

Forum

Cryoanalgesia for pain after herniorrhaphy

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Summary

The effect of freezing the ilioinguinal nerve on postoperative pain relief was examined in a double blind study in 36 patients undergoing herniorrhaphy, randomly allocated into two groups. Patients in the experimental group had their ilioinguinal nerves frozen during surgery and were compared with the patients in the control group who did not have cryoanalgesia. Pain relief was assessed over a 48-hour period in three ways, namely the linear analogue pain scale, peak expiratory flow rates and the amount of analgesic drugs required by patients in the two groups. We conclude that cryoanalgesia of the ilioinguinal nerve alone does not produce significant early post herniorrhaphy pain relief.

Key words

Pain; postoperative.

Equipment; cryoprobe.

Freezing of the ilioinguinal nerve during surgery has been described as a satisfactory method for relieving the pain after herniorrhaphy.¹ It is said to be a particularly suitable technique for day care patients as they needed less analgesic drugs and resumed normal activity earlier. When a herniorrhaphy is done under local analgesia three nerves must be blocked;² these are the iliohypogastric, ilioinguinal and the genitofemoral nerves. In view of the claim that cryoanalgesia of the ilioinguinal nerve alone is a satisfactory technique, this study was undertaken to see if freezing a single nerve was, in fact, a satisfactory method of postherniorrhaphy pain relief.

Method

The trial was approved by Northwick Park Hospital Ethical Committee. All patients studied gave informed consent. Patients who were admitted for inguinal hernia repair (36 males) took part in the study. The mean age of patients in the cryoanalgesia group was 50.8 years with a range of 30–74 years and the mean age of the

control group was 50.6 years with a range of 36–66 years. The patients were assessed for cardiovascular, respiratory, metabolic and central nervous system abnormalities. All patients fulfilled the criteria of ASA Class I or II. They were randomly allocated to two groups, the experimental and the control. The patient and the observer did not know to which group the patient belonged. Pre-operative peak expiratory flow was measured using a Wright's Mini Peak Flow Meter. No pre- or intra-operative analgesics or local anaesthetics were used in order to avoid confusing the assessment of cryoanalgesia in the immediate postoperative period.

Anaesthesia was induced with sodium thiopentone and maintained with oxygen, nitrous oxide and halothane using a mask and Guedel airway. None of these agents have any lasting analgesic effects.^{3,4}

Hernia repair was carried out in a standard manner. At the end of operation, before skin closure, the patients in the experimental group had the ilioinguinal nerve blocked as follows. The nerve was lifted and hooked by the surgeon onto the previously sterilised cryoprobe.

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No extra dissection was necessary to expose the nerve. The nerve was frozen for two periods of one minute each, with an interval of 30 seconds in between to allow thawing.

In the recovery ward, when the patient was able to cooperate, his pain was scored on the visual linear analogue scale which is simple and easy to use.⁵ Peak expiratory flow rate was also measured at this time. These measurements were repeated 4 hours and 8 hours later on the day of the operation and on the first and second postoperative days.

All the patients who complained of pain were given analgesic drugs. These were an injection of pethidine if the pain was severe and Distalgesic tablets if it was moderate. A record was kept of all analgesic drugs administered.

Results

The mean pain scores in the experimental (cryoanalgesia) and control groups are shown in Fig. 1. The maximum pain scores were observed within the first 4 hours of the operation. Statistically, the difference between the two groups was not significant. On the second day, the experimental group seemed to have had a tendency to less pain, but this difference was again not statistically significant.

The mean reduction in peak expiratory flow (PEF) from the pre-operative value is shown in Fig. 2 at different time intervals following surgery. Both groups showed a similar pattern of response. Although the mean PEF was greater in the experimental group, the difference was not statistically different in the treated and untreated groups at any time.

The mean number of doses of pethidine and Distalgesics for the control group was 1.0 and 3.8 respectively

and that for the experimental group was 1.1 and 3.7 respectively. The amount of pethidine and Distalgesic tablets that were required by the patients in the two groups is shown in Fig. 3. Again, the difference between the two groups was not statistically significant.

Discussion

Freezing a nerve, as described in this study, produces a reversible nerve lesion of the second degree, according to Sunderland's classification.⁶ Absence of damage to the nerve and minimal inflammation ensures that regeneration of function is complete and occurs at the rate of about 1–33 mm per day.^{7,8} In theory, therefore, it seems to be a suitable technique for postoperative pain relief for any operation when a sensory nerve is easily accessible, and freezing intercostal nerves has been shown to reduce the need for analgesic drugs after thoracotomy.⁹ The ilioinguinal nerve is a readily accessible nerve which is distributed to the skin over the root of the penis and upper part of the scrotum in the male and to the skin covering the mons pubis and the adjoining part of the labium majus in the female.¹⁰ The incision for inguinal hernia repair is usually made 1 cm above and parallel to the inguinal ligament. This area is not supplied by the ilioinguinal nerve and freezing this nerve alone will have limited effect on postoperative pain.

In our study, no pre- or intra-operative analgesia was used. All our patients had the same anaesthetic agents and technique and pain was assessed using three different methods: resting pain measured with the linear analogue scale, a graded painful stimulus and patient requirement for analgesic drug. None of these methods showed any significant improvement in postoperative analgesia in the cryoanalgesia group.

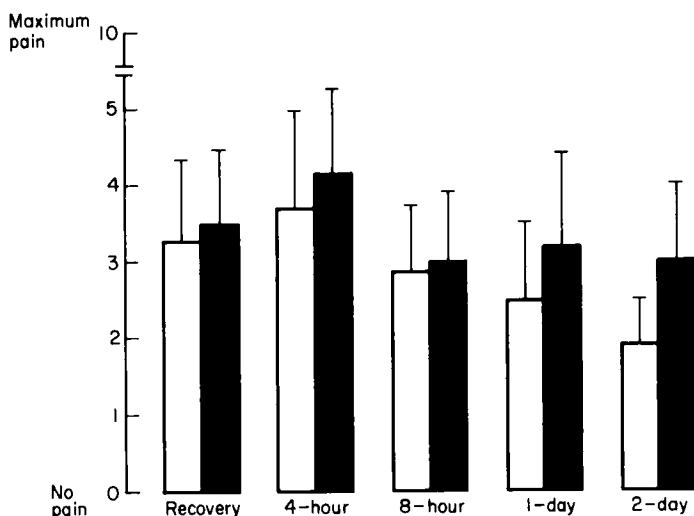


Fig. 1. Histogram of pain scores. The bars represent SE of the mean. □, experimental; ■, control.

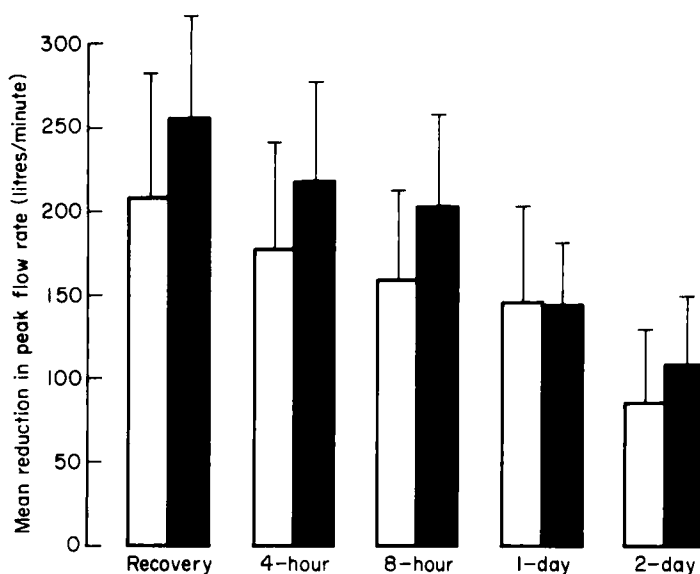


Fig. 2. Histogram of mean reduction in peak flow rate. The bars represent SE of the mean. □, experimental; ■, control.

Wood *et al.*¹ concluded that cryoanalgesia of the ilioinguinal nerve appeared 'to be a significant advance in postoperative analgesia both for inpatient and for day care or short stay patients'. Their use of epidural analgesia, using either lignocaine or bupivacaine may have influenced their results. Both local anaesthetic agents have varying duration of action ranging from 1–6 hours;¹² this effect could have reduced the need for analgesia in some of their patients.

We used peak expiratory flow as an index of pain

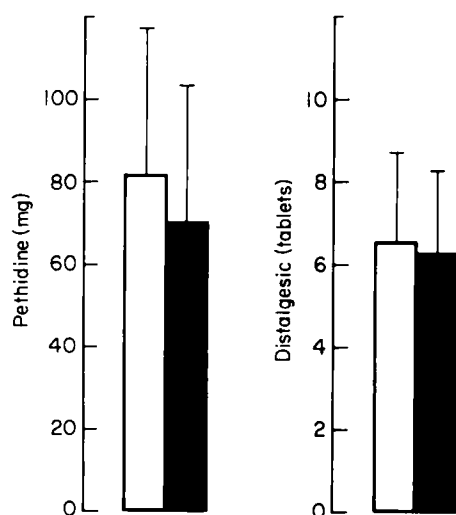


Fig. 3. Histogram of pethidine and Distalgiesics required by the two groups. The bars represent SE of the mean. □, experimental; ■, control.

relief for the following reasons. It has previously been shown¹² that vital capacity (VC), forced expiratory volume in one second (FEV₁) and PEF are all reduced to below 80% of the pre-operative value following abdominal surgery. This is presumably due to the pain associated with the contraction of chest wall (rib cage/diaphragm/abdomen) musculature. Each of these manoeuvres requires different amounts of muscle contraction. For example, the pressure required to achieve a maximal value of FEV_{1.0} is about 2.5 kPa, the vital capacity effort ranges from 2.5 to –2.5 kPa but the PEF effort may exceed 12.0 kPa.¹³ There is also a very non-linear relationship between pressure (i.e. effort) and FEV₁ and VC, whereas the relationship between effort and PEF is such that this test gives much more information about graded expiratory effort over a very large range of flows. Because of the greater muscle contraction in PEF, it is not surprising that little improvement in PEF is seen after papaveretum¹² and that there is a smaller improvement in PEF than with VC after nitrous oxide and morphine.¹⁴

This study showed that in the 48-hour period following surgery, cryoanalgesia to the ilioinguinal nerve alone did not reduce the pain experienced by the patients following a hernia repair, neither did it reduce the analgesic requirement. This result contrasts with that of Wood *et al.*, who used day care patients, epidural anaesthesia and a longer follow-up.

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Epidural buprenorphine for postoperative analgesia. A controlled comparison with epidural morphine.

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Summary

In a double-blind controlled study, epidural buprenorphine 0.3 mg was compared with 4 mg of epidural morphine for postoperative pain relief the first 24 hours after major orthopaedic surgery. The degree of analgesia was equal and satisfactory in both groups. Duration of action was 620 minutes with buprenorphine and 580 minutes with morphine, which was not significantly different. The only serious side effects were recorded in the morphine group, with two patients complaining of pruritus and five of urinary retention. In conclusion, epidural buprenorphine did not offer any advantages in preference to morphine for postoperative pain relief following orthopaedic surgery.

Key words

*Anaesthetic techniques, regional; epidural.
Analgesics, narcotic; morphine, buprenorphine.*

The demonstration of specific opiate receptors in the substantia gelatinosa of the spinal cord¹ and the subsequent original clinical application,² resulted in a widespread use of epidural opiates in the treatment of chronic and postoperative pain. Although most clinical

reports deal with the use of epidural morphine chloride, other opioids have been investigated.³

Buprenorphine is a relatively new synthetic opioid, with both agonistic and antagonistic properties; high receptor affinity and great lipid solubility have been

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