

Arthroscopic Meniscectomy under Local Anesthesia

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2.50, during rest was 2.28. The patients subjective satisfaction was sortable as excellent in 53.3% patients. 78% patients returned to previous sports within 2 months after the surgery.

CONCLUSION: The use of local anesthesia in knee arthroscopic surgery allows a reduction of operating time, costs, and an earlier return to work and sport activities, without the need to increase the postoperative pain therapy compared with surgery in spinal anesthesia.

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Key words: Knee; Arthroscopy; Local anesthesia; Meniscectomy

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ABSTRACT

AIM: The knee arthroscopy is often performed under general or spinal anesthesia on an outpatient basis. The purpose of this study was to demonstrate how the most common arthroscopic procedures of the knee can be performed with the combination of IA and pericapsular injection technique.

METHODS: From January 2011 to December 2013, 300 patients underwent arthroscopic meniscectomy surgery under local anesthesia. These patients were compared with other 150 cases treated with GA during the same period. They were evaluated for clinical symptoms during surgery and at predetermined intervals after surgery (1, 4 and 24 h); pain scoring was performed at rest (VASr) and on mobilization (VASm). The post-operative use of paracetamol has been noted (g / day). The patients were evaluated at 3 months after surgery with the patient's personal satisfaction scale and information about the return to work and sporting activities. Every patient was assessed clinically 3 months after surgery.

RESULTS: According to the patients treated with local anesthesia, the median VAS pain score during surgery was 2.27; one hour postoperative during movement was 2.27, during rest was 2.02; four hours postoperative during movement was 2.98, during rest was 2.70; twenty-four hours postoperative during movement was

INTRODUCTION

Arthroscopic knee surgery is commonly performed as an outpatient procedure and is often associated with postoperative pain.

This surgical procedure under general or spinal anesthesia is routinely performed on an outpatient basis. Sometimes this procedure may cause pain and discomfort, or postoperative nausea and vomiting, delaying rehabilitation and discharge, aggressive pain management in the early post-operative period^[1].

For several years knee arthroscopy has been performed with the patient under local anesthesia (LA) with the injection given intra-articularly or subcutaneously at the portal site^[2-6].

Some orthopaedic surgeons do not use local anesthesia for fear of having to convert to general anesthesia (GA) because of inadequate pain control^[5-7], but pre-emptive analgesia for arthroscopic knee surgeries has been demonstrated to provide pain control^[1,8-10].

In literature is shown that intra-articular anesthesia (IA) is associated with shorter operative times, reduced costs, and earlier

return to work and sports^[11].

The purpose of this study was to demonstrate how the most common arthroscopic procedures of the knee can be performed with the combination of IA and pericapsular injection technique.

METHODS

From January 2011 to December 2013, 300 patients (group A) of American Society of Anesthesiologists (ASA) class I or II, underwent arthroscopic meniscectomy surgery with LA. These patients were compared with other 150 cases (group B) treated with GA during the same period.

Exclusion criteria were severe systemic disease, inability of the patient to give informed consent, allergy to study drugs, long-term treatment with analgesics, consumption of analgesics or non-steroidal anti-inflammatory drugs within 24 h of surgery and refusal by the patient. None of the 450 patients were excluded from the study.

The group A age ranged between 28 and 65 years (average age 43.04) at the time of surgery, instead group B age ranged between 32 and 74 years (average age 46.09) at the time of surgery.

According to group A, one hundred ninety patients were male and one hundred and ten patients were female. One hundred eighty-five of the knees were the left and one hundred and fifteen the right. Forty-four patients underwent total meniscectomy and two hundred fifty-six to partial meniscectomy; two hundred and fifteen were traumatic meniscal tears, eighty-five degenerative lesions. In sixty cases osteochondral lesions were classified during arthroscopy, according to the Outerbridge classification^[12], as type 3 or 4.

The mean patient's weight was 76.33 kg (range, 56 to 93 kg), the mean BMI was 24.92.

All the 300 patients received IA with 10 ml of 20 mg/mL lidocaine and 10 mL of 10 mg/mL naropine through the classical arthroscopic access performed by the surgeon, about 20 minutes before surgery.

Arthroscopies were performed as day cases by one surgeon.

The median duration of surgery was 19,15 minutes (range, 14 to 25 minutes) (Table 1)

According to group B, eighty-five patients were male and sixty-five patients were female. Ninety-eight of the knees were the left and fifty-two the right. Thirty-two patients underwent total meniscectomy and one hundred and eighteen to partial meniscectomy; ninety-nine were traumatic meniscal tears, fifty-one degenerative lesions. In forty cases osteochondral lesions were classified during arthroscopy, according to the Outerbridge classification^[12], as type 3 or 4.

The mean patient's weight was 74.89 kg (range, 59 to 90 kg), the mean BMI was 24.52.

All the 150 patients received GA with fentanyl 1 µg/kg, propofol 2 mg/kg, atracurium 0.2 mg/kg, and a laryngeal mask airway was placed. Anesthesia was maintained with sevoflurane 1-3% in 50% mixture of O₂. Twenty milligram of tenoxicam was injected intravenously after induction of anesthesia in order to standardize the analgesic consumption postoperatively.

Arthroscopies were performed by one surgeon, with a night in hospital after surgery.

The median duration of surgery was 19.14 minutes (range, 14 to 25 minutes) (Table 1)

For each group no tourniquet or pump was used. Standard blood pressure controls were applied throughout the procedure. Standard anteromedial and anterolateral portals were used. A wool and crepe bandage was applied, which was removed at 24 hours postoperatively. The bandage had the purpose to avoid any formation of hemarthrosis^[13] and it was tolerated by each patient.

Each patient began rehabilitation after the bandage removal. Weight bearing was permitted by the second post-operative week^[14,15].

All patients were familiarized with a 10-cm visual analog scale (VAS)^[16] pre-operatively with 0: no pain and 10: the worse imaginable pain. Pre-operative VAS scores were obtained from all patients by asking the average intensity of pain at rest (VASr) and on movement (VASm) of the knee.

The end of the surgery was recorded as time zero. The VAS was assessed at predetermined intervals after surgery (1, 4 and 24 h for group A; 4 and 24 h for group B). At each time of measurement, pain scoring was performed at rest (VASr) and on mobilization (VASm) (bending of the operated knee). When patients complained of pain (VAS score more than 4), they were given 1 g of paracetamol orally as a rescue medication. Duration of effective analgesia was measured from the time of surgery completion until first requirement of rescue analgesia.

Patients were given a data sheet and they were instructed how to evaluate the degree of pain by using the VAS score ruler.

Therefore, they could read by themselves the corresponding numerical score, record it on the data sheet at the predetermined times, and report their analgesic consumption.

Patients in both groups were asked to indicate the degree of overall satisfaction with post-operative pain management on a 4-point satisfaction scale before discharge (0=unsatisfied/poor, 1=somewhat satisfactory/adequate, 2=satisfactory/adequate, 3=very good, 4=excellent) and information about return to work or sport (range, 0-1 points) were also evaluated at the final follow-up. Every patient was assessed clinically 3 months after surgery.

The preoperative clinical scores were correlated with the results of the final follow-up using the Student's *t*-test. A *P* value < 0.05 was considered significant. Statistical analysis was performed using Microsoft Office Excel (2007 version).

RESULTS

All patients reported reduction or lack of the pain in the knee area that they had experienced prior to the operation.

Intraoperative local anesthesia provided satisfactory conditions for all patients undergoing surgery.

Intra-articular placement of anesthetic was confirmed in all the patients by the outflow of anesthetic on introduction of the arthroscopy trocar.

According to group A, the median VAS pain score during surgery was 2.27±0.64 (range, 1 to 3); one hour postoperative during movement was 2.27±0.64, during rest was 2.02±0.68; four hours postoperative during movement was 2.98 ± 0.75, during rest was 2.70 ± 0.79; twenty-four hours postoperative during movement was 2.50 ± 0.76, during rest was 2.28 ± 0.75.

There was no significant difference in VAS pain scores recorded at rest or with movement at 1, 4, and 24 h after surgery.

We obtain intraoperatively excellent results (VAS < 3) in 190

Table 1 Patient's data: age, weight, gender, time of surgery and analgesics quantity.

	Data Group A	Data Group B
Age (yr)	43.04 ± 10.08	46.09 ± 10.49
Weight (kg)	76.33 ± 8.43	74.89 ± 6.93
Gender (M/F)	190/110	85/65
Time of surgery (min)	19.15 ± 3.16	19.14 ± 3.15
Paracetamol (g/day)	1.38 ± 0.62	1.28 ± 0.56

patients (63.3%) out of 300, and good intraoperatively results (VAS ≤ 4) in 110 patients (36.7%) out of 300 (Figures 1, 2A and 2B).

The mean analgesics postoperative was 1.38 ± 0.62 g/day.

The patients subjective satisfaction was sortable as excellent in 160 patients (53.3%), good in 136 (45.3%), and fair in 4 patients (1.4%) (Figure 3).

Two hundred and thirty-four patients (78%) returned to previous sports within 2 months after the surgery, in 15 cases (5%) out of 300 sporting activities were not possible for knee pain, while in 51 patients (17%) the no return to sport was not related with clinical outcome (Figure 4).

According to group B, the median VAS pain score four hours postoperative during movement was 3.00 ± 0.76 , during rest was 2.66 ± 0.72 ; twenty-four hours postoperative during movement was 2.51 ± 0.76 , during rest was 2.28 ± 0.76 .

Also in this group there was no significant difference in VAS pain scores recorded at rest or with movement at 4, and 24 h after surgery. The mean analgesics postoperative was 1.28 ± 0.56 g/day.

The patients subjective satisfaction was sortable as excellent in 116 patients (77.3%), and good in 34 (22.7%).

One hundred and eleven patients (74%) returned to previous sports within 2 months after the surgery, in 8 cases (5.3%) out of 150 sporting activities were not possible for knee pain, while in 31 patients (20.7%) the no return to sport was not related with clinical outcome.

There were no repeat arthroscopies and no side effects have been encountered after the study.

DISCUSSION

Different combinations and efficiency for intraarticular analgesic injections have been reported in literature^[17-22]. Kligman *et al* reported better pain relief with direct morphine injection into the synovia or the outer third of the meniscus than intraarticular injection following meniscectomy^[23].

Administering intra-articular agents maybe ineffective because of a possible washout of the drug during the intra-operative intra-articular lavage. However, analgesic efficacy was shown, when intra-articular morphine was administered 20 min before incision by Lundin *et al*^[24] and 30 min before incision by Reuben *et al*^[25]. Tetzlaff *et al*^[26] also selected 20 min as the minimum time interval from injection to first arthroscopic cannulation and reported improved pain control. Considering these concepts, we performed our injections 20 min before the surgery.

Beyzadeoglu *et al*^[27], showed results of intraarticular tramadol plus pericapsular bupivacaine injections provided better analgesia than intraarticular plus periarticular bupivacaine for day-case arthroscopic meniscectomy patients.

Some authors utilized IA tramadol for patients' pain management^[28]. Alagol *et al*^[28] showed that tramadol 100 mg without local anesthetics provided lower VAS pain scores and longer analgesic effect after IA administration more than after IV injection of the same doses with no significant side effects.

Zeidan *et al*^[29], showed that IA tramadol had an analgesic effect similar to that of IA bupivacaine. It is possible that the combination of IA tramadol and LA provides its regional analgesic effect by a multimodal mechanism of action, which gives a synergistic effect, as evidenced by the decreased VAS pain scores.

Robaux *et al*^[30] reported that tramadol, when added to local anesthetics, modifies peripheral anesthesia.

In practice, it is known that the level of pain after knee arthroscopy

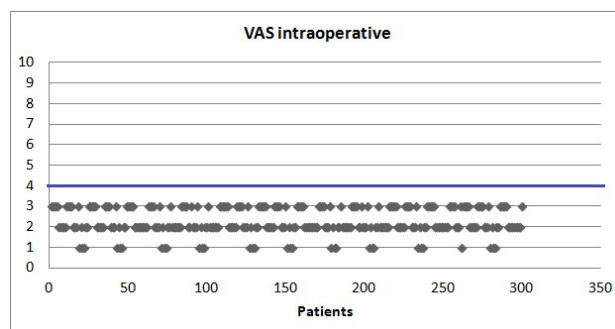


Figure 1 VAS intra-operative score trend. When VAS score is ≤ 4 we have good results.

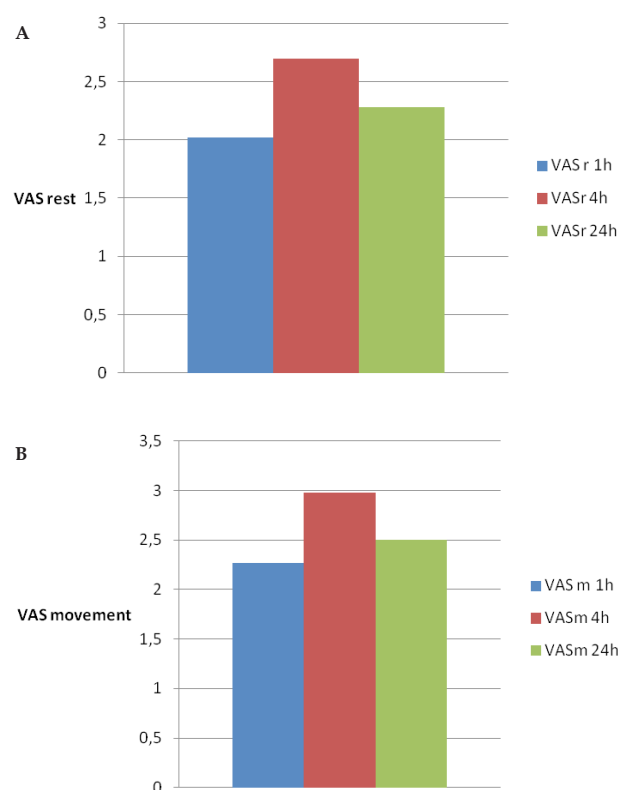


Figure 2 A: mean VAS score trend at rest at 1h, 4h and 24h with LA; B: mean VAS score trend in movement at 1h, 4h and 24h with LA.

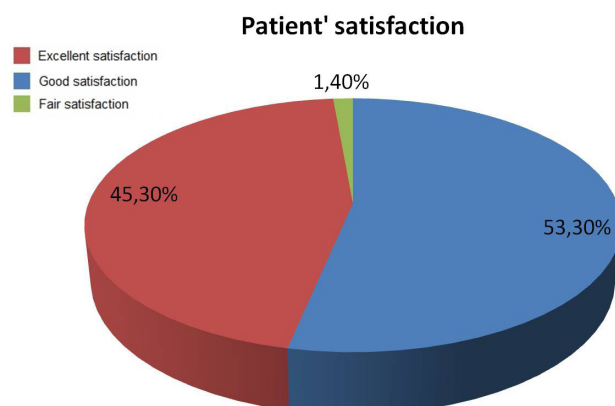


Figure 3 Patient satisfaction at final follow-up after LA treatment.

is in relation with the performed process. The source of pain is both intraarticular and capsular as the trauma stimulates free nerve endings and afferent nociceptors, and the inflammation factors such as bradykinin, histamine and serotonin are released from the damaged cells. Nociceptive activity with the establishment of primary hyperalgesia and the tissue mediators of pain and inflammation diffuse the pain by involving areas away from the skin incisions^[31]. Additional infiltration of the portal incisions and the neighborhood capsular area with local anesthetic agents would diminish the pain.

In our study we found that combination of intraarticular and pericapsular injection technique was efficient to provide good analgesia.

The injection technique through the arthroscopic portals infiltrating the surrounding capsule, subcutaneous tissues and the skin diminishes the need of intraarticular morphine and improves the postoperative pain-free period^[27]. The side effects of analgesic drugs, especially taken after GA can be reduced.

Intra-articular instillation of local anesthesia during arthroscopic procedures has been used by many orthopedic surgeons. It has been shown that diagnostic and some minor therapeutic procedures may be performed by intra-articular analgesia with or without a combined incisional local anesthetic administration^[3,32-34]. Bupivacaine, an amide local anesthetic, is frequently used because of its extended duration of action^[35]. The analgesic efficacy of bupivacaine that is administered into the intra-articular space has been demonstrated by many studies^[36-38].

Results of this study suggest that IA may be used as an alternative to GA for knee arthroscopy in patients ASA I or II.

The final results of the two methods are substantially overlapping (Figures 5A, 5B).

The presence of extensive synovitis is considered^[6] as a potential risk factor for premature termination of arthroscopy, but this problem was not noted here. Administration of LA is painful for patients with synovitis^[5].

Some technical difficulties associated with IA were reported by Jacobson *et al*^[5]. They compared 100 knee arthroscopies done under GA with 100 done under spinal anesthesia and with 180 done under IA combined with rectal and intravenous analgesia. Most patients underwent an intra-articular procedure, such as plica resection, synovial or chondral defect shaving, or partial meniscal resection. The authors reported a significantly number of technical difficulties in the IA as compared with the GA group. A total of 3 IA patients required re-arthroscopy, and no GA or spinal patients did so.

Some complications are reported in literature. Hypotensive episodes during knee arthroscopy using local anesthesia^[5] and bupivacaine toxicity following intra-articular injection^[39,40], large volumes of intraarticular local anesthetics are felt to be safe^[41-44] and are believed to lack adverse effects on intra-articular structures including articular cartilage^[45-47].

Local anesthesia does not appear to be associated with a higher repeat arthroscopy rate at 6 months^[6].

The no need for hospitalization after surgery is a benefit for the patient and cost savings for the hospital. In addition the patient has no nausea and the same day of surgery may eat; this results in greater comfort for the patient.

A potential advantage of IA is that it allows communication about the knee disease to the patient, in that patients can see the inside of their knee and can speak with the surgeon intraoperatively. Patients tell satisfaction in understanding underlying knee disease and did not report that seeing the inside of their knee was an unpleasant experience.

Return to previous sport activity

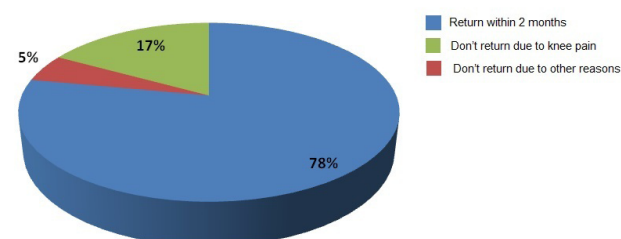


Figure 4 Return to previous sport activity after LA treatment.

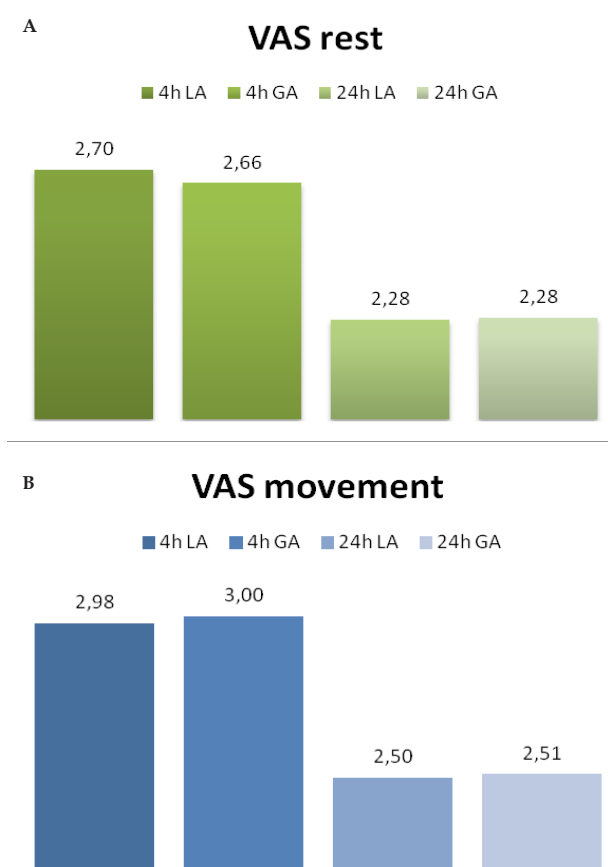


Figure 5 A: comparison of the mean VAS score trend at rest at 4h and 24h with LA and with GA; B: comparison of the mean VAS score trend in movement at 4h and 24h with LA and with GA.

We noted further that talking to the patient makes him feel less pain, probably not focus their attention on the operated knee is a valid placebo effect.

In our opinion IA may offer a valid option for patients who do not wish to undergo GA or spinal/epidural anesthesia, or for those in whom such modes of anesthesia are contraindicated.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

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