Three-year analysis and comparison of Lichtenstein hernioplasty under local anaesthesia performed between junior residents and teaching staff

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Abstract

Background: The retrospective analysis and comparison of three year-term results of Lichtenstein hernioplasty performed by junior residents and teaching staff .

Aim of the study: To compare Lichtenstein tension free hernioplasty performed by junior residents and teaching staff.

Methods: Training of tension-free Lichtenstein hernia operation was started in our surgery unit as an inpatient procedure under local anaesthesia in 2010. After assessing 20 operations by junior residents with teaching staff, the 200 patients were operated during 2011-2013. Number of surgeons selected for operations were three teaching staff and six junior residents and cases divided equally - 100 each (TS : JR = 100 : 100).

Results: After three year follow up assessment was done.150 patients were available for follow up . The early complications like wound infection rate (teaching staff 0.9%,junior residents 1.1%) and hematomas (teaching staff 1.0%,junior residents 2.50%) were low and not related to surgeon's training level. The late complications like clinically evident recurrences were not found in 3 years and one third of the patients reported some discomfort after 3 year and 93-95% of the patients were very satisfied with the operation, with no statistical difference between the group of surgeons.

Introduction

Inguinal hernias occur in about 15% of adult men and hernioplasty is the most common surgical procedure performed by general surgeons (1). Approximately 11 000 inguinal hernioplasties are performed each year in Finland, over 80 000 operations in England and over 800 000 in the United States (1-3). In Scandinavian countries, the majority of groin hernias are currently operated in ambulatory surgical units. About 20% of groin hernia repairs are done due to recurrences and only 4% as emergency (1-3). The economical impact of groin hernia surgery is high on the health care system.

There is strong evidence that surgeon's case volume, hospital volume and specialisation improve the outcome of many major surgical procedures, such as coronary artery bypass, gastrectomy, esophagectomy, pancreaticoduodenectomy and rectal cancer surgery (4,5). The role of specialist centres in more common surgical operations, such as colon resections or inguinal hernioplasties, is not so clear (3,6). Although inguinal hernioplasty is one of the first operations performed by surgical residents, only few studies have compared the immediate results between residents and their consultant (7,11). The reliable recurrence rate of inguinal hernioplasty needs over 5 years of

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follow-up, and there are not available such long-term studies between residents and attending surgeons so far.

Lichtenstein hernioplasty is a tension-free technique, which uses polypropylene mesh to support the inguinal muscular layers (12). Its learning curve may be shorter than traditional groin hernioplasties, and therefore Lichtenstein procedure has rapidly increased as a primary operation in inguinal hernia in many countries. Under local anaesthesia, it can be performed as a rapid outpatient procedure with cost savings (13). The present study was designed as a quality control audit in the surgical training program for this common surgical procedure. The main interest was whether well-trained surgical residents are able to perform Lichtenstein operation with an acceptable immediate and long-term outcome compared to the experienced specialist in hernia surgery.

Methods

This is a comparative retrospective trial of 200 adult patients operated for inguinal hernia ,who tolerated local anaesthesia. The patients fulfilling the following inclusion criteria were included in the study.

1. All patients aged above 18 years with inguinal hernia.
2. Patients giving written informed consent for the study.

Exclusion criteria:

1. Patients aged less than 18 years.
2. Patients with complicated hernia.
3. Non cooperative patients for local anaesthesia
4. Patients with femoral hernia.
5. Patients allergic to polypropylene mesh.

Three consultant surgeons and six junior residents of general surgery (undergoing 3 years of residency) performed all operations. Prior to the study, junior residents were trained in open hernia surgeries by consultants. They performed 10 open hernia surgeries assisting the senior consultants and another 10 under their direct supervision.

Following this 200 consecutive patients undergoing inguinal hernioplasties were enrolled for the study, out of which 100 were operated by senior consultants and rest 100 by junior residents.

The patients undergoing open mesh repair were operated under local anaesthesia with a standby anaesthetist .The various parameters pertaining to hernia and the surgery were collected and tabulated (Table -1).Postoperatively patients were followed up for a period of 3 years and various parameters were tabulated in Table 2 and Table 3.

Table 1. Initial operative data of 200 patients undergoing Lichtenstein hernioplasty in local anesthesia during 2010-2013

	Teaching staff (%)	Junior residents (%)	p
Number (n)	100	100	
Male / female	100 / 0	100 / 0	Ns
Mean age ± SD (range)	54 ± 15 (17 - 83)	53 ± 12 (19 - 80)	Ns
Body mass index ± SD	24 ± 3.2	25 ± 3.0	Ns
Lateral/medial hernia	90/51 (64/36)	73/67 (52/48)	Ns
Size of the defect (cm)			
< 1.5	46	51	Ns
1.5-3	64	69	Ns
Right/left sided	63/47	68/42	Ns
Mean operative time ± SD	40+/-13 mins	65+/-18 mins	p< 0.0001
Wound infections	2 (1.1)	3	Ns
Wound hematoma	2 (1.1)	3	Ns

Flow chart of the study.

Our hospital is a teaching hospital with 20 to 22 surgical residents working at the same time. The annual number of inguinal hernioplasties performed in our institute has varied from 900 to 1100 . Lichtenstein tension free hernioplasty was started in our unit from January 2010. The procedure was performed under local anaesthesia as a rapid outpatient surgery using 9 × 13 cm polypropylene mesh .

Ceftriaxone 1gm iv prophylactic antibiotic was administered before placing incision. The sac of the indirect hernia was either resected or just inverted into the abdomen (12,14). If the hernia sac was large and direct, it was inverted with absorbable 1-0 suture.

We did not try to identify the three inguinal nerves systematically at operation, however if nerves were identified they were preserved. A 0.5-1.0 mg bolus of intravenous

fortwin was given if the patient felt pain during the operation .The mesh was trimmed and placed between the conjoint tendon, inguinal ligament, pubic bone and external oblique aponeurosis (12,15). Mesh was fixed with 2-0 prolene nonabsorbable sutures. Local infiltration anaesthesia was a 1:1 mixture of bupivacaine and adrenalin with an average total volume of 40-50 ml. After surgery, the patient was followed up for 60 - 120 minutes to observe possible wound hemorrhage and then discharged. The same standardized postoperative instructions of our unit were given to all patients allowing normal daily activities after operation.

Operative time was recorded from infiltration of local anaesthetic to skin closure. The short-term outcome was evaluated 1 month post-operation. The long-term results (3 years) were asked by using questionnaire and clinical examination. The questionnaire included data of recurrence, pain in the last month at rest and during physical exercise, pain scores (VAS 0-10), testicular pain, need of pain-relieving medications, limitations in work or leisure-time activities, feeling of foreign body in the groin and overall satisfaction with the operation. The questionnaire and clinical examination was performed in 2010 and 2013. If the patient told that the hernia had recurred or that there were problems with the operated area, a physical and ultrasound examination was performed to rule out a recurrent hernia or the aetiology of chronic pain. Out of 200 patients, only 160 were available for the final analysis in 2013, rest were dropped because they could not be contacted or they were deceased . The statistical evaluation was performed with a Student's t test for paired values and ÷-2 test with Yates correction between the groups. $P < 0.05$ was regarded as significant for both tests.

Results

The patient characteristics were similar in both groups (Table1). Mean operative time was shorter with a teaching staff than with junior resident ($p < 0.0001$). There were no differences in the number of wound complications between the teaching staff and the trainees after 1 month post-operation (Table1). Chronic pain sensations and patient compliance to the surgery was asked for the first time after a mean follow-up of 3 years ? (Table2). One fourth of the patients announced some degree of pain in the operated area with no difference in the training level of surgeon. Only 3-4% of the patients needed occasionally pain-relieving drugs. We did not find any relation of chronic pain to nerve status at operation. Over 90% of patients felt that the operating field had healed well. The same percentage of patients was very satisfied with the surgery and they would come again. Every tenth patient felt the sensation of a foreign body in the groin area.

Table 2. Incidence of chronic pain and recurrences 3 years after Lichtenstein operation

	Teaching staff (%) n=100	Junior residents (%) n=100
Chronic groin pain	20	22
Testicular pain	5	8
Need pain relieving medications?	4	6
Are you satisfied with the operation?	100	96
Number of recurrences	0	0
Feeling of foreign body	20	25

The long-term outcome after 3 years did not differ much from the 3 years results ? (Table3). About 10% of the patients felt still the sensation of a foreign body in the groin area, and 25-30% felt some discomfort or pain at rest or during daily activities, but usually this was not disturbing. Again, there were no marked differencesbetweenthesurgeon's groups ? (Table3). The number of recurrence was 0/200 during the 3 years follow-up with no statistical difference between the surgeon groups. Chronic pain in the long-term follow-up was also measured by using a visual analogue scale. Usually the pain response was between 0-6 (mean 0.31 ± 1.0) at rest and slightly higher (mean 1.0 ± 1.8) during physical exercise with only minor non-statistical differences between the surgeons ? (Table4). After 3 years of Lichtenstein hernioplasty, 3 patients with VAS scale over 1 was also treated by local infiltrations of corticosteroids. Usually corticosteroids caused some relief, but did not abolish chronic pain. During 3 years of follow-up, no patients were re-operated due to chronic pain.

Table 3. Outcome of patients after 3 years post-operation

		Teaching staff (%) n=76	Junior residents (%) n=74
Feeling of foreign body		6 (7.9)	8(11)
Has anything been harmed from the mesh?		1(1.3)	2 (2.7)
Are your testicles normal?		63 (83)	50 (68)
Scar discomfort			
	No	49(64.5)	35 (47)
	At rest	1(1.3)	2(2.7)
	During movement	13 (17)	13 (17.6)
	Both	10 (13)	6 (8.1)
Need pain relieving medication?		2(2.6)	2(2.7)
Are you satisfied with the operation?		65 (85.5)	57 (77)

Table 4. Pain after 3 years measured by visual analogue scale (vas 0 -vas 10) at rest and during physical exercise

AT REST	Number of patients	
	Specialist (%) n=76	Resident (%) n=74
VAS 0	70 (92)	66 (89)
VAS 1	0	1 (1.4)
VAS 2	2 (2.6)	1 (1.4)
VAS 3	1 (1.3)	2 (2.7)
VAS 4	2 (2.6)	3 (4.1)
VAS 5	0	1 (1.4)
VAS 6	1 (1.3)	0

DURING PHYSICAL EXERCISE	Number of patients	
	Specialist (%) n=76	Resident (%) n=74
VAS 0	57 (75)	52 (70)
VAS 1	3 (4)	4 (5.4)
VAS 2	4 (5.3)	6 (8.1)
VAS 3	3 (4)	5 (6.8)
VAS 4	4 (5.3)	2 (2.7)
VAS 5	2 (2.6)	2 (2.7)
VAS 6	2 (2.6)	1 (1.4)
VAS 7	1 (1.3)	1 (1.4)
VAS 8	0	1 (1.4)
VAS 9	0	0
VAS 10	0	0

Discussion

Our results indicated that properly trained surgical junior residents are able to perform Lichtenstein hernioplasty without compromising patient's care and long-term outcome. This is an important finding considering quality control and economical views because the surgeon is the most important variable that influences surgical outcome (14). The influence of training and experience on the outcome was reflected only by the shortening of operating time, but not the other outcome parameters. The recurrence rate in their study after 3 years of follow-up is nil. Our junior residents were already well-experienced to perform independently soft-tissue surgery, which may explain the different results between the present study and that of Wilkiemeyer and co-workers (11). A properly allocated and powered randomized study between junior residents and teaching staff would be presently difficult to run, because nowadays patients demand always the best possible surgeon to operate their hernias.

Recurrences in three year is nil and infections between 0 and 5% have been reported (12,17,18). Our results indicate that open tension-free technique is well suited for smaller community-based and regional hospitals yielding good immediate and long-term results. Inguinal hernioplasty is an ideal operation to teach inguinal anatomy and soft-tissue surgery because the regional anatomy has been well described and the repair techniques are well outlined and reproducible. Our results encourage to perform Lichtenstein hernioplasty 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 the surgical training programs (8,,19).

Chronic pain after inguinal hernia repair was also noticed in the present study. Pain has been reported to occur in between 10-30% of the patients after a groin hernia repair (16,20). The present study indicated that although 25-30% of the patients reported some pain sensations

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