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

prospect

procedure specific postoperative pain management

Narinder Rawal[1] and Henrik Kehlet[2] on behalf of the PROSPECT (PROcedure-SPECific postoperative pain managemenT) Working Group.

[1]Department of Anaesthesia and Intensive Care, University Hospital, Örebro, Sweden; [2]Section for Surgical Pathophysiology, The Juliane Marie Centre, Rigshospitalet, Copenhagen, Denmark

Background

- PROSPECT is an international collaboration of surgeons and anaesthesiologists that provides evidence-based recommendations for procedure-specific postoperative pain management.[1]
- Local anaesthetic (LA), given by injection close to the nerve and at the wound site, is increasingly used in hernia repair, in combination with general anaesthesia, 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, effectively reduce postoperative pain?
  - What is the optimum timing of local anaesthetic injection in hernia repair to provide the greatest analgesic benefits?

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 herniorraphy, in which LA injection techniques (inguinal nerve block, field block and/or wound infiltration) were compared with placebo, or in which pre-incisional and postincisional 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, and supplementary analgesic consumption. Outcomes are reported as weighted mean differences (WMD) with 95% confidence intervals. Results are reported as significant where p<0.05; n = number of studies.

Results

- A total of fifteen studies were identified, of which twelve compared LA injection techniques with placebo, and three assessed pre- *versus* post-incisional LA injection.
- Placebo-controlled studies were grouped for analysis according to time of administration and then were stratified further by the LA injection technique used.

Time of administration:

- Seven studies[2-8] compared pre-incisional LA techniques with placebo (Figure 1), and five studies[9-13] compared intra-operative LA techniques with placebo (Figure 2). For both pre- and intra- operative LA injections, all studies showed a significant reduction in pain scores, measured at different times postoperatively. The majority of studies also reported a significant reduction in supplementary analgesic use.

LA injection techniques 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.
- Nine studies assessed a combination of inguinal nerve block/field block ± wound infiltration, while three studies assessed a combination of wound infiltration and field block in the absence of a targeted nerve block.

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

Inguinal nerve block	Discrete nerve block at the site of the ilioinguinal, iliohypogastric and/or genitofemoral nerve
Field block	Infiltration into the superficial and deeper structures in the field of surgery (which may result in a block of the ilioinguinal nerve)
Wound infiltration	Injection of local anaesthetic into the cutaneous/subcutaneous/deeper structures of the surgical field

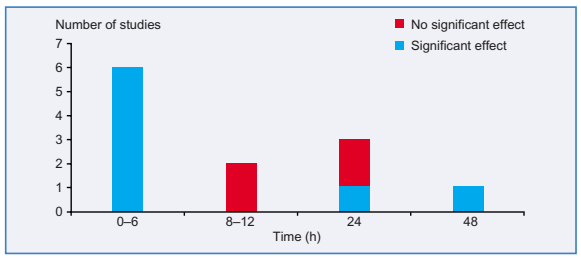

Figure 1. Number of studies showing a significant reduction in VAS pain scores at rest: pre-incisional LA injection *versus* placebo

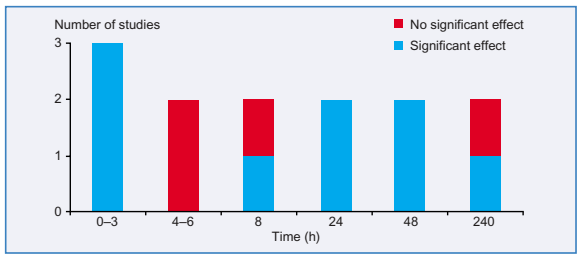

Figure 2. Number of studies showing a significant reduction in VAS pain scores at rest: all intra-operative LA injection techniques *versus* placebo

***Pre-incisional LA injection* ± *wound infiltration* versus *placebo* (n=7, 9 arms)**

- All seven studies showed that pre-incisional LA significantly reduced postoperative pain scores at different times compared with placebo:
  - reduced pain scores at rest during 0–6 h (n=6),[2-7] 24 h (n=1)[2], and at 48 h (n=1),[2] but not during 8–12 h (n=2)[2, 4] (Figure 1). Quantitative analysis showed a significant reduction in pain scores at rest at 3 h (two studies,[4, 6] WMD -11.40 mm (-16.03, -6.77), p<0.00001) (Figure 3)
  - reduced pain scores on movement at 3–6 h, but not 10–24 h (n=1),[4] or 1–24 h (n=1)[8]
  - five of seven studies showed that pre-incisional LA significantly reduced supplementary analgesic consumption compared with placebo.[2-4, 6, 8] Studies assessed different analgesic parameters and, where available, mean values are plotted on Figure 4
  - three studies reported that pre-incisional LA significantly extended the time to first analgesic request compared with placebo[4, 5, 8]

***Intra-operative LA injection* versus *placebo* (n=2, 2 arms)**

- Both studies showed that intra-operative LA injection significantly reduced pain scores compared with placebo: at rest during 0–24 h (n=1);[9] and pain scores on lying, sitting and walking for 0 h–10 days (n=1; in this study LA was administered pre-, intra- and postoperatively)[13]
- Both studies showed that intra-operative LA significantly reduced supplementary analgesic use[9, 13]
- One study reported that intra-operative LA significantly extended the time to first analgesic request[9]

***Intra-operative LA injection with no targeted nerve block* versus *placebo* (n=3, 5 arms)**

- All three studies showed that intra-operative LA was of superior analgesic benefit compared with placebo.
  - reduction in pain scores at rest at 1–3 h (n=2),[10, 11] 24 h (n=1)[12] and 48 h (n=1),[12] but not at 4–6 h (n=2),[10, 11] 8 h (n=1)[10] or at 10 days (n=1)[12]
  - reduction in pain scores on movement at 4 and 6 h (n=1),[10] and at 24 and 48 h (n=1)[12]
  - two studies showed a reduction in supplementary analgesic use (n=2)[10, 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 pre-incisional administration with postincisional administration of LA injection techniques.
  - pre-incisional and postincisional LA were of similar analgesic benefit: pain scores (n=3)[14-16] and supplementary analgesic use (n=2)[14, 15] were not significantly different between groups, except in one study that showed a significant reduction in the proportion of patients requiring supplementary analgesics for pre-incisional compared with postincisional LA[16]

Conclusions

- Pre-incisional and intra-operative LA injection provided pain relief and reduced supplementary analgesic use compared with placebo, with the majority of studies showing a significant benefit for reduction in pain scores during 0–6 h following surgery.
- This review supports the practice of using local anaesthetic injection to provide analgesia following herniorraphy. The data show that LA injection techniques provide significant reductions in pain and supplementary analgesic use regardless of whether they are given pre- or postincisionally.

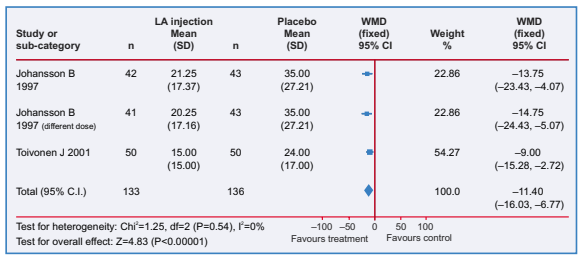

Figure 3. Pre-incisional LA injection ± wound infiltration *versus* placebo: VAS pain scores at rest at 3 h

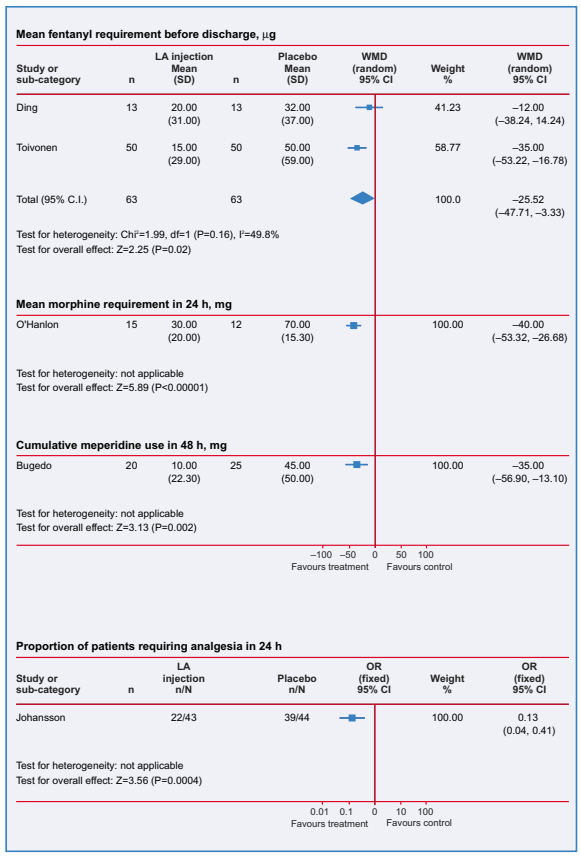

Figure 4. Pre-incisional LA injection ± wound infiltration *versus* placebo: supplementary analgesic use

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