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Original Article

The role of local anaesthesia in knee arthroscopy

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ABSTRACT

Introduction: In current times, knee arthroscopy is the most common orthopaedic procedure. Over the years, the preferential method of anaesthesia has been general or spinal anaesthesia. The use of local anaesthesia (LA) in knee arthroscopies has been mentioned in surprisingly few orthopaedic publications over the past few decades. This reflects the very moderate role of LA in general compared to other forms of anaesthesia, even though the majority of operations in orthopaedic practice can be regarded as minor procedures. The aim of this study is to assess the efficacy of LA in knee arthroscopies.

Methods: We performed a retrospective analysis of the efficacy of local anaesthesia in patients undergoing knee arthroscopy under LA over a period of 5 years. The anaesthetic routinely used is Xylocaine 2% with adrenaline. We evaluated pain during procedure and after the procedure by recording a Visual Analogue Score (VAS).

Results: Over a 5 year period (07/2005–06/2010), 433 knee arthroscopies have been performed under LA. The male:female ratio was 52:48%, mean age 48 years (range 14–84). The mean VAS during injection was 1.8 (SD 2) and during the procedure 0.9 (SD 1.7). There has been no complication reported related to LA. We have not encountered any type 1 allergic reactions.

Conclusion: Our experience demonstrates that LA in arthroscopies is a convincing alternative to other forms of anaesthesia and should further be considered as gold standard anaesthesia in knee arthroscopy.

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1. Introduction

Knee arthroscopies are currently the most common performed orthopaedic procedure. In most orthopaedic centers, the preferential method of anaesthesia has been general and spinal anaesthesia. The use of local anaesthesia (LA), defined as injection of an anaesthetic agent at the site of operation, in knee arthroscopies has been mentioned in several orthopaedic publications over the past decades.^{1–5} However, there is a

very moderate role of LA in knee arthroscopies compared to other forms of anaesthesia. Arthroscopy of the knee under local anaesthesia is still considered inferior to other forms of anaesthesia, perhaps because of fear of insufficient anaesthesia or a bad patient experience. A shortage of staff in the department of anaesthetics in our hospital 10 years ago, forced us to progressively explore the applications of LA in elective orthopaedic surgery. In addition, studies have demonstrated the cost-effectiveness of arthroscopies under

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Fig. 1 – Visual Analogue Score.

LA compared to spinal and general anesthesia.^{6–8} The aim of this study is to assess the efficacy of LA in knee arthroscopies.

2. Material and methods

We performed a prospective study of 433 patients who underwent arthroscopy of the knee under LA over a period of 5 years. Children and patients with a reduced mental capacity were excluded from our study, in which the use of the LA method may be less appropriate. Comorbidities, medication, obesity and other parameters do not influence the indication of LA. Anticoagulant therapy should be discontinued 48 h preoperatively. There is no need to keep the patient nil by mouth. The LA program has been approved by the Department of Anaesthesia in our local hospital. Pain during injection of LA is directly related to the diameter of the needle and inversely related to the speed of injection. We evaluated pain during procedure by recording a Visual Analogue Score (VAS) (Fig. 1). The local anaesthetic routinely used is Xylocaine 2% with adrenaline 1:80.000 (AstraZeneca*). A bottle of 20 ml consists of Lidocaine hydrochloride-monohydrate, corresponding with lidocaine hydrochloride-anhydrous 20 mg/ml (400 mg/20 ml), and Epinefrine-Hydrogenium-Tartrate, corresponding with Epinefrine 12.5 µg/ml (250 µg/20 ml). In addition, Methyl Parahydroxybenzoate and Natrium-metabisulfite were added.

2.1. The technique of the procedure

A tourniquet is not needed. Utilising 1.8 m hydrostatic pressure on the lavage fluid and owing to the vasoconstrictive effect of the adrenalin, we have a clear view. The orthopaedic surgeon administers the LA, accompanied by continuous feedback of the patient, which is of utmost importance. The

injection should be given gradually, in order to prevent a painful rise in local tissue pressure. The injection takes 3 min in case of a knee arthroscopy. Ideally, the anaesthetic effect precedes the progression of the needle. A bolus of anaesthetic is infiltrated at the site of surgery, in order to gain complete anaesthesia as well as optimal vasoconstriction locally (Fig. 2). The needle is kept in one straight line at all times during the procedure. By feedback of resistance encountered during injection, the successive tissue layers are identified (Fig. 2). A 10 ml syringe fitted with a 0.8 mm (21 G) needle allows ideal tactile feedback in this situation. Using a thin hypodermic 0.5 × 16 mm (25 G) needle, the first bolus is injected subcutaneously, where the typical high resistance of the tissue is met. The subcutis, where almost no resistance is met, is grossly bypassed, for hardly any sensation is present. For the next stage, the needle is exchanged for either a 0.7 × 40 mm (22 G) one or a 0.8 × 50 mm (21 G) one, to leave a next bolus in the fascia, again identified by increased resistance. Subsequently, another 0.5 ml is injected in the immediately underlying synovium offering low resistance. The joint compartment could easily be found through the same entry point, characterized by a steep drop in resistance, if the patient relaxes the extremity. In presence of underlying muscle, yielding low resistance feedback, some milliliters are left in different directions. After which 10 ml are left intra-articularly. The needle used for injection should have taken the same path of entry as the scope will take and could even guide the scope in finding the entry point in difficult cases, for example, in severe obesity. In a not all-inside technique of meniscal repair, additional anaesthetic is injected at the sites of the intended posterior approaches. Approximately 5 min is needed for this new dose to attain its anaesthetic effect. The smallest volume of LA possible is injected, keeping in mind not to exceed the maximum dose of lidocaine for each patient. We advise that at least one hour is needed for the local anaesthetic to settle and the arthroscopy could easily be postponed several hours following administration of LA.

3. Results

Over a 5-year period (07/2005–06/2010) 433 knee arthroscopies have been performed under LA in our hospital. The male/female ratio was 52/48%, mean age 48 years (range 14–84). The

Fig. 2 – Technique of injection.

mean VAS during injection was 1.8 (SD 2) and the mean VAS during the procedure was 0.9 (SD 1.7). There have been no complications reported related to LA. We have not encountered type 1 allergic reactions. There have been very few late reactions, in the form of skin rashes. No cardiotoxic or neurotoxic reactions have been observed.

4. Discussion

LA deserves a greater appliance than just in simple procedures as, for example a hammertoe correction. Following a correct technique of injection and timing, LA can and should prevent any pain sensation during knee arthroscopies. There are many advantages of LA in comparison to other forms of anaesthesia. Regarding patient's safety, there is a clear absence of complications as seen in other forms of anaesthesia: general, spinal and epidural anaesthesia. The patient is conscious throughout the procedure and does not have to be nil by mouth. The patient can be discharged soon after the procedure. LA under supervision of the anaesthetist may be the preferential and only option in patients with significant comorbidities. Injecting the local anaesthetic at slow speed is of utmost importance in order to prevent a sudden painful rise in tissue pressure, the anaesthetic effect should precede the mechanical point of the needle. Moreover, tactile feedback during injection of the anaesthetic facilitates correct localization of the portal. Arthroscopic techniques in the knee like meniscal repair, synovectomy, debridement and microfracturing can all be reliably performed (Table 1). The lateral meniscus can be repaired with great reassurance of the integrity of the peroneal nerve by continuous monitoring of the patient.

We chose lidocaine for its safety and our experience with the drug. It has a low cardiac toxicity compared with other local anaesthetics like citanest and bupivacaine. The adrenalin results in a diminished washout of the lidocaine resulting in a high and long-lasting local concentration of the anaesthetic and a low systemic level. Moreover it results in less bleeding, yielding a better view at the site of surgery as well in the joint during arthroscopy. An anaphylactic reaction has not been observed in any of our patients.

Recent studies have hypothesized that local anaesthetics could potentially be chondrotoxic. Dragoo et al studied the in vitro chondrotoxicity of single-dose local anaesthetics. They concluded that a single dose injection of 1% lidocaine resulted in a significant decrease in chondrocyte viability when compared with control cultures.⁹ Piper et al performed a review study looking at the relationship between local anaesthetic chondrotoxicity and clinical chondrolysis. They concluded that intra-articular local anaesthetics should be used with caution, especially continuous infusions of bupivacaine and lidocaine at high concentrations in joints with compromised cartilage, however the consequences of a single intra-articular injection of local anaesthetic remained unclear and requires further investigation.¹⁰

LA in arthroscopies is a safe and cost-effective method of anaesthesia.^{6–8} The key to success is a slow administration of the LA and the following delay of the procedure of at least an

Table 1 – Procedures performed during arthroscopies under LA.

Procedure	N
Diagnostic	68
Debridement	54
Meniscectomy	116
Debridement and meniscectomy	56
Plica resection	27
Microfracturing	19
Removal loose body	35
Partial synovectomy	16
Removal metal work	3
Other	39

hour. LA should be considered as an alternative in any case where regional or general anaesthesia might carry a risk for the patient. Our experience demonstrates that LA in arthroscopies is a great alternative to other forms of anaesthesia and should be considered as gold standard anaesthesia in knee arthroscopies. However, more research is necessary to investigate chondrotoxicity caused by local anaesthesia.

Conflicts of interest

All authors have none to declare.

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