Introduction

Several studies have now shown that daycase arthroscopic knee surgery can be safely and effectively performed under local anaesthetic (LA) [5, 7, 12]. Other studies have highlighted the cost benefit of performing such a technique under LA rather than general anaesthetic (GA) [7, 10]. Despite these reports there are few centres in the United Kingdom routinely performing arthroscopic knee surgery under LA.

Hyaluronidase, a naturally occurring enzyme, is extensively used in the fields of both plastic and ophthalmic surgery as an adjunct with the LA infiltration. It acts via depolymerizing hyaluronic acid present in the subcutaneous tissue, thus increasing the permeability of the subcutaneous tissues to LA, and thus facilitating more rapid and wider dispersal of the anaesthetic solution [3, 4, 6]. We report our technique, which the senior author has successfully used in 121 patients having arthroscopic knee surgery over the past year, and discuss the role of added hyaluronidase to the local anaesthetic portal infiltrate.

Abstract

Whilst local anaesthesia for daycase arthroscopic knee surgery has been well reported, there are few centres in the United Kingdom performing such a technique. Hyaluronidase has been widely used as an adjunct to local anaesthetic infiltration in the fields of ophthalmic and plastic surgery, but it is rarely used in orthopaedic surgery. We report our technique, which the senior author has successfully used in 121 patients having arthroscopic knee surgery under LA.

Keywords

Daycase · Knee arthroscopy · Local anaesthetic · Hyaluronidase

Surgical technique

When patients are listed for arthroscopic knee surgery in the outpatient clinic, we advise that the procedure can be performed under either LA or GA. We have found that for the most part patients are keen to avoid GA and tend to choose LA. All patients conform to the published guidelines for daycase surgical procedures and undergo full informed consent by the operating surgeon on the daycase ward prior to surgery.

Xylocaine (20 ml, 1%) with 1 in 200,000 adrenaline (Astra) is reconstituted with 1500 IU hyalase (hyaluronidase injection BP; CP Pharmaceuticals, Clywd, UK). Twenty minutes prior to surgery, following skin preparation with a swab soaked in aqueous chlorhexidine, 10 ml of the LA/hyaluronidase mixture is injected via a 21-guage needle into the lateral portal tract. By avoiding deep penetration of the needle at the portal site and by aspiration on the needle, to exclude the presence of intra-articular synovial fluid, we avoid injection of the mixture into the knee joint itself. Using the same needle the remaining 10 ml is then injected into the medial portal tract, again taking care to avoid injection into the knee joint. The needle is then advanced down the medial portal tract into the knee joint and 40 ml 0.25% bupivicaine plain is injected into the knee joint. Thus only two stabs with the needle are required.

No tourniquet is used during the surgery. Following surgery patients are discharged as per routine daycase protocol with oral analgesia. All patients are reviewed in the out-patient clinic at 2 weeks for wound inspection, an assessment of surgical efficacy and for any complications.
Results

The senior author (A.S.P.) has performed this technique on 121 patients over the past year. The breakdown of surgical cases by procedure is as follows: meniscal trimming, n=73; meniscal repair, n=8; arthroscopic washout/chondroplasty, n=26; synovial biopsy, n=10; microfracture, n=4. In all cases except for the lateral release of the patella only two needle stab incisions were required for administration of the local anaesthetic. Those requiring lateral release needed further administration of anaesthetic down the lateral edge of the patella and thus another needle stab. There were no allergic reactions or complications related to the use of hyaluronidase.

Discussion

Hyaluronidase is a naturally occurring enzyme found in human semen, snake venom and certain bacteria. It has a depolymerizing action on the polysaccharide hyaluronic acid, which is present in the intercalated matrix of connective tissue, and it thus acts to increase the permeability of the subcutaneous tissues. It is supplied as a sterile freeze-dried powder (hyalase) which easily reconstitutes with LA solutions. The standard dose is 1500 IU, and the only reported side effect is allergic reaction [9]. Hyaluronidase has been widely used as an adjunct to LA infiltration in the fields of ophthalmic and plastic surgery [3, 4, 6], but few reports exist of its use in orthopaedic surgery [9]. By facilitating more rapid and wider dispersal of the anaesthetic solution at the portal sites multiple stabs with the needle when infiltrating the LA at the portal sites are avoided. Before injecting the LA/hyaluronidase mix at the portal sites we check to exclude fortuitous injection of the solution into the knee joint itself, both by avoiding deep penetration of the needle and by aspiration on the needle, to exclude the presence of intra-articular synovial fluid.

Serum lignocaine and bupivacaine levels have been investigated following arthroscopic knee surgery using LA mixtures [1, 2, 8, 11]. Weiker et al. [11] found safe serum levels of lignocaine and bupivacaine 2 h after injection, when using much higher LA doses than our regime (their regime; a 50-ml intra-articular mixture of 25 ml 1% lignocaine with adrenaline 1 in 100,000 plus 25 ml 0.25% bupivacaine, together with 40 ml 1% lignocaine with adrenaline 1 in 100,000 for the portals). Butterworth et al. [2] found that in patients having knee arthroscopy the addition of 1 in 200,000 adrenaline to intra-articular injections of 0.5% bupivacaine resulted in a seven- to ten-fold reduction in serum bupivacaine levels 1 h after injection, and hence higher total doses of LA could safely be given. Barr et al. [1] reported that addition of hyaluronidase did not affect peak plasma concentrations of either lignocaine or bupivacaine up to 9 h after injection and thus did not affect the toxic dose of either of the two LA agents. Nathan et al. [8] investigated the effect of hyaluronidase on lignocaine and bupivacaine pharmacokinetics and also reported hyaluronidase to have no effect on the peak plasma concentration of the two LA agents, but found it led to a 40% reduction in the time to reach peak plasma concentration. From the above data, our regime falls well within the safety spectrum for LA.

Hyaluronidase costs 13 euros a vial, and as such adds only a minimal amount to the overall cost of the LA procedure. We feel it does, however, reduce the number of needle stabs required for LA administration and as such increase patient acceptability and comfort.

Conclusions

Patients are increasingly requesting that daycase arthroscopic knee surgery be performed under LA rather than GA. As in previous studies [7, 12], we have found that a variety of arthroscopic procedures can be safely and effectively performed under LA, including meniscal trimming, meniscal repair, synovial biopsy, arthroscopic washout and chondroplasty. We found arthroscopic drilling/microfracture techniques of the femoral condyle, however, to be too painful for the patient, and we thus recommend GA for this procedure. We have successfully used hyaluronidase, without complications, in the LA portal infiltrate and believe that it reduces the number of stabs required with the needle when administering the portal anaesthetic and reduces the number of times that supplemental LA is given because of discomfort. As such we therefore recommend its use.

References