Systematic review of nerve block and incisional local anaesthetics for analgesia in herniorrhaphy

Background

• PROSPECT is an international collaboration of surgeons and anaesthetists that provides evidence-based recommendations for procedure-specific postoperative pain management.

• Local anaesthetic (LA) injection before or during hernia surgery is commonly used in an attempt to provide postoperative pain relief.

• However, in clinical practice a variety of different protocols are used for administration of local anaesthetic; the technique is not standardised and studies describe different injection sites and timings of administration. Thus there is a need to assess how this technique can be used most effectively.

• PROSPECT has examined the evidence to address the following questions:
  - Does local anaesthetic injection, before or during hernia surgery, reduce postoperative pain?
  - What is the optimum timing of local anaesthetic injection in hernia repair to provide the greatest analgesic benefit?

Methods

• A systematic review of the literature was performed according to the protocol of the Cochrane collaboration. MEDLINE and EmbASE were searched from 1966-January 2004 using predefined search terms.

• Studies included in the review were randomised trials in adult herniorrhaphy, in which LA injection techniques (inguinal nerve block, field block and/or wound infiltration) were compared with placebo, or in which pre- and postincisional and postoperative administration of LA injection techniques were compared.

• All included studies were required to report pain scores using a visual analogue scale (VAS) or verbal rating scale (VRS). All pain scores were converted to VAS 1–100 mm.

• Where possible, meta-analyses were conducted on mean differences in postoperative VAS scores, grouped by time postoperatively. The majority of studies showing a significant benefit extended the time to first analgesic request compared with placebo.

Results

• A total of fifteen studies were identified, of which twelve compared LA injection techniques with placebo, and three assessed pre- versus postincisional LA injection.

• Placebo-controlled studies were grouped for analysis according to time of administration and then stratified further by the LA injection technique used.

Time of administration:

• Seven studies1-7 compared preincisional LA techniques with placebo (Figure 1), and five studies8-12 compared intraoperative LA techniques with placebo (Figure 2). For both pre- and postincisional LA injections, all studies showed a significant reduction in pain scores, measured at different times postoperatively. The majority of studies also reported a significant analgesic benefit compared with placebo in the surgical field.

LA injection technique used:

• Studies used different LA injection protocols and described the techniques in different ways. PROSPECT has defined the three main LA techniques in Table 1.

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Table 1. PROSPECT definitions of LA injection techniques (studies combined all techniques unless otherwise specified).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
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<tbody>
<tr>
<td>Inguinal nerve block</td>
<td>Injection of local anaesthetic into the ilioinguinal/nerve</td>
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<tr>
<td>Field block</td>
<td>Injection into the superficial and deeper structures in the field of surgery (which may result in a block of the ilioinguinal nerve)</td>
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<tr>
<td>Wound infiltration</td>
<td>Injection of local anaesthetic into the subcutaneous/deepest structures of the surgical field</td>
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Pre-incisional LA injection versus placebo (n=7, 9 arms)

• All seven studies showed that preincisional LA significantly reduced postoperative pain scores at different times compared with placebo:
  - reduced pain scores at rest during 0–6 h postoperatively (n=7)10–12 h (n=2) (Figure 1), quantitative analysis showed a significant reduction in pain scores at rest at 3 h (two studies)8,11–13 (Figure 3), reduced pain scores on moving at 3–6 h, but not 10–24 h10 (two studies)10–12 (Figure 3)
  - five of seven studies showed that preincisional LA significantly reduced supplementary analgesic consumption compared with placebo.8,11,12,13,14 Studies assessed different analgesic parameters and, where available, mean values are shown on Figure 4

Pre-intracorporeal LA injection versus placebo (n=7, 9 arms)

• All seven studies showed that intracorporeal LA injection significantly reduced pain scores compared with placebo: (n=7)10–12 h (n=2) (Figure 1) and pain scores on lying and sitting and walking for 0 h–10 days (n=1) and at 24 and 48 h (n=1)7,12 (Figure 3). Quantitative analysis showed a significant reduction in pain scores at rest at 3 h (two studies)8,11–13 (Figure 3) and at 24 and 48 h (n=1)

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Intraoperative LA injection versus placebo (n=2, 2 arms)

• Both studies showed that intracorporeal LA injection significantly reduced pain scores compared with placebo: (n=2)10–12 h (n=1) and pain scores on lying and sitting and walking for 0 h–10 days (n=1), in this study LA was administered pre-, intra- and postoperatively10.

Intraoperative LA injection versus placebo (n=2, 2 arms)

• Both studies showed that intracorporeal LA significantly reduced supplementary analgesic use.

• One study reported that intracorporeal LA significantly extended the time to first analgesic request.

Intraoperative LA injection with no targeted nerve block versus placebo (n=3, 5 arms)

• All three studies showed that intraoperative LA was of superior analgesic benefit compared with placebo:
  - reduction in pain scores at 1–3 h postoperatively (n=3)10–12 h (n=1), but not at 6–12 h (n=2) (n=2)8
  - 8 h (n=1) or at 10 days (n=1)12
  - reduction in pain scores on movement at 4 and 6 h (n=3)10,11 and at 24 and 48 h (n=1)7
  - two studies showed a reduction in supplementary analgesic use (n=2)8,11

• Three studies showed an increase in the time to first analgesic request (n=3)10–12

Pre-incisional versus postincisional LA injection

• Three studies compared preincisional administration with postincisional administration of LA injection techniques: preincisional and postincisional LA were of similar analgesic benefit: pain scores (n=3)10–12 and supplementary analgesic use (n=2)8,11 were not significantly different between groups, except in one study that showed a significant reduction in the proportion of patients requiring supplementary analgesics for preincisional compared with postincisional LA.

Figure 1. Number of studies showing a significant reduction in VAS pain scores at rest: preincisional LA injection versus placebo.

Figure 2. Number of studies showing a significant reduction in VAS pain scores at rest: intracorporeal LA injection versus placebo.

Figure 3. Number of studies showing a significant reduction in VAS pain scores at rest: intracorporeal LA injection versus placebo.

Figure 4. Preincisional LA injection versus wound infiltration: VAS pain scores at rest: n=3 (1, 1).