

# Groin hernia repair under local anaesthesia: effect of surgeon's training level on long-term results

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## Abstract

Tension-free Lichtenstein procedure was performed as an outpatient procedure under local anaesthesia in 317 patients. One senior consultant operated on 182 hernias and 12 surgical trainees on 135 hernias during 1996–2000. After a mean follow-up of 3 years, a postal questionnaire was sent to the patients. The operative outcome (operation time, pain, bleeding, infections) and long-term results (recurrences, chronic pain) were recorded. The rate of wound infections (consultant 1.1%, residents 0.7%) and hematomas (consultant 1.1%, residents 3.0%) were low and not related to the surgeon's training level. Only five recurrences were found at follow-up: two after consultant and three after trainee repair. Although 25% of the patients reported some groin pain afterwards, over 90% were very satisfied with the operation. Open mesh repair under local anaesthesia is cost-effective, simple and a safe operation. The learning curve was relatively short and there was no difference in the long-term outcome between the trainees and their consultant.

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## 1. Introduction

Inguinal hernias occur in about 16% of adult men and herniorrhaphy is one of the top three surgical procedures in most western countries [1]. Approximately 12 000 inguinal herniorrhaphies are performed each year in Finland and over 80 000 operations in UK [1,2]. The majority of groin hernias are currently operated on in ambulatory surgery units. About 20% of groin hernia repairs are undertaken for recurrences and 4% as an emergency [3]. Therefore, the socioeconomical impact of groin hernia surgery is high on health care system.

There is strong evidence that surgeon's case volume, hospital volume and specialisation improve the outcome of major surgical procedures, such as coronary artery bypass, gastrectomy, oesophagectomy, arthroplasty and rectal cancer surgery [4,5]. The role of specialist centres in more common surgical operations, such as colon

resections or inguinal herniorrhaphies, is not so clear [3,6]. Although inguinal herniorrhaphy is one of the first operations performed by surgical trainees, few studies have compared the operative results between trainees and consultants.

Lichtenstein hernioplasty is a tension-free technique, which uses polypropylene mesh to support the inguinal muscular layers [7]. Its learning curve is even shorter than traditional groin hernioplasties, and, therefore, the Lichtenstein procedure has rapidly increased as a primary operation for inguinal hernias. In some countries the rate of the Lichtenstein operation is over 50% of all inguinal hernia surgery [3]. Under local anaesthesia it can be performed as a rapid outpatient procedure with cost savings. The present study was designed as a quality control audit in the surgical training programme for this common surgical procedure. The main interest was whether young surgical trainees can perform the Lichtenstein operation with an acceptable immediate and long-term outcome compared with an experienced specialist in hernia surgery.

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## 2. Materials and methods

This was an observational study of one hospital during the years 1996–2000. Our hospital is a non-university teaching hospital with six to eight surgical trainees working at the same time. In Finland, the general surgical training consists of 2.5–3 years serving in a central provincial hospital and thereafter 3 years subspecialisation at the university hospital. The annual number of inguinal herniorrhaphies in our hospital has varied between 180 and 200 (population 110 000). The tension-free Lichtenstein technique was started in January 1996. In the study years 1996–2000, 317 out of 964 of inguinal hernias (33%) were operated on using the Lichtenstein procedure under local anaesthesia as an outpatient procedure. The patient selection for open mesh repair under local anaesthesia was based on the common clinical criteria of ambulatory surgery. The same senior consultant surgeon operated on 182 consecutive patients, 135 patients were operated on by 12 first- or second-year surgical trainees. The first three operations were supervised by the same consultant surgeon and thereafter the consultant was on call and advised if necessary. The trainees operated on 10–11 patients during their 3 months education period in inguinal hernia surgery. The consultant operated annually on 60–70 inguinal hernias using an open mesh technique as well as laparoscopic techniques.

The procedure was always performed under local infiltration anaesthesia as a rapid outpatient surgery using 9 × 13 cm polypropylene mesh (Premilene, B. Braun AG, Germany). The sac of the indirect hernia was either resected or just inverted into the abdomen [7,8]. If the hernia sac was large and direct, it was inverted with absorbable 2-0 Dexon sutures. The mesh was trimmed and placed between the conjoint tendon, inguinal ligament, pubic bone and internal oblique aponeurosis [7,8]. Bilateral hernias were present in 12/317 cases and were operated on at the same time. Local infiltration anaesthesia was a 1:1 mixture of bupivacaine (Marcain 5 mg/ml, AstraZeneca, UK) and Citanest-adrenalin (10 mg/ml+5 µg/ml, AstraZeneca) with an average total volume of 40–50 ml [9]. After surgery the patient was followed up for 60–120 min to see possible wound haemorrhage and then discharged. No prophylactic antibiotics were used. A 0.5–1.0 mg bolus of intravenous alfentanil was given (Rapifen, AstraZeneca) if the patient felt pain during the operation. The average cost of the operation was estimated at between 380 and 420 Euros [2].

The immediate outcome was analysed from the operative reports and patient's records. The patient characteristics, type of hernia, operation time and wound complications were recorded. The long-term results (mean follow-up 3.2 years, range 1–6 years) were assessed by using a questionnaire and if necessary

by clinical examination. The questions were based on the study of the Danish Hernia Database [10]. The questionnaire was sent on May 2002 (2 years after the last operation) with a covering letter and a stamped addressed envelope. If the patient responded that the hernia had recurred or that there were problems with the operated area ( $n = 7$ ), the physical examination was performed by the consultant surgeon. The following questions were asked:

- |   |   |            |
|---|---|------------|
| 1 | Have you noticed recurrence of your inguinal hernia?                | Yes/<br>no |
| 2 | Have you had any pain within the last month in the inguinal area?   | Yes/<br>no |
| 3 | If there has been pain, have you taken any pain-relieving pills?    | Yes/<br>no |
| 4 | Have there been any limitations in work or leisure-time activities? | Yes/<br>no |
| 5 | Do you have any radiating pain in the testicle?                     | Yes/<br>no |
| 6 | Was there any problems with wound healing?                          | Yes/<br>no |
| 7 | Are you satisfied with the operation and would you come again?      | Yes/<br>no |
| 8 | Was the operation unpleasant or painful?                            | Yes/<br>no |

The data analysis was carried out using Statistical Package for the Social Sciences (SPSS) for WINDOWS, version 10.0 (SPSS, Chicago, IL, USA). The statistical evaluation was performed with a Student's *t*-test for paired values and  $\chi^2$ -test with Yates correction between the groups.  $P < 0.05$  was regarded as significant for both tests.

## 3. Results

The patient characteristics were similar in both groups (Table 1). Consultant mean operative time was shorter than the trainees. There were no differences in the number of recurrent hernias or severe wound complications between the consultant and the trainees (Table 1).

Table 1  
Characteristics of the patients

	Consultant (%)	Trainee (%)
Number of patients	182 (57)	135 (43)
Male/female	176/6 (97/3)	131/4 (97/3)
Mean age ± S.D. (range)	54 ± 15 (17–83)	53 ± 12 (19–80)
Lateral/medial hernia	117/65 (64/36)	70/65 (52/48)
Right/left sided	80/92 (44/51)	61/72 (45/53)
Mean operative time ± S.D.	39 ± 13 min	62 ± 18 min***
Recurrent hernia	2 (1.1)	3 (2.2)
Wound infections <sup>a</sup>	2 (1.1)	1 (0.7)
Wound hematoma <sup>b</sup>	2 (1.1)	4 (3.0)

\*\*\* $P < 0.001$ .

<sup>a</sup> Severe enough to open the wound.

<sup>b</sup> Severe enough to be evacuated.

Three of the recurrences appeared in the medial border of the mesh near the pubic bone, one through too wide an external ring and one through the femoral canal.

The presence of chronic pain and the patients' assessment of the surgery were enquired after by questionnaire after a mean follow-up of 3.2 years (Table 2). One fifth of the patients announced some degree of pain in the operated area with no difference in the training level of the surgeon. Only 3–5% of the patients needed occasional pain-relieving drugs. Over 90% of patients felt that the wound healed well, and the same amount of patients were very satisfied with day-case surgery and would come again if necessary (Table 2).

#### 4. Discussion

Inguinal hernias are so common in the population that centralisation into specific hernia centres in Europe has not been carried out. In United States, the results of such specialist clinics have been encouraging. For example, recurrences between 0 and 1% and infections between 0 and 5% have been reported [8,11,12]. The results of nonspecialist hospitals have been slightly worse reporting recurrence rates between 4 and 7% [3,13,14]. Our results indicate that the open tension-free technique is well suited for smaller community-based and regional hospitals yielding excellent immediate and long-term results. The influence of training and experience on outcome was reflected only by the shortening of operating time, but not the long-term results.

In Finland, the frequency of groin hernia repair is third after cataract and tonsil surgery. The results of the present study suggest that with appropriate supervision and training even first or second-year surgical trainees can safely perform Lichtenstein operation without compromising patient care and the long-term outcome. This is an important result for quality control and economics because the surgeon is most important variable that influences outcome [4]. Operative training of a suitable quality and quantity is essential if inter-

surgeon variation is to be reduced. It seems that inguinal herniorrhaphies can be performed safely in general hospitals by well supervised trainees. This may indicate that the learning curve of Lichtenstein hernioplasty is relatively short and the procedure is simple enough to be part of surgical training programmes.

Chronic pain after inguinal hernia repair was also noticed in the present study. It has been reported to occur in between 10 and 30% of patients after groin hernia repair [10,15]. The aetiological factors may include irritation or damage of inguinal nerves or mesh inguinodynia [16], inflammatory reaction against the mesh or simply scar tissue [17]. Chronic pain is reported to be neuropathic in character, related with younger age, to exist during physical activity and more often related with recurrent hernia [10,15]. Laparoscopic techniques may give some short-term advantages in terms of pain and patients' perception of health [18], but the long-term comparative follow-up studies to open techniques are still few [19]. The present study indicated that although 25% of patients reported some pain sensations afterwards in the groin, this was mild in nature since over 90% were very satisfied with the operation.

The recent cost-analysis from Finland reported that Lichtenstein hernioplasty without general anaesthesia costs between 380 and 650 Euros depending on the need for an anaesthesia nurse and equipment [2]. We estimated that our costs would be about 380 Euros, since the patient was discharged after 1 or 2 h follow-up [20]. This is clearly less than that estimated by Wellwood et al. in their randomised study comparing laparoscopic versus open mesh repair in UK [18].

In our hospital, young surgical trainees have been systematically trained in operating an inguinal hernia using the Bassini, McWay and Lichtenstein procedures, and to a lesser extent laparoscopic techniques. Our current policy is to operate on all patients suitable for day-case surgery using the Lichtenstein technique under local anaesthesia. The percentage of the Lichtenstein operation under local anaesthesia is currently over 50% of all groin hernia surgery. The only indications for the laparoscopic procedure are occasionally bilateral hernias, complicated recurrences and a suspicion of an incipient hernia. Our experience is that the open tension-free mesh technique under local anaesthesia is simple enough to be learned well in general surgical training. It should be the primary standard operation for almost all adult inguinal hernias.

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Table 2  
Incidence of chronic pain after Lichtenstein operation

	Consultant (n = 182) (%)	Trainee (n = 135) (%)
Pain sensations in the last month?	42 (23)	33 (25)
Need pain-relieving pills?	5 (3)	6 (5)
Problems in work or leisure time activities?	15 (8)	22 (16)
No pain radiating to testicles?	152 (87)	121 (92)
Normal wound healing?	162 (89)	125 (93)
Satisfied with the operation?	167 (93)	128 (95)
Was the operation unpleasant?	30 (17)	16 (12)

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