

Chronic sequelae of common elective groin hernia repair

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Abstract

Background The aim of this study was to assess long-term chronic pain, numbness and functional impairment after open and laparoscopic groin hernia repair in a teaching hospital.

Methods We performed a cross-sectional study in which all adult patients with a groin hernia repair between January 2000 and August 2005 received a questionnaire by post. It contained questions concerning frequency and intensity of pain, presence of bulge, numbness, and functional impairment.

Results One thousand seven hundred and sixty-six questionnaires were returned (81.6%) and after a median follow-up period of nearly 3 years 40.2% of patients reported some degree of pain. Thirty-three patients (1.9%) experienced severe pain. Almost one-fourth reported numbness which correlated significantly with pain ($P < 0.001$). Other variables, identified as risk factors for the development of pain were age ($P < 0.001$) and recurrent hernia repair ($P = 0.003$). One-fifth of the patients felt functionally impaired in their work or leisure activities.

Conclusion Chronic pain and functional impairment are very common long-term complications after groin herniorrhaphy in Dutch teaching hospitals.

Keywords Groin · Pain · Postherniorrhaphy · Questionnaire · Functional impairment

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Introduction

Worldwide groin hernia repair is one of the most common operations performed in general surgery, with any complication affecting a high number of patients. Since the introduction of the tension-free mesh technique by Lichtenstein in 1984, recurrence rates have diminished to an acceptable level. This has drawn attention to chronic pain and functional impairments. With a reported incidence varying from 14 to 54%, several studies have shown chronic pain to be a common sequel after groin hernia repair [1–11]. As a result about 11% of patients are claimed to be functionally impaired in their work or leisure activities [1]. Causative mechanisms are thought to be neuropathic (entrapment or injury of ilioinguinal, iliohypogastric or genitofemoral nerves) or somatic (tissue damage, scar formation) [12]. In the present study we evaluated the results and complaints of a large group of patients after elective groin hernia repair performed mainly by residents in two teaching hospitals.

Patients and methods

This is a population-based postal questionnaire study of consecutive adult patients (≥ 18 years) who underwent groin hernia repair between January 2000 and August 2005 in two teaching hospitals [the Máxima Medical Centre in Eindhoven (MMC-E) and Veldhoven (MMC-V), The Netherlands, serving a total population of approximately 350,000 inhabitants]. Patient records were checked to exclude patients who were deceased or unable to return the questionnaire because of mental incapacities. If patients had moved and no

current address was available, they were excluded as well. The surgical techniques included were both open (Lichtenstein, Shouldice) and laparoscopic repair (total extra peritoneal, TEP; transabdominal preperitoneal, TAPP) for primary or recurrent and uni- or bilateral groin hernias.

To assure that the International Association for the Study of Pain's definition of chronic pain (pain persisting beyond the normal tissue healing time, assumed to be three months) was applicable to all reported pain complaints, the shortest follow-up period was three months [13]. The questionnaire was based on information from various previous studies [1–11] (See Appendix). Between November 2005 and February 2006 all patients of the Máxima Medical Centre were sent a questionnaire with a pre-stamped envelope with questions regarding frequency and intensity of pain, suspicion of recurrence, presence of numbness and degree of functional impairment in work or leisure activities. Pain intensity was measured with a visual analogue scale (VAS). This is a 10 cm scale with on the one end no pain and on the other unbearable pain. In order to evaluate different severities it was subdivided according to a previously validated classification: 0 = no pain, <3 = mild pain, 3–7 = moderate pain, >7 = severe pain [14]. In the present study, chronic pain was defined as any VAS > 0. After two months all non-responders were reminded by telephone or by post.

Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS), Windows version 12.0.1. The level of significance was set at a *P* value of 0.05. Pearson χ^2 test was used to determine statistical significance between different variables and the presence of pain.

Results

A total of 2,339 elective groin hernia repairs were performed on adult patients between January 2000 and August 2005 in the Máxima Medical Centre in Eindhoven (*n* = 973) and in Veldhoven (*n* = 1,368). Since the operation 82 patients had died and 75 patients had moved. Another 18 patients were excluded because of mental incapacitation, leaving 2,164 patients. The questionnaire was returned by 1,766 patients (MMC-E *n* = 702, MMC-V *n* = 1064) resulting in a response rate of 81.6% (Fig. 1). The study population consisted mainly of males (95%) with a median age of 60 years. In the MMC-V 90.5% of all repairs was performed using an open anterior technique (Lichtenstein 89.0%, Shouldice 1.5%), as opposed to the MMC-E, where almost half of the surgery was done laparoscopically

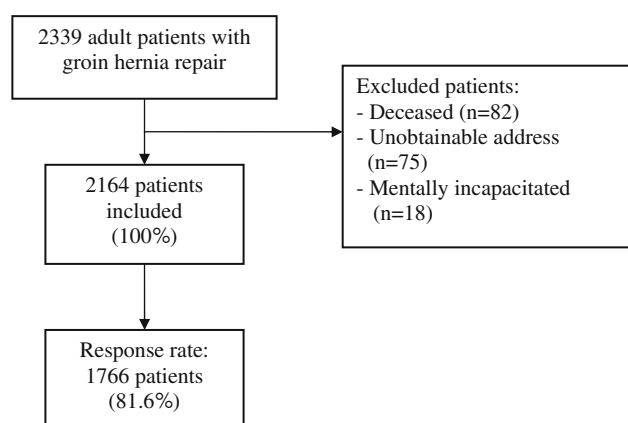


Fig. 1 Schematic depiction of patient selection and response to the questionnaire

Table 1 Demographic and operative characteristics of 1,766 patients who completed the questionnaire

	% (n)
Age (years)	
18–65	61.0 (1,078)
>65	39.0 (688)
Sex ratio (male/female)	94.8/5.2 (1,674/92)
Hernia type	
Primary	89.0 (1,571)
Recurrence	11.0 (195)
Surgical technique	
Open	75.4 (1,331)
Lichtenstein	67.5 (1,192)
Shouldice	7.9 (139)
Laparoscopic (TEP/TAPP)	24.6 (435)
Median follow up: range in months	35 (3–72)

Values in parentheses are numbers of patients

TEP total extra peritoneal, TAPP transabdominal preperitoneal (range)

(47.5%, mainly TAPP). Demographic and operative characteristics are listed in Table 1.

After a median follow-up period of 2 years and 11 months, pain was reported by 40.2% of the patients (810/1,766). Severe pain was reported by 33 patients (1.9%). Pain frequency and intensity are graphically shown in Figs. 2 and 3, respectively. As a result of persisting pain 21% of the patients was confronted with some degree of limitations in daily functioning (severe functional impairment = 1.2%). Severity of functional impairment is detailed in Table 2. A bulge was noticed by 13.2% of the patients and 25.8% (MMC-E 16.6%, MMC-V 29.9%) experienced numbness in the groin area. Laparoscopic procedures were associated with statistically fewer cases of numbness than the anterior approach (*P* < 0.001). Surgical technique (open or laparoscopic treatment) was not significantly related to

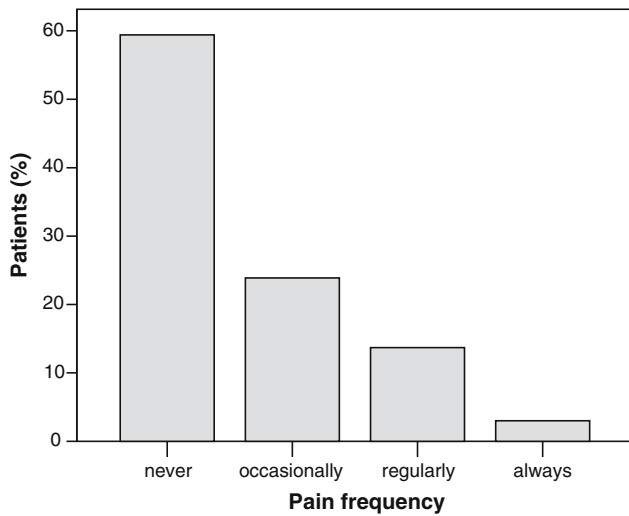


Fig. 2 Graphic representation of pain frequency

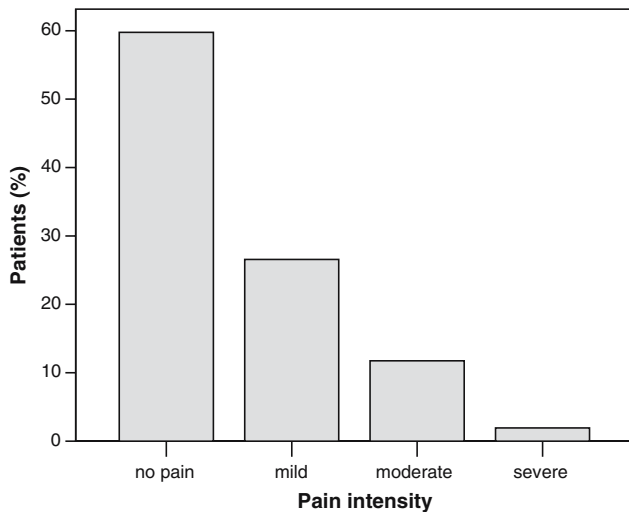


Fig. 3 Graphic representation of pain intensity

Table 2 Functional impairment in 1,705 patients (missing data in 61 patients)

	% (n)
No impairment	79.1 (1348)
Mild	13.3 (226)
Moderate	6.5 (110)
Severe	1.2 (21)

Values in parentheses are numbers of patients

reported pain intensity ($P = 0.15$). However, age (<65 years, $P < 0.001$), presence of numbness ($P < 0.001$) and recurrent hernia repair ($P = 0.003$) did appear as significant determinants for chronic pain (Table 3).

Table 3 Assessment of risk factors for the development of pain

	Pain (any severity) % (n)	No pain % (n)	P value*
Age			
18–65	49.0 (528)	51.0 (550)	<0.001
65+	26.9 (185)	73.1 (503)	
Numbness			
Present	72.8 (310)	27.2 (116)	<0.001
Absent	29.7 (385)	70.3 (914)	
Surgical technique			
Open	41.7 (555)	58.3 (776)	0.15**
Laparoscopic	36.3 (158)	63.7 (277)	
Groin hernia repair			
Primary	39.0 (612)	61.0 (959)	0.003
Recurrent	50.8 (99)	49.2 (96)	

Age, numbness, surgical technique, and recurrent groin hernia repair. Values in parentheses are numbers of patients

* Pearson χ^2 –test

** Surgical technique did not significantly relate to the development of chronic pain

Discussion

Taking the large sample size ($n = 2164$) and the good response rate (81.6%) into consideration, these results constitute a valid representation of the current prevalence of chronic pain following groin hernia repair. Especially since all applied surgical techniques for both unilateral and bilateral, primary and recurrent hernias were included, a complete picture of the current residual pain problem can be drawn. Drawbacks of this study are the retrospective design and the lack of a validated questionnaire. By using items from previous validated questionnaires, we tried to minimize such methodical bias.

In the past decade numerous studies have pointed out long-term groin pain complaints as a very common complication of hernia repair. A previous Dutch questionnaire study revealed that with one year follow-up 43.3% of the patients (138/319) still experienced some degree of groin pain, of which 14.5% was reported to be severe [7]. The present study shows equal results based on a large group of post-repair cases: some degree of pain persisted in as much as 40% of the patients after a median follow-up of approximately three years. Although the majority of reported pain intensity was mild, one in every eight groin hernia repairs was followed by moderate or severe pain complaints. These results confirm the significance of chronic pain as a complication of groin hernia surgery in Dutch clinics.

Residual pain is frequently accompanied by limitations in general functioning. In a published series of 1,166 hernia repairs, 11% of the patients were negatively influenced one year after surgery by their groin pain in work performance or leisure activities [1]. Bozuk et al. [15] reported 2.2% of the patients to be unable to return to work. In the present series 21% of the respondents contended with functional impairments. An alarming 1.2% of the patients felt severely impaired, resulting in filing for workers' compensation in most cases. Unfortunately, we did not assess quality of life. By using the short-form 36 (SF-36) Poobalan and colleagues [3] concluded that quality of life was significantly affected in chronic pain patients on three of eight dimensions: social functioning, mental health and pain.

A number of studies revealed that hernia type, size of defect, experience of surgeon, length of incision, and choice of anaesthesia do not correlate with chronic pain. At first the introduction of laparoscopy in inguinal hernia surgery seemed promising with respect to the prevention of residual pain. However, long-term pain complaints are similar, despite a reduction in the early postoperative period and faster resumption of daily activities within one day [8–11]. Our study confirms these results and we conclude that laparoscopic surgery should not be considered as a chronic pain preventing measure.

Various variables have been recognized as independent risk factors for long-term pain after inguinal hernia repair: age, numbness, high pain levels before and directly after the operation, surgery for a recurrence and postoperative complications [7–11]. Firstly, our results show a correlation between younger age (<65 years) and pain. This is probably due to age-related changes in pain experience and daily exertional level [7]. Secondly, with one-fourth of the patients reporting numbness, local cutaneous neurosensory disturbances appear to be common after inguinal herniorrhaphy, in particular after the open technique. Compared to patients with normal sensory functions, twice as many patients with numbness experienced some degree of pain. Most likely sensory abnormalities and pain are both resultants of damage or entrapment of the ilioinguinal, iliohypogastric and genitofemoral nerves symptoms [12]. Thirdly, as in previous literature, recurrent inguinal hernia repair was identified as a significant risk factor for the development of chronic pain as well [2, 3].

Hernia surgery research has hitherto focused on preventing recurrences. However, the prevention of chronic pain should be dealt with in a different way. Amid, for instance, emphasized the importance of a thorough knowledge of groin anatomy to avoid injury or entrapment of the nerves, dissecting meticulously, and handling nerves with care [12]. Based on the

adversative concept of 'no nerves no pain', few randomized controlled trials have been conducted to evaluate if preservation or elective division of the inguinal nerves during hernia repair would influence chronic pain [16, 17]. These trials reported inconclusive results. In a recently published double-blind randomized controlled trial with 100 subjects, a prophylactic neurectomy of the ilioinguinal nerve during Lichtenstein hernia repair decreased the incidence of exertional chronic pain [18]. The procedure was neither associated with more neurophysiological abnormalities nor with deterioration in quality of life. Therefore the authors proposed ilioinguinal neurectomy as a routine surgical step during open mesh hernia repair. From an empirical point of view a neurectomy is advisable when the ilioinguinal nerve is at high risk of entrapment due to the placement of the mesh. Larger clinical trials with a longer follow-up period are warranted.

The standard polypropylene mesh is associated with a strong foreign-body reaction resulting in the desired abdominal wall strength, but it may also act as a probable cause of pain [19]. Based on this hypothesis Bringman et al. assessed the impact of a lightweight or standard mesh on chronic pain with a three-year follow-up [20]. The use of lightweight mesh (LW) produced less chronic pain, although the reported difference was small and only significant on palpation in the groin (standard = 3.3% versus LW = 0.8%). There was no difference in recurrence rates. However, considering the increased costs of lightweight mesh, these results are not sufficiently convincing.

The issue of chronic postherniorrhaphy pain has created a dilemma. Is surgery still the primary treatment in patients with no or only mild symptoms? In a published series of 323 operated patients, those who graded their preoperative pain as moderate or severe benefited the most from their hernia repair, which is in contrast to those patients who had no pain at rest before operation [4]. These latter patients had significant pain scores at one year. Overall five percent of the total study group graded their present pain as slightly or much worse compared to their preoperative situation. The question thus rises whether asymptomatic patients should be treated surgically at all. A possible answer to this question is given by Fitzgibbons et al. [21]. Their randomized controlled trial showed 'watchful waiting' to be an acceptable option for men with minimally symptomatic inguinal hernias. Because of the low incidence of incarceration (1.8/1000 patient-years), delaying surgical repair was considered to be a safe option.

The present study shows that pain and consequently long-term functional impairment affect a large number

of patients after groin herniorrhaphy in a Dutch teaching hospital. Fortunately, much attention is presently drawn to preventive issues of groin pain. Surgeons, however, should also set up a protocol for recognizing and treating these serious events. To realize such a protocol the authors recommend additional research on the etiology and treatment of postherniorrhaphy pain.

Appendix

Questionnaire sent to all patients

1. How often did you experience pain in the groin area during the previous month?

Never, Occasionally, Regularly, Always

2. Please draw an x to indicate the average pain intensity in the operated groin area during the past month.

VAS: No pain—Unbearable pain

3. Did you ever notice a bulge in the operated groin area during the past month?

Yes, No

4. Did you notice a numb feeling in the groin, pubic area or the upper leg during the past month?

Yes, No

5. Are you functionally impaired in daily activities by your complaints?

No, Occasionally, Regularly, Always

6. What was the average functional impairment during the past month?

None, Mild, Moderate, Severe

References

- Bay-Nielsen M, Perkins FM, Kehlet H (2001) Pain and functional impairment 1 year after inguinal herniorrhaphy: a nationwide questionnaire study. *Ann Surg* 233:1–7
- Callesen T, Bech K, Kehlet H (1999) Prospective study of chronic pain after groin hernia repair. *Br J Surg* 86:1528–1531
- Poobalan AS, Bruce J, King PM, Chambers WA, Krukowski ZH, Smith WCS (2001) Chronic pain and quality of life following open inguinal hernia repair. *Br J Surg* 88:1122–1126
- Page B, Paterson D, Young D, O'Dwyer PJ (2002) Pain from primary inguinal hernia and the effect of repair on pain. *Br J Surg* 89:1315–1318
- Cunningham J, Temple WJ, Mitchell P, Nixon JA, Preshaw RM, Hagen NA (1996) Cooperative hernia study: pain in the postrepair patient. *Ann Surg* 224:598–602
- Courtney CA, Duffy K, Serpell MG, O'Dwyer PJ (2002) Outcome of patients with severe chronic pain following repair of groin hernia. *Br J Surg* 89:1310–1314
- Nienhuijs SW, Boelens O, Strobbe LJA (2005) Pain after anterior hernia repair. *J Am Coll Surg* 200:885–889
- Liem MSL, Graaf van der Y, Steensel van C, Boelhouwer RU, Clevers G-J, Meijer WS, Stassen LPS, Vente JP, Weidema WF, Schrijvers AJP, Vroonhoven van TJMV (1997) Comparison of conventional anterior surgery and laparoscopic surgery for inguinal hernia repair. *N Engl J Med* 336:1541–1547
- Neumayer L, Giobbie-Hurder A, Jonasson O, et al (2004) Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med* 350:1819–1827
- Grant AM, Scott NW, O'Dwyer PJ, on behalf of the MRC Laparoscopic Groin Hernia Trial Group (2004) Five year follow-up of a randomised trial to assess pain and numbness after laparoscopic or open repair of groin hernia. *Br J Surg* 91:1570–1574
- Fränneby U, Sandblom G, Nordin P, Nyrén O, Gunnarsson U (2006) Risk factors for long-term pain after hernia surgery. *Ann Surg* 244:212–219
- Amid PK (2004) Causes, prevention, and surgical treatment of postherniorrhaphy neuropathic inguinodynia: triple neurectomy with proximal end implantation. *Hernia* 8:343–349
- Classification of chronic pain (1986) Descriptions of chronic pain syndromes and definitions of pain terms. Prepared by the International Association for the Study of Pain, Subcommittee on Taxonomy. *Pain* 3 (Suppl):S1–S226
- Kelly AM (2001) The minimum clinically significant difference in visual analogue scale pain score does not differ with severity of pain. *Emerg Med J* 18:205–207
- Bozok M, Schuster R, Stewart D, Hicks K, Greaney G, Waxman K (2003) Disability and chronic pain after open mesh and laparoscopic inguinal hernia repair. *Am Surg* 69:839–841
- Ravichandran D, Kalambe BG, Pain JA (2000) Pilot randomised controlled study of preservation or division of ilioinguinal nerve in open mesh repair of inguinal hernia. *Br J Surg* 87:1166–1167
- Picchio M, Palimento D, Attanasio U (2004) Randomized controlled trial of preservation or elective division of ilioinguinal nerve in open inguinal hernia repair with polypropylene mesh. *Arch Surg* 139:755–758
- Mui WL, Ng CS, Fung TM, Cheung FK, Wong CM, Ma TH, Bn MY, Ng EK (2006) Prophylactic ilioinguinal neurectomy in open inguinal hernia repair. A double-blind randomized controlled trial. *Ann Surg* 244:27–33
- Klinge U, Klosterhalfen B, Muller M, Schumpelick V (1999) Foreign body reaction to meshes used for the repair of abdominal wall hernias. *Eur J Surg* 165:665–673
- Bringman S, Wollert S, Osterberg J, Smedberg S, Granlund H, Heikkinen TJ (2006) Three-year results of a randomised clinical trial of lightweight or standard polypropylene mesh in Lichtenstein repair of primary inguinal hernia. *Br J Surg* 93:1056–1059
- Fitzgibbons RJ Jr, Giobbie-Hurder A, Gibbs JO, Dunlop DD, Reda DJ, McCarthy M Jr, Neumayer LA, Barkun JS, Hoehn JL, Murphy JT, Sarosi GA Jr, Syme WC, Thompson JS, Wang J, Jonasson O (2006) Watchful waiting vs. repair of inguinal hernia in minimally symptomatic men, a randomized controlled trial. *JAMA* 295:285–292