Benefits of pre-emptive analgesia by local infiltration at day-case general anaesthetic open inguinal hernioplasty

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ABSTRACT

INTRODUCTION The open prosthetic repair of inguinal hernias under local anaesthesia (LA) is well established, with the concept of intraoperative 'pre-emptive analgesia' evolving so that patients are as comfortable as possible. We used a peri-incisional LA solution in patients undergoing day-case inguinal hernioplasty under general anaesthesia (GA) and recorded use of analgesia in the immediate postoperative period.

METHODS In this observational cohort study, 100 consecutive unselected men underwent open inguinal hernia repair as a day case. Of these, 75 underwent repair under GA and 25 with peri-incisional LA solution (equal mixture of 0.5% bupivacaine and 1% lignocaine with 1:200,000 adrenaline). Analgesia prescribed at induction, for maintenance and after cessation of anaesthesia was scored in accordance with the World Health Organization (WHO) analgesic ladder.

RESULTS The median age in the GA group was 59 years (range: 25–89 years) and in the GA+LA group, it was 62 years (range: 27–88 years). Of the 100 patients, 82 underwent a mesh plug repair by seven surgeons whereas 18 underwent a flat (Lichtenstein) mesh repair by two surgeons. WHO analgesic induction and postoperative scores were significantly lower in the GA+LA group ($p=0.034$ and $p<0.001$ respectively). There was also a significant difference in use of postoperative antiemetics (23% vs 0% in the GA only and GA+LA cohorts respectively, $p=0.020$). Six patients (8%) in the GA group failed day-case discharge criteria.

CONCLUSIONS Patients undergoing contemporary day-case GA inguinal hernioplasty with pre-emptive LA solution infiltration require lower levels of postoperative opioid analgesia and antiemetics. These cases are less likely to fail discharge criteria for planned day surgery.

KEYWORDS

Inguinal hernia – Day surgery – Pre-emptive analgesia

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The repair of inguinal hernias under local anaesthesia (LA) is well established. However, although this approach allows surgery in relatively unfit patients with rapid mobilisation in an ambulatory/day-case setting, the procedure does require a 'lighter' touch and attention to surgical detail. Despite this, those who carry out repairs under LA obtain excellent results irrespective of whether they come from specialist hernia centres.^{1,2}

When consulting with an inguinal hernia patient, surgeons need to pose the question of which type of anaesthesia and hernia repair is the safest and best for their patient. While many repairs are performed under general anaesthesia (GA), it is important to administer appropriate perioperative analgesia in order to attain safe and comfortable day-case discharge. With this in mind, the concept of 'pre-emptive analgesia' has evolved so that the patient's experience is made as comfortable as possible.³ We scrutinised a series of consecutive GA day-case open prosthetic inguinal hernia repairs with regard to immediate postoperative analgesic

requirements after pre-emptive analgesia with the same solution/mixture we use when performing repairs under LA.

Methods

In this retrospective observational cohort study, unselected consecutive patients undergoing a day-case open inguinal hernia repair were identified. Information was collected from our day-case unit database and verified with the typed operative reports, clinical charts and hospital patient management computer system. All laparoscopic hernia repairs, bilateral hernia repairs and repairs not performed under GA were excluded.

Two groups of patients were established: those receiving GA only and those receiving GA with intraoperative peri-incisional LA infiltration as if they were having their repair solely under LA. The LA solution (20ml) consisted of an equal mixture of 0.5% bupivacaine and 1% lignocaine with 1:200,000 adrenaline. This was administered using a step-

by-step approach as described by the Lichtenstein clinic (Figs 1–3).⁴

All analgesia prescribed at induction, for maintenance and after cessation of anaesthesia was recorded. These data were categorised and scored in accordance with the World Health Organization (WHO) analgesic ladder.⁵ Non-opioids and non-steroidal anti-inflammatory drugs were individually given a score of 1, weak opioids (codeine and tramadol) were individually given a score of 2 and strong opioids (morphine and fentanyl) were individually given a score of 3. Summative scores at induction and following surgery were calculated for each patient prior to discharge. Use of postoperative antiemetics was also recorded.

The primary outcome measure was postoperative analgesic requirements prior to discharge. Differences in variables between groups (GA vs GA+LA) were examined using the chi-squared test for categorical data and one-way analysis of

Figure 1 Infiltration of inguinal canal before division of external oblique aponeurosis

Figure 2 The local anaesthetic solution allows for easy identification of the nerves and spermatic cord

variance for continuous data. All statistical analysis was performed using SPSS® version 23 (IBM, New York, US).

Results

A total of 100 patients (all male) were identified and included over a 10-month period to July 2017. Three-quarters ($n=75$) had repairs performed under general anaesthesia (GA) and the remaining patients received the per-incisional LA solution infiltration alongside the general anaesthesia (GA+LA). The median age was 59 years (range: 25–89 years) for the GA group and 62 years (range: 27–78 years) for the GA+LA group. The majority of patients ($n=82$) underwent a mesh plug repair (by 7 surgeons) with the remaining individuals ($n=18$) undergoing an anterior (Lichtenstein) mesh repair (by 2 surgeons). There were 13 anaesthetists for the GA group and 3 for the GA+LA group (Table 1).

Table 1 Baseline patient characteristics

	GA (<i>n</i> =75)	GA+LA (<i>n</i> =25)	<i>p</i> -value
Median age (range)	59 years (25–89 years)	62 years (27–78 years)	0.149*
Median induction analgesia score (range)	4 (1–5)	3 (1–4)	0.034*
Median postoperative analgesia score (range)	4 (0–18)	0 (0–3)	<0.001*
<i>Postoperative antiemetic</i>			0.020**
Yes	14	0	
No	61	25	
<i>Overnight admission</i>			0.145**
Yes	6	0	
No	69	25	

GA = general anaesthesia; LA = local anaesthesia

*one-way analysis of variance; **chi-squared test

Induction analgesia

The median WHO induction analgesia score for the GA group was 4 (range: 1–5). This compared with 3 (range: 1–4) for the GA+LA group ($p=0.034$).

Postoperative antiemetics

A total of 14 patients (25%) were given postoperative antiemetics (on request) in the GA group while none of the 25 patients in the GA+LA cohort needed antiemetics ($p=0.020$).

Postoperative analgesia

The operative records demonstrated that all but 2 of the 75 patients (97%) in the GA group were given 20ml of 0.5% bupivacaine as an infiltrative analgesic on wound closure. The median WHO postoperative analgesia score (in the recovery ward) for patients having GA alone was 4 (range: 2–18) compared with a median score of 0 (range: 0–3) in the GA+LA cohort ($p<0.001$).

Unplanned admission

Six patients (8%) in the GA group failed day-case discharge criteria, and required overnight admission for pain relief and monitoring.

Discussion

There is nothing ignominious in performing groin herniorrhaphy under GA, which does allow more extensive surgery should the need arise. Indeed, many patients prefer to undergo surgery under GA. On the other hand, it requires a certain level of fitness and may lead to postoperative coughing/straining. With our increasingly elderly population and their concomitant co-morbidities, general surgeons should be able to offer repairs under LA. Indeed, the results obtained by many surgeons with various open prosthetic tension free techniques (irrespective of the anaesthesia used) approaches those of specialists.²

Despite this, LA repairs are not as fashionable as they possibly should be, even though there is good evidence that LA is well tolerated and has numerous advantages over a repair under either regional anaesthesia or GA.^{1,2} However, repairs under LA do require a gentler surgical touch and with this in mind, trainees in our unit are actively encouraged to administer LA when patients undergo a GA repair. The LA method certainly aids in the identification of the sensitive nerves in the canal and allows for an easier separation of an indirect sac (Figs 2 and 3).

The concept of pre-emptive analgesia anticipates that pain can be modified by analgesic nerve blocks prior to tissue trauma with its resultant release of nociceptive stimuli.⁵ The many studies reviewed by Kissin compared the outcome of preincisional versus postincisional treatment options including the use of various drugs, epidurals and nerve blocks.⁵ For example, in a double blind, randomised study of 40 herniorrhaphy cases, a preoperative field block of bupivacaine was of no benefit in terms of postoperative pain.⁶ In contrast (and not surprisingly), when ilioinguinal and iliohypogastric blocks (with 0.75% ropivacaine) were combined with wound infiltration and compared with placebo, there were a number of clinical benefits.⁷

Although these reports may oversimplify the concept of pre-emptive analgesia (and the difficulties of any meaningful clinical data), any study that demonstrates a positive effect is worth exploring further. To our knowledge, the present study is the first to look at the use of this common LA solution mixture to provide pre-emptive analgesia in a day-case setting. While a statistical difference was found between our cohorts with respect to immediate postoperative analgesic requirements, more importantly, no patients in the GA+LA group required antiemetics or overnight admission because of pain. This is clearly a clinical benefit for all concerned and it is of interest to note that in a study of 185 patients undergoing inguinal herniorrhaphy solely under LA, the majority did not require opioid analgesics.⁸ It is undeniable that any simple clinical intervention that leads

Figure 3 Infiltration allows for easy separation of sac from cord structures

to less demand for the prescription of opioids is worthy of further scrutiny.⁹

Finally, despite evidence that pre-emptive analgesia does not affect pain scores at later postoperative times (≥ 24 hours),¹⁰ our study has shown the value of this easily administered peri-incisional LA infiltration in GA day cases. We concede that the sample size in this non-randomised analysis may limit the above remarks but we believe this reflects contemporary day-case inguinal hernioplasty in busy general hospitals.

In addition, our anaesthetists were not blinded to the use of the LA solution at operation, leading to a potential

bias in terms of their use of analgesia at induction and maintenance of the GA. However, they are unlikely to be critical of each other's approach to a safe GA day case. With regard to the postoperative analgesia, this was prescribed on an 'as required' basis and as such, it is a faithful reflection of the patients' immediate postoperative pain.

Similarly, the surgeons would be unlikely to make harsh comments about their colleagues or the type of repair performed. While the choice of prosthetic mesh remains debatable, there is no evidence to suggest that one type is superior to another.^{11,12} In effect, the only variable tested was the use of the LA solution as a peri-incisional analgesic. Future studies using a randomised design with standardised visual analogue scale scores would no doubt be more robust.

Conclusions

We recommend this simple additional step for all open inguinal hernia repairs and would encourage surgeons who may feel uneasy about performing LA repairs to at least try it. Their confidence will grow, and their anaesthetists and patients will be grateful.

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