.0 for statistical analysis. The Kolmogorov- Smirnov test was used to assess the distribution of data. Descriptive statistics were performed. Quantitative variables were presented as mean ± standard deviation (SD) or as median with 25-75% interquartile range (IQR), as appropriate. Categorical variables were expressed by absolute numbers and percentages and were compared using the Chi-square test or Fisher's exact test.

Based on data distribution between groups, one-way analysis of variance (ANOVA) or the Kruskal-Wallis test was performed. In situations where a significant difference was found in intergroup comparisons, the Tukey test was employed to establish which group was responsible for the difference. When the variance homogeneity assumption was not fulfilled, Welch's test was applied. The paired sample t-test or Wilcoxon signed-ranks test was used to compare different vital signs, anxiety and pain scale in each group. P value < 0.05 was considered statistically significant.

Results

Ninety-two patients were evaluated for eligibility criteria. 17 patients were not included. The remaining 75 patients were then allocated randomly to one of the three groups (figure 1). Finally, 25 patients were analyzed in each group.

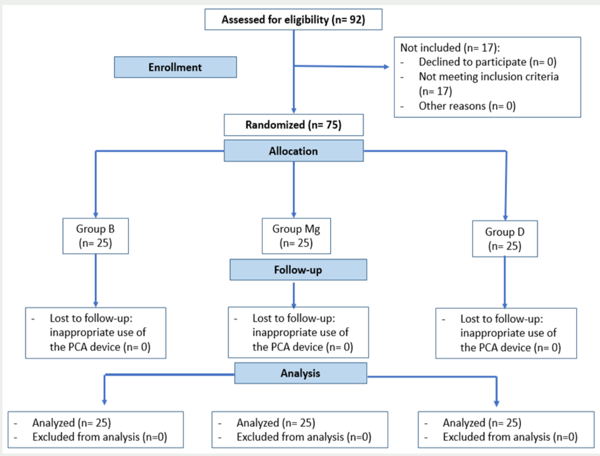

Figure 1. CONSORT flow chart of the study

The study groups were comparable in terms of sociodemographic features, anesthesia and surgery related data (Table 1).

The comparison of cumulative doses of morphine between groups was represented in figure 2.

Table 1. Comparison of demographic characteristics and type of surgery

	Group B[a] (n=25)	Group D[b] (n=25)	Group Mg[c] (n=25)	P
Sex (M/F)	19/6	19/6	20/5	0.92
Age (years)	33.4 ± 9,5	32.4± 12.1	30.5 ± 7.5	0.54
BMI[d] (Kg/m²)	27.5[24.8-28.7]	24.2[22-27.5]	26.5[23.1-24.8]	0.11
ASA[e] score (I/II)	24/1	18/7	20/5	0.07
Comorbidities:				
. Hypertension	0 (0%)	1 (4%)	1 (4%)	0.6
. Diabetes	0 (0%)	0 (0%)	2 (8%)	0.13
. Asthma	0 (0%)	4 (16%)	1 (4%)	0.06
. COPD[f]	0 (0%)	0 (0%)	1 (4%)	0.36
Type of surgery:				0.08
. Ligamentoplasty	15 (60%)	8 (32%)	8 (32%)	
. Meniscal repair	6 (24%)	13 (52%)	8 (32%)	
.Ligamentoplasty and meniscal repair	4 (16%)	4 (16%)	9 (36%	
Duration of surgery (min)	90 [70-120]	80 [50- 90]	80 [45- 95]	0.125

Group B[a]: Group Bupivacaine; Group D[b]: Group Dexamethasone; Group Mg[c]: Group Magnesium; BMI[d]: Body Mass Index; ASA[e]:American Society of Anesthesiologists; COPD[f]: Chronic obstructive pulmonary disease.

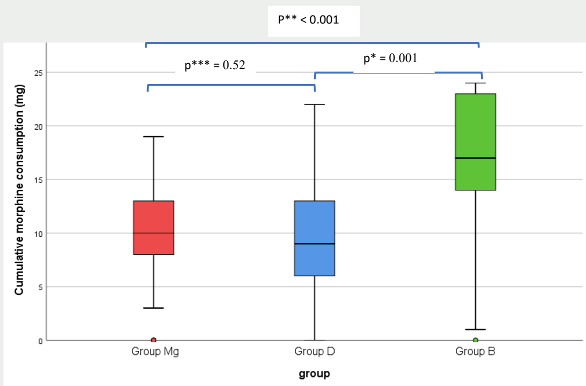

Figure 2. Comparison of the cumulative morphine consumption during the first postoperative 24 hours.

Group B[a]: Group Bupivacaine; Group D[b]: Group Dexamethasone; Group Mg[c]: Group Magnesium; p* : Group B vs Group D; p** : Group B vs Group Mg; p*** : Group D vs Group Mg

The comparison of morphine dose needed according to postoperative time ranges was detailed in table 2.

Table 2. Comparison of morphine consumption (mg) according to time intervals

	Group B[a] (n=25)	Group D[b] (n=25)	Group Mg[c] (n=25)	p*	p**	p***
[H0-H1]	0 [0-0]	0 [0-0]	0 [0-0]	1	1	1
[H1-H2]	0.36 [0-1]	0 [0-0]	0 [0-0]	0.015	0.010	0.977
[H2-H4]	1.24 [0-2]	1 [0-1]	1 [0-2]	0.033	0.470	0.164
[H4-H6]	3.04 [0-6]	2 [0.5-3]	2 [1.5-3]	0.007	0.054	0.192
[H6-H12]	6.08 [4.5-8]	3.44 [0-10]	4 [3-5]	0.001	<0.001	0.497
[H12-H24]	5.96 [0-10]	3.24 [0-8]	3 [2-4]	0.001	<0.001	0.790

Group B[a]: Group Bupivacaine; Group D[b]: Group Dexamethasone; Group Mg[c]: Group Magnesium; p* : Group B vs Group D; p** : Group B vs Group Mg; p*** : Group D vs Group Mg

The comparison of the dynamic VAS scores at 24 hours was represented in table 3.

There were no differences among the three groups regarding time to first mobilization, first morphine request, side effects of morphine, and patient satisfaction (Table 4). No patient had local anesthetic toxicity.

Table 3. Comparison of the static and dynamic visual analog scale scores

	Group B[a] (n=25)	Group D[b] (n=25)	Group Mg[c] (n=25)	P*	P**	P***
Static VAS[d]:						
H1	0 [0-0]	0 [0 ; 0]	0 [0-0]	1	1	1
H2	0 [0-2]	0.65 [0-3]	0 [0 -1.5]	0.118	0.385	0.881
H4	3 [2-4]	2.96 [0-5]	2.56 [0-5]	0.01	0.02	0.481
H6	4.92 [2-6]	4 [3-5]	4 [3-5]	<0.001	0.004	0.834
H12	7 [6-8]	4.76 [2-9]	3 [4-6]	0.019	<0.001	0.984
H24	4 [3-5]	2.92 [0-6]	2.82 [0-6]	0.019	0.004	0.588
Dynamic VAS[d]: H24	6 [4-6.5]	4.92 [3-7]	4 [4-5]	0.114	0.005	0.101

Group B[a]: Group Bupivacaine; Group D[b]: Group Dexamethasone; Group Mg[c]: Group Magnesium; VASd: Visual analog scale ; p * : Group B vs Group D; p** : Group B vs Group Mg; p*** : Group D vs Group Mg

Table 4. Comparison of first morphine request, side effects of morphine, first mobilization and patients'satisfaction

	Group B[a] (n=25)	Group D[b] (n=25)	Group Mg[c] (n=25)	p*	p**	p***
Timing of first morphine request (Hours)	4.76 [2 ; 5]	3.03 [0 ; 10]	4 [2 ; 4.5]	0.588	0.693	0.360
Nausea	2 (8%)	3 (12%)	2 (8%)	1	1	1
Vomiting	1 (4%)	2 (8%)	0 (0%)	0.49	1	1
Urinary retention	2 (8%)	0 (0%)	1 (4%)	1	1	0.49
First mobilization (Hours)	22 [18 ; 24]	22 [18 ; 24]	24 [20 ; 24]	0.536	0.69	0.343
Patients' satisfaction				0.304	0.471	0.599
Not satisfied	1 (4%)	0 (0%)	1 (4%)			
Mildly satisfied	5 (20%)	5 (20%)	2 (8%)			
Satisfied	19 (76%)	20 (80%)	22 (88%)			

Group B[a]: Group Bupivacaine; Group D[b]: Group Dexamethasone; Group Mg[c]: Group Magnesium; p *: Group B vs Group D; p**: Group B vs Group Mg; p***: Group D vs Group Mg

Discussion

This prospective, double-blind, randomized study, including 75 patients, aimed to assess the analgesic contribution of dexamethasone and magnesium as adjuncts to intra-articular bupivacaine after knee arthroscopic surgery.

The three groups were comparable in terms of demographic characteristics, type of surgery, and duration of the procedure. The cumulative dose of morphine was statistically higher in the bupivacaine group compared to the magnesium and dexamethasone groups (p=0.001 and p<0.001, respectively). There was no significant difference between the dexamethasone group and magnesium group in terms of cumulative morphine dose.

Static VAS values were statistically higher in the bupivacaine group compared to the dexamethasone and magnesium groups.

The dynamic VAS value at H24 was significantly lower in the magnesium group compared to the bupivacaine group (p=0.005).

Strengths and Limitations

This study had some limitations, such as the use of the Visual Analog Scale (VAS), a subjective measure of pain, and the inclusion of different types of surgeries, like ligament reconstruction and meniscal repairs, which involve varying levels of postoperative pain. Nevertheless, the distribution of surgeries was balanced across the three groups. Additionally, bupivacaine was used instead of ropivacaine, a less chondrotoxic option [4], due to the latter's unavailability in our institution.

Nevertheless, this was an original topic as we compared magnesium sulfate and dexamethasone as adjuncts to bupivacaine in IAI. To our knowledge, we did not find any studies in the current literature that have compared the postoperative analgesic effects of these two adjuncts.

The three study groups were comparable in terms of all biometric characteristics, reflecting effective randomization.

Pain charactericts after intraarticular arthroscopy

Postoperative pain is primarily neurological. It is mediated by inflammatory mediators present at the surgical site, which sensitize peripheral nociceptors. These substances are responsible for the peripheral nociceptive component, also known as primary postoperative pain. However, a central component, known as secondary hyperalgesia, adds to this peripheral pain [5].

The underlying mechanisms of central hyperalgesia are increasingly understood. They are very similar for various types of pain and are at the origin of neuropathic pain. Pain sensations, such as allodynia and hyperalgesia, appear to be linked to the hyperexcitability of nociceptive neurons [6]. The N-methyl-D-aspartate (NMDA) receptor has gained particular interest for its key role in the genesis of this hyperexcitability [7,8].

NMDA receptors are found both in the central and peripheral nervous systems. Research has shown their existence in joints [9,10], as well as in the skin and muscles, where they play a role in the sensory transmission of harmful stimuli.

Several studies have been conducted to prevent postoperative hyperalgesia. Intra-articular infiltration of local anesthetics was among the first approaches to postoperative analgesia targeting these receptors in the context of arthroscopic surgery, including knee arthroscopy.

Intra-articular Infiltration

Intra-articular infiltration of the knee involves injecting a local anesthetic directly into the knee joint during or after surgery. This technique targets the source of pain specifically while minimizing the systemic effects of the anesthetic. The goal is to provide immediate pain relief and prolong this effect during the critical hours following surgery [11].

Bupivacaine

Bupivacaine is a local anesthetic that exerts its effect by inhibiting nerve conduction, which results in reduced pain perception in the specifically targeted area. In the context of postoperative pain management, a single administration of bupivacaine directly into the surgical area, such as the knee joint, is a rational approach to alleviate pain and promote recovery [12].

However, the analgesic effect of bupivacaine is controversial, as other studies have found that its analgesic effect in the postoperative setting was effective for only a short duration of 4 to 6 hours compared to a placebo, which aligns with the results of our study. We observed significant increases in VAS scores starting from the fourth postoperative hour. The DUPRA (DUtch Pain Relief after Arthroscopy) trial, a randomized prospective study conducted by Campo et al. [13], compared the effect of low doses of bupivacaine in IAI versus a saline solution. Dynamic and static VAS scores at the first and fourth hours were higher in the saline group compared to the bupivacaine group ($p < 0.01$). A study conducted by Andres et al. supported this hypothesis by demonstrating that verbal rating scale (VRS) and VAS scores were lower in the bupivacaine group at twenty minutes, one hour, and four hours after surgery compared to the control group, which received saline solution in IAI [14].

Magnesium Sulfate

Magnesium sulfate ($MgSO_4$) plays a crucial role in the development and functioning of the central and peripheral nervous systems. It is important for stabilizing the cell membrane of nerve cells, promoting their regeneration, and inhibiting inflammatory processes [15]. The analgesic effect of magnesium can be attributed to its inhibitory action on synaptic nociceptors by blocking NMDA receptors [16]. Several clinical trials have tested the analgesic effect of $MgSO_4$ in various types of surgeries, including arthroscopic surgery.

A 2018 study by Devi et al. compared the addition of $MgSO_4$ and dexmedetomidine to bupivacaine alone in knee arthroscopy. It showed that the duration of analgesia was prolonged in the bupivacaine-$MgSO_4$ group compared to bupivacaine alone ($p = 0.001$). Static and dynamic VAS scores were lower in the $MgSO_4$ group compared to the bupivacaine group ($p = 0.002$ and $p = 0.004$, respectively). The rescue analgesic use was higher in the bupivacaine group ($p < 0.001$) [17]. A meta-analysis conducted by Xiang et al. and published in 2021 included six randomized controlled trials comparing the effect of bupivacaine alone versus bupivacaine plus $MgSO_4$ in IAI for knee arthroscopy [18]. It concluded that the addition of magnesium as an adjunct to bupivacaine was associated with a significant prolongation of postoperative analgesia ($p = 0.006$) and a delay in the first need for analgesics ($p = 0.03$). Additionally, this combination resulted in a significant reduction in pain scores ($p = 0.007$) and decreased analgesic consumption ($p < 0.00001$), with no notable impact on postoperative nausea or vomiting ($p = 0.37$).

The results of our study aligned with those found in the literature, showing that at 6, 12, and 24 hours, static VAS values were statistically higher in the bupivacaine group than in the magnesium group, and dynamic VAS values at 24 hours also higher in the bupivacaine group compared to the magnesium group ($p = 0.005$). Total morphine consumption was higher in the bupivacaine group compared to the magnesium group ($p < 0.001$).

Dexamethasone

Dexamethasone is a synthetic glucocorticoid derived from 9α, which has powerful anti-inflammatory properties and minimal effects on mineralocorticoids [19]. We chose it because it is highly selective, making it safer and less likely to cause potential side effects. It directly acts on postoperative pain by reducing inflammatory processes through its effect on COX2 [20] and the secretion of prostaglandins, and by blocking the transmission of nociceptive impulses along myelinated fibers [21]. Several studies have combined dexamethasone with local anesthetics in peripheral nerve blocks to test its analgesic effect, showing that it prolongs the duration of peripheral blocks [20-22]. Based on these findings, we hypothesized that such beneficial effects of dexamethasone would manifest when it is associated with local anesthetics in intra-articular infiltration.

Bhattacharjee et al. [23], in 2014, studied the effect of dexamethasone combined with levobupivacaine in IAI for knee arthroscopy. Fifty patients were divided into two groups: the levobupivacaine with dexamethasone (D) group and the levobupivacaine with saline (L) group. Time to first request for additional analgesics was longer in the D group (10.24 ± 2.8 hours) compared to the L group (5.48 ± 1.6 hours), and total sodium diclofenac consumption during the first 24 postoperative hours was significantly lower in the D group.

Moeen et al. [24] compared dexamethasone and dexmedetomidine as adjuncts to bupivacaine versus bupivacaine alone in IAI for sixty patients undergoing knee arthroscopy under spinal anesthesia. This study showed that VAS scores were lower in the dexamethasone group compared to the bupivacaine-only group. The time to the first request for analgesics was significantly shorter in the placebo group compared to the dexamethasone group ($p = 0.001$). The total rescue acetaminophen dose was higher in the placebo group compared to the test groups ($p = 0.001$).

In 2020, Punj et al. [25] compared the analgesic effect of adding neostigmine and dexamethasone to bupivacaine in IAI for knee arthroscopy, concluding that the mean duration of postoperative analgesia was significantly longer in the dexamethasone group compared to the neostigmine group ($p < 10-3$), and the need for additional analgesia on the day of surgery was significantly lower in the dexamethasone group ($p = 0.0422$ and 0.0103, respectively).

The results of our study were comparable to those previously described regarding postoperative analgesic consumption. However, there was no significant difference in the time to request additional analgesia in our study. This could be due to several factors: the nature of the surgery, the duration of the tourniquet, and the medications used in spinal anesthesia. Further in-depth studies on this subject are recommended in the future.

Dexamethasone versus Magnesium Sulfate

To date, no study in the literature has compared the

postoperative analgesic effect of adding magnesium sulfate to that of adding dexamethasone to bupivacaine in IAI for knee arthroscopic surgery. Previous studies have shown, as noted above, that both dexamethasone and magnesium sulfate, as adjuncts to bupivacaine in IAI, improve postoperative analgesia in terms of duration and quality. The addition of our study was to compare these two effects individually.
The results of our study showed that the effects of dexamethasone and magnesium sulfate were similar. There was no statistically significant difference in the analgesic effect of the two molecules. Additionally, the total morphine consumption was lower in patients who received these adjuncts compared to those who received bupivacaine. No significant difference was noted between the two groups (Mg and D) regarding total morphine consumption. No significant difference was observed for postoperative side effects.

Perspectives

The use of adjuncts such as magnesium sulfate and dexamethasone in intra-articular injections is becoming increasingly common as it has proven effective in improving postoperative analgesia and reducing pain in patients undergoing arthroscopic surgery. However, there is still a need for further research to compare these two adjuncts in terms of efficacy, duration of action, potential side effects, and cost-effectiveness. This encourages further multicenter studies to expand the sample size and make this clinical practice a standard while ensuring patient safety.

Conclusion

Intra-articular infiltration is a promising technique for pain management. The addition of dexamethasone and magnesium sulfate to bupivacaine improves the quality of postoperative analgesia by reducing morphine consumption and prolonging the effect of local analgesia, which allows for early patient mobilization and rehabilitation.

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