*Annals of the Royal College of Surgeons of England* (1982) *vol.* 64

ASPECTS OF TREATMENT*

# A randomised controlled trial to compare local with general anaesthesia for short-stay inguinal hernia repair

C Teasdale BSc FRCS
*Senior Surgical Registrar,*
A McCrum MB ChB
*Senior House Officer,*
N B Williams FFARCS
*Consultant Anaesthetist,*
R E Horton MBE FRCS
*Consultant Surgeon, Royal Infirmary, Bristol*

**Key words:** INGUINAL HERNIA; SHORT-STAY SURGERY; LOCAL ANAESTHESIA; GENERAL ANAESTHESIA

## Summary

*A series of 117 consecutive unselected patients with clinically reducible unilateral inguinal herniae were admitted for short-stay repair. Seven expressed a strong preference for one form of anaesthesia (6 general (GA) 1 local (LA)) and 7 were unfit for GA; these were excluded from the trial. The remaining 103 patients were allocated at random to receive either LA or GA in order to compare the two methods of anaesthesia. The resulting groups (53 LA, 50 GA) were well matched for age and obesity. Per- and postoperative symptoms were assessed with linear analogue self-assessmemt questionnaires.*

*Statistically significant differences were demonstrated between the groups; those patients having LA were able to walk, eat, and pass urine earlier than those having GA, who experienced more nausea, vomiting, sore throat, and headache. The postoperative course and additional symptoms were otherwise similar. Forty-five LA patients experienced mild pain during the operation, but nevertheless 85% of the total group said they would consent to its use again. Ninety-three patients (90%) were discharged at 24 h.*

*LA was applicable to all types of clinically reducible inguinal hernia and was an acceptable, safe, and satisfactory alternative to GA.*

## Introduction

There has been a recent resurgence of interest in the use of local anaesthesia (LA) for inguinal hernia repair as it facilitates short-stay and day-case surgery and thus leads to economy of resources and shortening of waiting lists *(1)*. The pioneers of this technique have published their extensive experience *(2–5)* and LA is now being used increasingly both in Britain and abroad.

Before initiating a change in our own surgical practice, however, we wished to clarify certain aspects of this approach to hernia surgery. Information from previous trials was incomplete regarding patient selection and acceptance, applicability to different types of hernia, and the overall comparability with general anaesthesia (GA). We therefore designed a prospective randomised trial to obtain this information, performing the surgery on a short-stay basis. We know of no previous similar randomised study.

## Patients and methods

Between April and December 1980 117 consecutive unselected patients were admitted from the surgical waiting lists with a unilateral clinically reducible inguinal hernia. All diagnoses were confirmed before operation by two of the authors and the body mass index (BMI) (weight/height$^2$) was determined as a measure of the presence and degree of obesity *(6)*. Those patients whose BMI was above 26.2 were considered to be obese. Consent was sought for either method of anaesthesia and consenting patients were then assessed by the anaesthetist. Seven patients who specifically requested one method of anaesthesia (6 GA, 1 LA) and 7 who were considered unfit for GA were excluded from the study. The remaining 103 patients were then allocated at random to receive either LA or GA (Table I). It was explained that provided complications did not occur they would be discharged 24 h after the operation.

*The Editor would welcome any comments on this paper by readers*

*Fellows and Members interested in submitting papers for consideration with a view to publication in this series should first write to the Editor

TABLE I *Composition of the two groups of patients*

| | *LA* | *GA* |
|---|---|---|
| No of patients | 53 | 50 |
| Mean age ± SD (years) | 52 ± 14 | 51 ± 16 |
| Age range (years) | 18–75 | 18–79 |
| Mean BMI ± SD | 24.4 ± 2.8 | 23.9 ± 2.9 |
| No with BMI >26.2 | 13 (25%) | 12 (24%) |
| Classification of hernia at operation: | | |
| Indirect | 31 | 35 |
| Direct | 19 | 15 |
| Both present | 3 | 0 |
| Irreducible | 2 | 2 |
| Recurrent | 4 | 5 |
| Sliding | 7 | 3 |

All patients received intramuscular papaveretum (10–20 mg) and either hyoscine (0.2–0.4 mg) or atropine (0.3–0.6 mg) 1–1½ h before operation, the dose and choice of drugs depending on body weight and age. Local anaesthesia was achieved immediately before the operation with a maximum dose of 350 mg of plain lignocaine; 10 ml of 1% concentration was injected medial to the anterior superior iliac spine to block the ilioinguinal and iliohypogastric nerves and the remainder was used in 0.5% concentration (maximum 50 ml) as a local infiltration in the operative field *(7)*. General anaesthesia was induced with fentanyl and thiopentone on a dose/weight basis and maintained with alcuronium and an oxygen/nitrous oxide mixture to which halothane was added as required. Ventilation was by intermittent positive pressure via an endotracheal tube. At the end of the operation neuromuscular blockade was reversed with atropine and neostigmine.

Herniotomy was performed on those patients with indirect and narrow-necked direct sacs. Herniorrhaphy consisted of plication of the transversalis fascia and repair of the internal inguinal ring with continuous polypropylene (Prolene) followed by a relieving incision in the aponeurosis of the internal oblique and apposition of the conjoined tendon to the inguinal ligament with interrupted monofilament polyethylene (Dermalene).

After operation, if required, patients were prescribed one dose of intramuscular papaveretum and tablets of Distalgesic (dextropropoxyphene + paracetamol) for pain. All patients completed linear analogue questionnaires at 6 h, 24 h, and 7 days after their operation, measurements in centimetres and millimetres being based on a scale from 0–10 cm as described and recommended by previous authors *(8–9)*. We were thus able to record and measure the presence and severity of a variety of symptoms — namely, peroperative pain and anxiety in the LA group and postoperative pain, sore throat, nausea, vomiting, headache, and difficulty in passing urine and opening the bowels in both groups. In addition at 6 h all patients were asked whether they had walked, eaten, and passed urine since the operation and at 24 h the LA group was asked whether they would consent to receive LA if they had to have the operation again. Patients were also asked to assess their degree of mobility on the linear analogue scale at 24 h and 7 days.

In the absence of postoperative or social problems the patients were discharged at 24 h and were given 30 Distalgesic tablets to take home. They attended again at 7 days for examination and removal of their subcuticular suture. In addition to recording the aforementioned symptoms they were asked whether they thought the 24-h discharge was too early after operation, whether they had requested a home visit from their general practitioner for any reason relating to the operation, and whether they had used either laxatives or suppositories. The number of analgesic tablets taken was recorded as well as any postoperative complications.

Statistical comparisons between the groups were made with the $\chi^2$ test except with regard to the number of analgesic tablets taken for which, owing to a skew distribution, the Mann-Whitney U test was used.

## Results

The majority of LA patients experienced pain during the operation, though this was usually mild, and a minority recorded some anxiety (Table II).

After GA significantly greater numbers of patients suffered from sore throat (at 24 h and 7 days), vomiting (at 6 and 24 h), nausea (at 6 h), and headache (at 6 h) (Table III). There was, however, no significant difference between the groups regarding the severity of any of the symptoms as determined by the linear analogue

TABLE II *Presence and severity of peroperative symptoms recorded 6 h after operations under LA*

| *Symptom* | *No of patients with symptom* | *Mean score ± SD* |
|---|---|---|
| Pain | 45/53 (85%) | 2.7 ± 1.7 |
| Anxiety | 20/53 (38%) | 3.2 ± 1.9 |

TABLE III *Presence of symptoms recorded 6 and 24 h and 7 days after operation in the two groups*

| Symptom | No of patients with symptom at: | | | | | |
|---|---|---|---|---|---|---|
| | 6 hours | | 24 hours | | 7 days | |
| | LA | GA | LA | GA | LA | GA |
| Wound pain | 52 | 49 | 53 | 49 | 52 | 47 |
| Sore throat | 5 | 17*** | 4 | 14** | 1 | 9** |
| Nausea | 14 | 28*** | 12 | 20 | 4 | 1 |
| Vomiting | 3 | 13*** | 2 | 11** | 0 | 0 |
| Headache | 4 | 12* | 4 | 7 | 7 | 5 |
| Difficulty in passing urine | | | 7 | 8 | 3 | 3 |
| Difficulty in opening bowels | | | | | 25 | 17 |

***p<0.01; ** p<0.02; * p<0.05

scores and hence these are not shown in the table. The mean scores for those patients who complained of symptoms were always less than 5 out of 10 and the degrees of wound pain and later mobility were virtually identical in the two groups. No patient suffered postoperative urinary retention.

Further comparisons are shown in Table IV. Significantly greater numbers in the LA group were able to walk, eat, and pass urine within 6 h of operation, but there was no significant difference in the requirement for intramuscular papaveretum. Only a small proportion of patients (20%) asked for intramuscular analgesia and no patient received more than one dose. The LA patients did, however, require significantly more oral analgesia than the GA patients.

Ninety-three patients (90%) were discharged as planned at 24 h. Seven were retained after LA (3 for persistent pyrexia, 2 for persistent vomiting, and 2 for social reasons) and 3 after GA (2 for chest infections and 1 for social reasons). Four of the 9 requests for a home visit from the GP were for relief of constipation and the remaining 5 patients gave the following reasons — 'slightly below par and needed a certificate', 'for different pain killers', 'blister at the edge of the wound' (due to allergy to the wound dressing), 'rash, temperature, and abdominal pain' (the one patient who was readmitted but whose symptoms quickly settled without the cause being discovered), and 'a painful, swollen testis'. Twenty-seven patients used either laxatives or suppositories and the same number considered that their discharge from hospital had been too early, the predominant reason being that they

TABLE IV *Comparisons between the groups after operation*

| | LA | GA |
|---|---|---|
| Activity 6 h after operation | | |
| Walking | 18 (34%) | 2 (4%)*** |
| Eating | 41 (77%) | 2 (4%)*** |
| Passing urine | 24 (45%) | 9 (18%)** |
| Postoperative analgesic requirements | | |
| Papaveretum | 9 (17%) | 12 (24%) |
| Distalgesic tablets (median no) | 21 | 14** |
| Discharge at 24 h | 46 (87%) | 47 (94%) |
| Requesting home visit from general practitioner | 5 (9%) | 4 (8%) |
| Considering discharge from hospital too early | 14 (26%) | 13 (26%) |
| Using laxatives or suppositories after discharge | 14 (26%) | 13 (26%) |

***p<0.001; **p<0.01

would have valued a little more time in the reassuring atmosphere of the hospital in view of their pain and relative lack of mobility.

Forty-five of the 53 LA patients (85%) said that they would consent to have the operation performed under LA were they to have it again. The remaining 8 patients stated that either pain, anxiety, or both were reasons for declining LA again.

Four of the herniae (2 in each group) proved to be irreducible at operation, all having omentum adherent within the hernial sac. Nevertheless, all 53 operations under LA were completed satisfactorily without recourse to GA and in each case the LA was given by the surgeon performing the operation.

Complications were relatively few: 2 LA and 4 GA patients developed minor chest infections and 1 in each group had a superficial discharging wound haematoma, but both wounds were fully healed when seen 1 month later. One patient who had a recurrent hernia repaired under GA developed a painful, swollen testis owing to infarction, the symptoms settling spontaneously.

## Discussion

We set out to compare LA with GA for short-stay inguinal hernia repair and to determine the acceptability and applicability of LA for this procedure. Short-stay surgery proved successful in the great majority of cases with either method of anaesthesia and carried with it well-recognised advantages *(4,10)*. Neither anaesthetic technique was applicable to all patients in the series as a whole as 13 patients had to be excluded before randomisation; 5% initially declined LA and 7% were considered unfit for GA, so that both techniques have a role in overall patient care.

The main disadvantage of LA was the mild pain that most patients experienced during the operation; nevertheless, this did not prevent the majority from agreeing to its use again. Indeed, one non-randomised study has reported a 99% acceptability of LA *(11)*. Intraoperative intravenous sedation was not used in our series as all patients were given adequate premedication and we did not wish to compensate for inadequate LA *(12)* or to induce amnesia *(11)*.

The advantages of LA include: for the patient an earlier return to normal activities and a lower incidence of postoperative sore throat, nausea, vomiting, and headache; and for the surgeon the ability to operate without dependence on the services of an anaesthetist and with no disruption of planned operating lists should patients be judged unfit for GA. LA also confers a technical advantage in the occasional case in which there is difficulty in identifying the hernial sac. When such a patient is asked to cough the sac will usually become apparent and this manoeuvre can also be used at the completion of the herniorrhaphy to assess the competence of the internal inguinal ring and posterior wall repair.

The increased incidence of sore throat and vomiting in the GA group may well have been attributable to the particular GA technique employed. This technique was chosen because of its wide applicability, but we accept that many patients could have been anaesthetised without endotracheal intubation, anticholinergic premedication, and fentanyl. The addition of an antiemetic might also have further reduced the incidence of nausea and vomiting *(13,14)*.

Lignocaine was chosen as the LA agent because it was familiar to the surgeons and has a rapid onset of action. The advantage of the commonly used bupivacaine lies in its longer duration of action, which makes it particularly applicable to day-stay patients who return home soon after operation. This action, however, is largely dependent on its combination with adrenaline and there is therefore an increased risk of haematoma formation. Moreover, it has a much slower onset of action, which makes planning of surgery more complicated. We were thus dissuaded from its use.

It is too early to report on any difference in recurrence rates between the groups. However, in view of a very recent paper reporting high recurrence rates for those surgeons inexperienced with the LA technique *(15)* it is perhaps pertinent to state that at all operations under LA in our series the surgeon or his assistant was either a consultant or a senior registrar, each having had previous experience of the technique.

We have demonstrated that LA is applicable to all types of clinically reducible inguinal hernia and is an acceptable, safe, and satisfactory alternative to GA. A day-case programme has now been initiated with confidence in the light of the results of this study, which has supplemented existing information *(16)*. With the addition of a laxative to the analgesic prescribed on discharge and active involvement of community nurses, to include home visits in the early postoperative period, we envisage many fewer requests for the attendance of the GP. We believe that such a programme of day-case surgery for hernia under LA will not only lead to economy of resources and shortening of waiting lists but also to increased patient satisfaction.

We are grateful to Messrs R N Baird, H K Bourns, and H J Espiner, and to Professor R C N Williamson for allowing us to include their patients in this study and to the staff of the British Homoeopathic Hospital for their co-operation throughout.

## References


1 Oosterlee J, Dudley HAF. Surgery in outpatients. Br Med J 1979;ii:1459–60.

2 Farquharson EL. Early ambulation with special reference to herniorrhaphy as an out-patient procedure. Lancet 1955;2:517–9.

3 Goulbourne IA, Ruckley CV. Operations for hernia and varicose veins in a day-bed unit. Br Med J 1979;ii:712–4.

4 Glassow F. Short-stay surgery (Shouldice technique) for repair of inguinal hernia. Ann R Coll Surg Engl 1976;58:133–9.

5 Bellis CJ. 16,069 inguinal herniorrhaphies using local anaesthesia with one-day hospitalization and unrestricted activity. Int Surg 1975;60:37–9.

6 Cole TJ, James WPT. The slimdicator: a slide-rule device for assessing obesity. Practitioner 1978;220: 629–9.

7 Nicholls JC. Necessity into choice: an appraisal of inguinal herniorrhaphy under local anaesthesia. Ann R Coll Surg Engl 1977;59:124–7.

8 Aitken RCB. Measurement of feelings using visual analogue scales. Proceedings of the Royal Society of Medicine 1969;62:989–93.

9 Mansel RE, Wisbey JR, Hughes LE. The use of danazol in the treatment of painful benign breast disease: preliminary results. Postgrad Med J 1979; 55 (Suppl 5):61–5.

10 Adler MW. Randomised controlled trial of early discharge for inguinal hernia and varicose veins. Ann R Coll Surg Engl 1977;59:251–4.

11 Makuria T, Alexander-Williams J, Keighley MRB. Comparison between general and local anaesthesia for repair of groin hernias. Ann R Coll Surg Engl 1979;61:291-4.

12 Job CA, Fernandez MA, Dorph DJ, Betcher AM. Inguinal hernia repair: comparisons of local, epidural and general anesthesia. N Y State J Med 1979;79:1730–3.

13 Shutt LE, Bowes JB. Atropine and hyoscine. Anaesthesia 1979;34:476–90.

14 Fragen RJ, Caldwell N. A new benzimidazole antiemetic, domperidone, for the treatment of postoperative nausea and vomiting. Anesthesiology 1978;49:289–90.

15 Kingsnorth AN, Britton BJ, Morris PJ. Recurrent inguinal hernia after local anaesthetic repair. Br J Surg 1981;68:273–5.

16 Ruckley CV. Day case and short stay surgery for hernia. Br J Surg 1978;65:1–4.