

Original Article**Analgesic effects of intra-articular fentanyl, pethidine and dexamethasone after knee arthroscopic surgery***H. Saryazdi*, P. Kashefi*, M. Heydari*, A. Kiani*****Abstract**

BACKGROUND: Many different methods have been used in an effort to provide adequate analgesia after knee arthroscopic surgery. In this study analgesic effect of intra-articular fentanyl, pethidine and dexamethasone was compared.

METHODS: In a double blind randomized study 48 male patients undergoing knee arthroscopic meniscectomy were allocated to groups receiving intra-articular fentanyl 50 µg or pethidine 20 mg or dexamethasone 8 mg at the end of arthroscopy during general anesthesia. Postoperative pain scores using visual analogue scale were measured and also analgesic requirements and the time of ability to walk were recorded.

RESULTS: Pain scores at one, two, six and 24 h after intra-articular injection were not significantly different for fentanyl and pethidine but were higher significantly for dexamethasone at all four mentioned times. The mean average time of ability to walk was significantly longer for dexamethasone. The analgesic requirements during the first 24 h after intra-articular injection were significantly greater only for dexamethasone too.

CONCLUSION: Better postoperative analgesia, less pain score and shorter time to walk were achieved by fentanyl and pethidine in comparison to dexamethasone but the results were not significantly different between fentanyl group and pethidine.

KEYWORDS: Arthroscopy, opioid, pain.

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Arthroscopy of the knee has spared patients large incisions and decreased morbidity compared with those of open incisions but has not eliminated pain^{1, 2}. The demonstration that opioid receptors are present in the peripheral nervous system prompted using opioid for regional analgesia³. Intra-articular (IA) opioid administrations have been studied with regard to their analgesic efficacy⁴. Some reports showed IA opioid to be ineffective⁴⁻⁶. Others reported significant positive effects on postoperative analgesia⁷⁻⁹. Better postoperative analgesia with IA fentanyl than morphine is reported too¹⁰. More over, IA triamcinolone and methylprednisolone may improve pain relief after meniscectomy^{11, 12}.

Also, IA dexamethasone may improve pain in advanced chronic synovitis¹³. Because both corticosteroids and opioids have documented peripheral effects and the analgesic effects of them have not been compared in previous studies, we decided to compare the effects of IA pethidine, fentanyl and dexamethasone on the postoperative pain and analgesic requirement after arthroscopic knee surgery.

Methods

After institutional approval and informed patient consent, 48 ASA (American Society of Anesthesiology) physical status I, II (15-65 y) male patients scheduled for knee arthroscopic meniscectomy were included in this double

*Assistant Professors, Department of Anesthesiology, Isfahan University of Medical Sciences, Isfahan, Iran.

**Anesthesiologist.

Correspondence to: Dr Hamid Saryazdi, Department of Anesthesiology, Alzahra University Hospital, Isfahan, Iran.
e-mail: haji@med.mui.ac.ir

blind randomized study. The exclusion criteria included daily intake of opioids or steroids, relevant drug allergy and psychiatric disease. All patients received 10 mg oral diazepam, the night before surgery. Operations were performed under general anesthesia which was induced with fentanyl 2 µg/kg and thiopental 5 mg/kg. Tracheal intubation was facilitated with atracurium 0.6 mg/kg and anesthesia was continued with halothane 0.8% plus morphine 0.1mg/kg and breathed N₂O 50% and oxygen 50% by means of endotracheal tube. A tight pneumatic tourniquet was applied during surgery until 10 minutes after IA injection of drug into the knee joint. At the end of procedure and before removing the arthroscope, patients were randomly allocated into 3 groups for double blind IA drug administration: Group A, (n = 16) 50 µg fentanyl in 10 ml isotonic saline; group B, (n = 16) 20 mg meperidine in 10 ml isotonic saline and group C, (n = 16) 8 mg dexamethasone in 10 ml isotonic saline. The IA drug was given to the surgeon who was blind to kind of medication and performed the injection through the arthroscope at the end of procedure to ensure that the drug would be delivered into the joint. All patients were instructed preoperatively on the use of 10 cm visual analogue scale (VAS) for pain (0 = no pain to 10 = the worst pain) 14. VAS scores were recorded by a blind observer without knowing the kind

of injected drug at 60 min (T₁), 120 min (T₂), 6 h (T₃) and 24 h (T₄) after IA injection. Supplementary analgesia (morphine) was given at patient request, and the time of administration was recorded. In addition, time of ability to walk was recorded for each group. The occurrence of side effects such as nausea and sedation were noted. The data was compared using one way analysis of variance (ANOVA) and Kruskal-Wallis and Duncan test. P<0.05 was considered to be significant.

Results

There was no difference among three groups in terms of age, weight or duration of anesthesia (table 1). No side effect was seen. Pain scores at T₁, T₂, T₆ and T₂₄ were not significantly different between fentanyl and pethidine but were significantly higher for dexamethasone. The mean average time of ability to walk was 31.9 hours for fentanyl, 32.6 hours for pethidine and 42.7 hours for dexamethasone which did not show again any significant difference between groups A and B but it was significantly longer in group C. The mean average morphine requirement during the first 24^h after IA injection was 9.4 mg for fentanyl (group A), 9.75mg for pethidine (group B) and 11.6 mg for dexamethasone (group C) which was not significant between group A and B but was significantly greater in group C (table 2).

Table 1. Patients demographics and durations of anesthesia.

	Fentanyl (A)	Pethidine (B)	Dexamethasone(C)
Age (yr)	24.7 ± 6.01	26 ± 8	26 ± 4.9
Weight (kg)	74 ± 5	71 ± 6	73 ± 8
Duration of Anesthesia (min)	62 ± 11	58 ± 12	64 ± 9

Values are mean ± SD; P values were >0.05

Table 2. Post operative pain scores, morphine consumption and time to move among three groups. Data are shown as mean ± SD.

	Fentanyl (n = 16)	Pethidine (n = 16)	Dexamethasone (n = 16)
1 hour	3.7 ± 5.7	3.7 ± 4.6	7.06 ± 13.3
2 hour	2.75 ± 5.2	3.2 ± 6.3	5.84 ± 9.25
6 hour	2.4 ± 5.2	2.6 ± 3.9	5.78 ± 6
24 hour	1.06 ± 6	1.84 ± 7.7	4.7 ± 6
Morphine (mg)	9.4 ± 2.4	9.75 ± 2	11.6 ± 2.4
Time to move (hr)	31.9 ± 3.9	32.6 ± 3.4	42.7 ± 4.3

P<0.05 between group A and B compared to C.

Discussion

To control pain after arthroscopy NSAIDs ^{7, 15, 16}, IA bupivacaine and morphine ¹⁷ have been used. Peripheral opioid receptors may be activated only in the presence of tissue inflammation; also, opioid binding sites have been identified in synovial tissues indicating that analgesia is locally mediated ^{3, 8, 18, 19}. The analgesic effect of IA opioids after arthroscopy is controversial; in a few studies, IA administration of opioids such as fentanyl or pethidine did not result in significant analgesic effects as compared with IA morphine ¹⁸. However, other studies have revealed significant analgesic efficacy of IA pethidine ^{19, 20} which was shown in the current study too. IA glucocorticoid has been reported to improve pain relief after meniscectomy and synovitis ¹¹⁻¹³. But, in our study dexamethasone didn't show good results on reducing post-arthroscopic pain.

All patients received 2 µg/kg fentanyl IV at induction and 0.1 mg/kg morphine IV before incision and that may have blunted greater difference among groups through a preemptive analgesic effect. Also, postoperative supplemental analgesic use was not likely to have confounded our results as the amounts of administered morphine were comparable in both fentanyl and pethidine groups but, was greater in the dexamethasone group which nevertheless had higher pain scores. More over, we used relatively equipotent doses of fentanyl and pethidine to control this confounding effect on groups A and B. Finally, patients were hospitalized for 24 hours after surgery, there by eliminating any influence of postoperative activity.

In summary, this study demonstrated the same efficacy of 50 µg fentanyl IA as 20 mg pethidine IA in controlling post-arthroscopy pain but little efficacy of dexamethasone IA.

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