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Intra-articular local anaesthetic on the day after surgery improves pain and patient satisfaction after Unicompartmental Knee Replacement: A randomised controlled trial

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ABSTRACT

Intra-operative local anaesthetic infiltration provides good early pain relief after Unicompartmental Knee Replacement (UKR). However, appreciable pain may occur on the day after surgery. The purpose of this double-blinded, prospective randomised controlled trial was to evaluate the effectiveness of a bolus of local intra-articular anaesthetic given early on the day after surgery. Forty-four patients were randomised to receive an intra-articular injection, via an epidural catheter inserted at operation, of either 20 ml 0.5% plain bupivacaine or 20 ml normal saline. All patients received a femoral nerve block with 20 ml prilocaine 1% and local anaesthetic infiltration by the surgeon. Patients injected with bupivacaine had significantly less ($p<0.001$) pain than control patients immediately (mean pain score 1.82 v 6.1) and 6 hours (2.5 v 5.7) after injection. Patient satisfaction was also significantly greater ($p<0.001$) in the local anaesthetic group. We conclude that a bolus dose of intra-articular bupivacaine early on the day after surgery dramatically improves pain control after UKR and improves patient satisfaction.

1. Introduction

Peri-operative pain management for both Unicompartmental Knee (UKR) and Total Knee Replacement (TKR) is not yet optimised [1]. Postoperative pain is often severe and can be managed with a variety of analgesic regimes [2,3]. In the current climate of healthcare cost-savings, there is a drive to reduce hospital stay whilst maintaining high patient satisfaction. All methods of analgesia have a direct impact on these outcomes, whilst also having unwanted side-effects and potential serious complications [4]. As a result, there has been a concerted effort to alter and augment surgical and anaesthetic techniques. Changes to aspects of surgical technique, such as those seen in minimally invasive surgery (MIS), have been shown to reduce hospital stay whilst maintaining clinical outcomes [5].

Strategies have been developed to improve the management of peri-operative pain and have included peri- and intra-articular infiltration of cocktails containing local anaesthetic. Local infiltration analgesia (LIA) has been demonstrated to have a positive outcome in both TKRs and UKRs with regard to pain score, patient satisfaction and hospital stay [6–9]. This has been the case when comparing LIA to placebo [9] and peripheral nerve block [10]. The addition of non-steroidal anti-inflammatory drugs (NSAIDs) and opiods to local infiltration analgesia has also been shown to improve patient satisfaction, pain relief and lead to early discharge [7].

Attempts to identify the most appropriate agent to administer post-operatively have illustrated that all are superior to placebo and that the use of multimodal drugs can significantly reduce the requirements for patient controlled analgesia (PCA) and improve patient satisfaction [6]. There is no difference in the effectiveness of analgesia administered either intra-articularly or into the intra-capsular tissues [11].

In our unit, where large numbers of the Oxford UKR are carried out, we routinely use LIA [7] with a cocktail containing local anaesthetic, adrenaline and non-steroidal drugs. This is injected in all tissues around the knee, (particularly the skin), that have been affected by the operation, before insertion of the components. However, an audit identified that an appreciable number of patients suffered from pain on the day after surgery when the effects of the nerve block and local analgesia were wearing off [12]. This led to delays in their mobilisation and subsequent hospital discharge. To address this we have been injecting a bolus of local anaesthetic through an epidural catheter, implanted at the time of surgery. We are not aware of any study that has assessed the effectiveness of this technique using a randomised controlled trial.

The aim of this prospective, randomised, double-blinded trial was to evaluate whether pain scores and patient satisfaction were affected

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if intra-articular analgesia was administered on the day after surgery through a catheter, inserted into the knee at operation.

2. Methods

After regional ethical approval had been granted, 47 consecutive patients, who were scheduled to have UKR because of end-stage medial compartmental osteoarthritis, were recruited (Fig. 1). Patients were excluded if there was known allergy or intolerance to one of the study drugs.

Three patients were excluded prior to randomisation as they refused to participate in the study. Randomisation occurred on the day of surgery. One of a series of sealed, opaque envelopes was opened to decide the type of solution to be administered. The instruction within the envelope had been randomly generated by computer. The solutions were drawn up by an independent doctor so that the patient, anaesthetist, surgeon and pain observer were all blinded. Anaesthesia was administered by the same anaesthetist for all patients. Operations were performed by two surgeons using a minimally invasive surgical (MIS) technique [13]. All patients received a medial phase III Oxford UKR with tourniquet.

Both groups of patients received multi-modal LIA, (ropivocaine 3.0 mg/ml, adrenaline 10 μg/ml and keterolac 30 mg added to normal saline to make a volume of 100 ml) intra-operatively, a short acting femoral nerve block with 20 ml 1% prilocaine and general anaesthesia, (GA), using propofol. Prior to insertion of the components, the LIA was injected into the posterior capsule, the synovium and subcutaneous tissues. All patients had an intra-articular 16G multi-holed epidural catheter with a one way valve and filter, placed by the surgeon in the lateral para-patellar gutter and a Redivac drain left in situ.

Post randomisation, patients were divided into Groups A (active) and C (control). At 24 hours post surgery, Group A patients had 20 ml of 0.5% bupivacaine injected, via the intra-articular catheter, whilst Group C patients received 20 ml of normal saline intra-articularly. The drain was clamped prior to infiltration and then removed with the intra-articular catheter after infiltration.

All patients were prescribed paracetamol 1G four times a day and diclofenac 50 mg three times a day that were to start on the day of surgery, (day 1). Parenteral morphine was prescribed as rescue analgesia. Thromboprophylaxis, (aspirin 150 mg once a day orally), was administered on the day of surgery in the evening and continued for a total of 6 weeks post-op.

The primary end-point of the study was pain relief. An independent observer recorded post-operative pain scores using a visual analogue score, (VAS: 0–10), immediately post-op and then every 6 h with further readings taken immediately prior and 30 min post infiltration at 24 h. The assessment was discontinued on the morning of the second day after surgery. Secondary end-points were patient satisfaction and the amount of rescue analgesia required. Patient satisfaction was recorded, (using a nominal scale), at 24 and 48 h post-op. All rescue analgesia that was required was also recorded.

The Mann–Witney *U* test was used to analyse all median pain scores, patient satisfaction and the use of rescue analgesia as the data was found to not be normally distributed.

3. Results

The two patient groups, (22 in each), were well matched for patient demographics and surgical time. Two patients were excluded after randomisation as one was converted to TKR at the time of surgery and one suffered medical complications in the first 24 h.

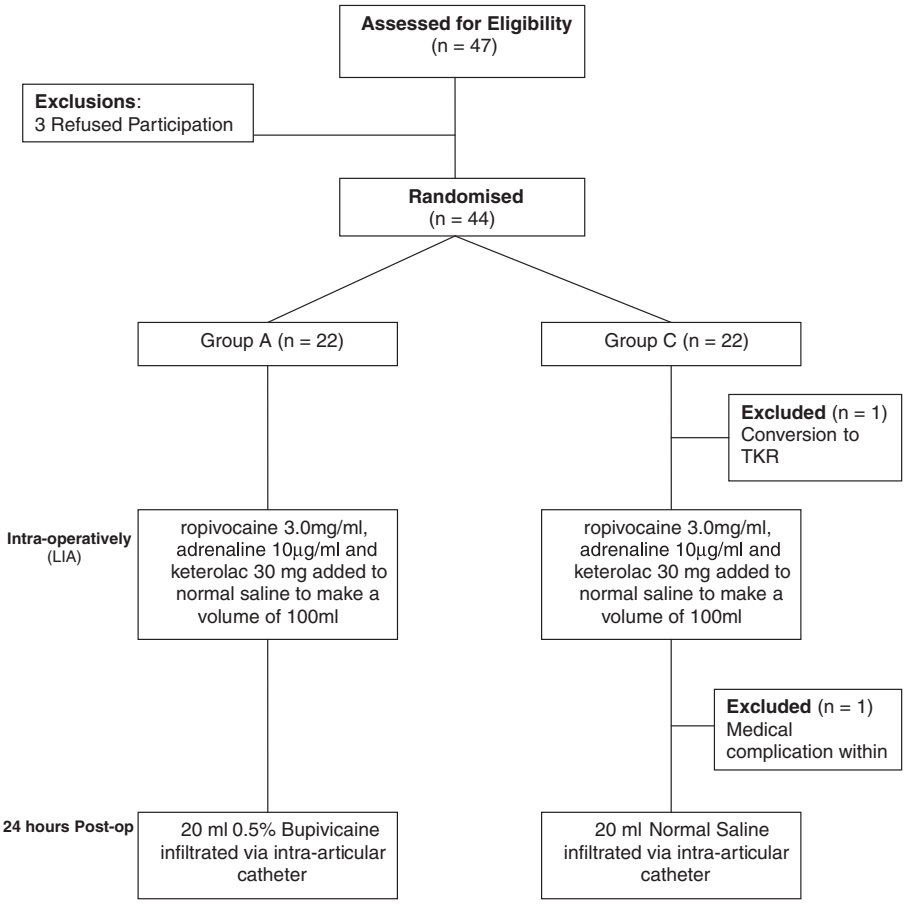

Fig. 1. A flow chart illustrating the study.