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STUDY OF DIAGNOSTIC AND THERAPEUTIC KNEE ARTHROSCOPY UNDER LOCAL ANESTHETIC INFILTRATION

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Abstract

Introduction: To evaluate effectiveness and patient satisfaction of the local anesthesia and intravenous sedation in the patients undergoing diagnostic and therapeutic arthroscopy of knee.

Methods: We conducted prospective study in 62 consecutive diagnostic and therapeutic knee arthroscopies in patients between the ages of 18 to 60 years.

Visual analogue pain score (VAS) from 0 no pain to 10 worst pain was used for evaluation of pain at the time of local anesthetic injection, during procedure, 30 min, 2 hour and 4 hours post operative period. Patient satisfaction, complications and conversion to other mode of anesthesia was also recorded.

Results: In our study 95% (n=57) patients experience no or mild pain during procedure mean VAS of 2.01±1.40. Intra articular and portal site injection was more painful than arthroscopic procedure itself VAS Score 3.43 ± 1.38, two patients (03.22%) planned for both medial and lateral partial meniscectomy and one patient (01.61%) planned for lateral meniscectomy and synovial biopsy had severe pain and were converted to general anesthesia. We did not notice any other complication attributed to local anesthesia or sedation given to patients.

Conclusion: Local anesthesia plus intravenous sedation is safe, inexpensive, economical and acceptable alternative of general or spinal anesthesia for the patients undergoing knee arthroscopy for diagnostic or therapeutic procedures like meniscectomy, meniscal repair, plicae excision and loose body removal.

Keywords: *Local Anesthesia, Arthroscopy, Day Care Surgery.*

Introduction

Knee arthroscopic surgery can be performed under general anaesthesia (GA), spinal anaesthesia (SA) or local anesthesia (LA). Spinal anaesthesia is widely used and preferred method of anaesthesia for knee arthroscopic surgeries [1,2,3]. Arthroscopic surgery being minimally invasive and with advancement of anesthetic techniques can be safely done as a day care procedure [3,4,5,6]. Spinal anaesthesia is good choice of anaesthesia for knee arthroscopic surgery as it provides adequate analgesia but it is associated with complications like urinary retention, drop in blood pressure, post spinal headache, motor block, and may lead to delayed recovery and rehabilitation of patient [7,8,9].

Local anaesthesia has been found as an effective method of anaesthesia for knee arthroscopy as anesthetic drug is given and absorbed in the target tissue. Forssblad and Weidenhielm [10] found local anaesthesia for knee surgery as effective method of anaesthesia in 99.1% case and in only 0.9% cases patient had discomfort sufficient to hamper safe arthroscopy. Yacobucci et al [11], found local anesthesia alone adequate in 497 of 500 knee arthroscopic surgery patients and only 3 patients were converted to general anesthesia out of 500 patients.

Mondino[12], reported success rate of local anaesthesia in >98 % cases of knee arthroscopy patients. The safety of local anaesthesia is well documented [1,13 and 14]. Weiker GG et al [15] measured level of local anesthetic level in blood both in intraoperative and postoperative period in knee arthroscopic patients, performed under local anaesthesia and found drug level in the blood within the safety limits. Local anesthesia reduces hospital stay and cost, provides early rehabilitation, and patient satisfaction is excellent [16].

However there is concern that local anesthesia may not provide adequate pain control and may lead to increase in operative difficulties and reoperation rate and patient dissatisfaction [1,17].

Materials and methods

This prospective study was done in SKIMS medical college and hospital Srinagar from June 2018 to December 2018. All the patients aged between 18 to 60, ASA grade 1 and 2, undergoing knee arthroscopy for meniscectomy, meniscal repair, loose body removal, synovial plica excision, arthroscopic biopsy as well as diagnostic arthroscopy who gave consent were included in this study.

Exclusion criteria for our study were patients allergic to drugs used, recent trauma with swollen painful knee joint, apprehensive patients, severe vulgus /varus knee, hypertrophic synovitis, children and elderly patients, respiratory and neurological disorders, ipsilateral hip joint pathology with painful restricted movement and patient refusal for local anesthetic .

Preoperatively patients where explained in detail about the procedure, anesthetic technique, pain measurement by visual analog scale VAS (0 to 10) and written consent was obtained .Routine pre anesthetic checkup was done by anesthetist and preparation for general/spinal anaesthesia was done. Procedure was done in presence of anaesthetist.

Drugs and procedure

Every patient got intravenous channel, 75 mg of injection diclofenac intravenously was given as pre medication to reduce the synthesis of prostaglandins by blocking cyclooxygenase -1 and 2 (COX-1 and 2) that reduces hyperalgesia.

In operation theatre monitoring was done with electrocardiography, non invasive blood pressure monitoring and pulse oximetry.

30 ml of local anaesthesia mixture was used (15 ml of 2% lidocaine with 1:2,00,000 epinephrine and 15 ml of 0.2% bupivacaine) 15 ml given into intraarticular space and remaining 15 ml was given as portal site infiltration from skin to capsule avoiding fat pad. Active as well as passive Knee movements were done to spread the drug in the joint, procedure was started after 20 minutes of intraarticular injection. Tourniquet was not applied. Midazolam 5 mg intravenous slow infusion over 25 minutes was given.

Every patient was asked about level of pain from 0 (no pain) to 10 (worst pain a person can have) at the time of local anesthetic infiltration then every 10 min or if the patient feels pain. Vitals including pulse, blood pressure, oxygen saturation of blood (Spo2) were monitored by anesthetist.

Time taken for arthroscopy procedure from skin incision to closure of wound, as well as time from anesthetic infiltration to the end of procedure was noted.

Patients were shifted directly to ward, vital signs were recorded in addition to post operative pain every 30 min and need of analgesic was documented. Every patient was given Paracetamol 1gm and tramadol 50 mg oral every eight hourly, if the patient still complains of pain (VAS >3) injection diclofenac 50 mg was given. Patients were discharged at 6 hrs post operatively. Complication if any was recorded.

At the time of discharge patients were asked for satisfaction with local anesthesia, and would they like to

undergo further surgery under local anaesthesia if required.

Data was analyzed with the help of statistician for following measurements, mean, standard deviation, standard error and p-value.

Result

In this prospective study of 62 consecutive cases of knee arthroscopic surgery patients who gave written consent 37 (59.67%) were males and 25 (40.32%) were females. The mean age of the patients was 33.06 ± 10.22 (range 18-59 years), mean weight was 65. 38± 9.39 (range 40-89 kg).The operative procedure include diagnostic arthroscopy, medial partial meniscectomy, partial lateral meniscectomy, both medial and lateral meniscectomy, plicae excision, meniscal repair foreign body removal and synovial biopsy table 1.

Total duration (mean) of procedure including anaesthesia was 63.85 ±9.98 (standard error 1.28) minutes, range 45-95 minutes, while as mean duration of arthroscopy (from skin incision to skin closure) excluding anaesthesia was 31.48 ±6.55 minutes (stand error 0.84) ,range 19- 45 minutes.

The mean value of VAS pain score during infiltration of anaesthesia was 3.43 ±1.38, stand error 0.17, range 0-7. And during actual procedure mean VAS pain score was 2.01 ± 1.40, standard error 0.18, range 0-8. VAS score was significantly less during procedure than during infiltration of injection which was statically significant p-value <0.05. Two patients planned for medial and lateral partial meniscectomy and one patient of lateral meniscectomy and synovial biopsy had severe pain VAS pain score of >5, intra operatively anesthesia was converted to general anesthesia. In post operative period VAS pain score at 30 min the mean VAS was 1.6 ±0.99, standard error of mean 0.12, range 0-5, at two hours postoperative the mean VAS was 1.63 ± 1.04, standard error 0.13, range 0-4 and four hours post operative mean VAS was 2.60 ± 1.32, standard error 0.17, range 0-6 respectively.

Post operative pain was managed by giving tablet of Paracetamol 1gram and tramadol 50 mg oral thrice a day. In addition to this 3 patients received one injection of diclofenac 50 mg during post operative hospital stay.

Patient satisfaction with the anesthetic procedure and pain control were measured in the scale of 0 to 10, the score of less than 5 being unsatisfied, 5 to 7 good, and more than 7 as excellent. Patients were asked for opinion that in future if they need to undergo arthroscopy will they prefer local anesthesia or any other form of anesthesia.

In our study; 70% patients show satisfaction score of >7 (excellent), 25% patients > 5 (good) and 5% of patients <5 (unsatisfied). 95% of the patients responded that in future if need to undergo knee arthroscopy arises they will prefer to undergo under local anesthesia technique.

Discussion

Knee arthroscopy is performed under spinal (SA), general anaesthesia (GA) and local anesthesia (LA) each modality having definite advantages and disadvantages over one another, the most common preferred method being SA.

Our study shows local anesthesia for diagnostic and selected therapeutic knee arthroscopies is technically simple, effective, safe, economic, time saving technique with better patient satisfaction, provides prolonged analgesia, reduces postoperative analgesic intake and facilitates early post operative rehabilitation thus making it a choice of anesthetic technique for day care knee arthroscopic surgeries.

Zanini A,et al 2015 [13] in his comparative study of 300 knee arthroscopic surgeries performed under local anaesthesia verses 150 performed under general anaesthesia shows decrease in operative time, postoperative analgesia intake, hospital expenditure and rehabilitation time to return to sports activity. Takahashi et al 2004 [14], found that local intraarticular injection of lidocaine provides adequate pain relief in knee arthroscopic surgeries in 63 patients.

We used combination Of lidocaine and bupivacaine for local anaesthesia, as lidocaine is rapidly acting local anesthetic agent and was used earlier for knee arthroscopic surgeries [12,18] bupivacaine is long acting and is useful for prolonging anesthetic effect and postoperative analgesia [19,20].

C R P Williams et al, 1997 [20] in prospective comparative study of 153 knee arthroscopic surgeries (71 local and 82 general anesthesia) concluded that local anaesthesia is relatively safe particularly in elderly patients who may be at particular risk of general anaesthesia, reduces hospital stay, faster recovery and allows patient better understanding of their condition and is having considerable cost saving.

The main afferent pathway from knee joint are transmitted by fast transmitting A-delta fibers and slow transmitting group C fibers, which transmit nociceptive and proprioceptive stimuli, capsular trauma stimulate free nerve endings. Release of inflammatory modulators like histamine, bradykinin and serotonin in response to tissue damage

causes a state of hyperalgesia causing diffuse pain.

Intraarticular and pericapsular injection of analgesic prevents state of hyperalgesia and decreases pain. Zeidan et al[22] concluded that tramadol given intraarticularly had pain reducing efficacy equal to intraarticular bupivacaine. Beyzadeoglu et al[23] demonstrated that intraarticular tramadol with pericapsular injection of bupivacaine is more effective in pain control than intraarticular with periarticular bupivacaine injection for patients undergoing partial meniscectomy.

We used diclofenac 75 mg intravenous just before shift ing the patient to operation theater so as to reduce the hyperalgesia by inhibiting cyclooxygenase and reducing synthesis of prostaglandins, therefore reducing diffuse pain in the knee joint in intraoperative and postoperative period [24].

Drug used in our study was combination of 15 ml of 2% lidocaine with 1:200,000 epinephrine plus 15 ml of 0.2% bupivacaine and low dose 5 mg of midozolam infusion over 25 minutes is within the standard limits of toxicity. 15 ml where injected intra articular and 15 ml in the arthroscopic portal sites from skin to capsule taking care to avoid fat pad which is less innervated and injection into fat pad can obstruct vision. We did not notice any local or systemic adverse effects. Lidocaine is rapidly and short acting local anesthetic agent provides immediate block where as bupivacaine takes 20 min to act but provides a prolonged anesthetic effect.

Maldini [24] used 2% lidocaine with 1:200,000 epinephrine, 10 ml injected into joint and 5 ml into each portal site. Díaz-Osuna V, et al [18] used lidocaine 2 %, 20 ml intraarticular and 6 ml into each portal site for rapid anesthetic action and 20 ml of 0.75 % lidocaine intraarticular at the end of procedure for post operative analgesia.

Safety of lidocaine with epinephrine plus bupivacaine was well established by Weiker GG etal [15] in 500 cases, he used 45 ml of 1% lidocaine with 1% epinephrine and 45 ml of 0.25 % bupivacaine for intraarticular and portal site anesthetic. Serum concentration was checked at 5, 15, 30, 60 and 120 minutes, level of drugs used were well in safety range.

Complications

However there is concern about cytotoxicity of high doses of local anesthetic given for pronged time to the chondrogenic differentiation of mesenchymal stem cells particularly by continuous infusion pumps [26,27] which needs to be further evaluated.

Postoperative complication of spinal and general anaesthesia like nausea vomiting, hypotension, headache, urinary retention, myelitis and meningitis are avoided in local anesthetic technique. Anaphylaxis with ropivacaine, bupivacaine and lidocaine is extremely rare [7,8,9].

Conclusion

Local anesthesia is safe, inexpensive, effective and acceptable alternative to general or spinal anesthesia for the patients undergoing knee arthroscopy for diagnostic or therapeutic procedures like meniscectomy, meniscal repair, plicae excision, arthroscopic biopsy and loose body removal in properly selected patients.

Table 1

S. N.	Procedure	Number of cases	Percentage
1	Medial meniscectomy	35	56.45
2	Lateral meniscectomy	08	12.90
3	Medial and lateral meniscectomy	07	11.29
4	Plica excision	2	03.22
5	Foreign body removal	2	03.22
6	Meniscal repair	2	03.22
7	Lateral meniscectomy +synovial biopsy	1	01.61
8	Diagnostic arthroscopy	5	08.06

Knee arthroscopies performed under local anaesthesia

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