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Dysejaculation after laparoscopic inguinal herniorrhaphy: a nationwide questionnaire study

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Abstract
Background Dysejaculation and pain from the groin and genitals during sexual activity represent a clinically significant problem in up to 4% of younger males after open inguinal herniorrhaphy. The aim of this questionnaire study is to assess the prevalence of dysejaculation and pain during sexual activity after laparoscopic inguinal herniorrhaphy on a nationwide basis.
Methods The study population comprised all men aged 18–50 years registered in the Danish Hernia Database ($n = 1{,}671$) who underwent primary laparoscopic herniorrhaphy between January 1, 1998 and November 30, 2009. Questionnaires regarding dysejaculation and pain during sexual activity were mailed 3 months to 12 years after surgery, and 1,172 patients were included for analysis.
Results The response rate was 68.7% ($n = 805$). Dysejaculation occurring after laparoscopic repair was present in 25 patients (3.1%). Pain from the groin or genitals during sexual activity was reported by 88 patients (10.9%), and 19 patients (2.4%) reported that the pain had impaired their sexual activity to a moderate or severe degree. Older patients and patients with longer follow-up had lower prevalence of pain during sexual activity.
Conclusions Dysejaculation and pain-related impairment of sexual activity is a significant problem after laparoscopic inguinal herniorrhaphy. The role of improved laparoscopic technique with use of glue fixation of lightweight meshes to reduce the risk of developing these complications needs to be evaluated.

Keywords Chronic pain · Dysejaculation · Laparoscopic inguinal herniorrhaphy · Postoperative pain · Sexual dysfunction

Dysejaculation and genital pain during sexual activity following inguinal herniorrhaphy are complications that can have serious consequences for patients' sexual function and quality of life. In a nationwide questionnaire study of patients with previous inguinal herniorrhaphy (mainly open repairs), 4% of patients reported dysejaculation and 2–3% had moderate to severe pain-related impairment of sexual activity [1]. In 10 of the patients with dysejaculation, the symptoms were investigated in detail, including neurophysiological testing and psychosexual evaluation, and it was concluded that the pain was of somatic origin [2]. Dysejaculation and pain during sexual activity have also been described after laparoscopic herniorrhaphy [3–5], but the prevalence and significance have not been assessed in a large-scale epidemiologic study based on a nationwide population. Therefore, the primary objective of this study is to investigate in detail pain during sexual activity, with specific emphasis on dysejaculation, in patients with previous laparoscopic inguinal herniorrhaphy.

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Patients and methods

Study design

After receiving approval from the local Ethics Committee and the Danish Data Protection Agency, a questionnaire study, based on patients registered in the Danish Hernia Database, was carried out. The set-up and organisation of the database have been reported previously [6]. In brief, it is a national database that includes more than 98% of inguinal herniorrhaphies performed in Denmark since January 1, 1998, allowing complete follow-up based on linkage between the database and the unique social security numbers in the Danish population. Inclusion criteria specified male patients aged 18–50 years at time of operation registered in the Danish Hernia Database after primary laparoscopic inguinal herniorrhaphy between January 1, 1998 and November 30, 2009. Transabdominal preperitoneal (TAPP) repair is the method used in more than 99% of patients in Denmark. Patients who had a subsequent hernia repair (ipsilateral or contralateral) in the follow-up period were excluded.

A detailed questionnaire, separated into four parts, was mailed to 1,194 patients. The first and second part of the questionnaire concerned prior inguinal hernia surgery and inguinal pain, within the last 3 months, respectively. The third part of the questionnaire (Table 1) included prevalence, intensity and location of pain during sexual activity, with specific emphasis on dysejaculation, and the extent of impairment of sexual life. In the fourth part of the questionnaire, information on concomitant pain conditions and diagnosed depression or anxiety disorders was collected. Non-responders received a new questionnaire after 4 weeks. The study was registered on www.clinicaltrials.gov (NCT01086007).

Data analyses

Data analyses were performed using SPSS version 17.0 (SPSS, Chicago, USA). Statistical analyses were based on the number of answers to any given question compared with the number of responders ($n = 805$). Pain was assessed on a numeric rating scale (NRS: 0 = no pain, 10 = worst pain imaginable). Mild pain was defined as NRS 1–3, moderate pain as NRS 4–6 and severe pain as NRS 7–10 [7]. Categorical data were analysed using Pearson chi-square test, and two-sided P-values < 0.05 were considered statistically significant. Continuous data (e.g. age and time since surgery) are presented as median with range intervals. Time since surgery (follow-up time) was categorized into <3 years, 3–6 years and >6 years.

Results

In the period between January 1, 1998 and November 30, 2009, 1,671 male patients were registered in the Danish Hernia Database as having undergone laparoscopic surgery for a primary groin hernia. Reasons for not receiving a questionnaire are illustrated in Fig. 1. Questionnaires were mailed to 1,194 patients, and 1,172 patients were included for final analysis. Reasons for exclusion are shown in Fig. 1. The questionnaire was returned by 805 patients, giving a response rate of 68.7%. Median age at time of operation was 43 years (18–50 years), and median follow-up time until the questionnaire was mailed was 3.3 years (0.25–12.1 years). Persistent non-sexual-related post-herniorrhaphy pain was reported by 176 patients (21.9%), and 67 patients (8.3%) had moderate to severe pain.

Dysejaculation

Dysejaculation was reported by 25 patients (3.1%), of whom 9 (1.1%) did not report any other sexual-related pain. The location of pain in patients with dysejaculation was in the inguinal region ($n = 16$), the testes/scrotal region ($n = 14$), the lower abdomen ($n = 12$), the thigh ($n = 4$), the penile shaft ($n = 2$) and the anal region ($n = 1$).

Pain during sexual activity

Pain during sexual activity was reported by 88 patients (10.9%), of whom 45 (5.6%) described the pain as mild, 34 (4.2%) described it as moderate and 9 (1.1%) described it as severe. Nineteen patients (2.4%) reported that pain had impaired their sexual life to a moderate or severe degree.

Unilateral laparoscopic repair was performed in 458 patients (56.9%), and 347 patients (43.1%) were bilaterally operated. The risk of pain during sexual activity was not different after bilateral repair compared with unilateral repair [40/347 (11.5%) vs. 48/458 (10.5%); $P = 0.65$]. Previous non-inguinal abdominal surgery was not related to the development of pain during sexual activity [12/113 (10.6%) vs. 75/683 (11.0%); $P = 1.0$; 9 responders missing]. Patients with longer follow-up (>6 years) had lower prevalence of pain during sexual activity compared with patients with shorter follow-up (<3 years) [11/189 (5.8%) vs. 53/368 (14.4%); $P = 0.002$; Fig. 2]. Younger age (20–45 years) was significantly related to pain during sexual activity compared with older age (46–62 years) at follow-up [52/88 (59.1%) vs. 36/717 (5.0%); $P = 0.009$, respectively]. Chronic pain from other regions was present in 36/87 (41.4%; 1 respondent missing) of the patients with pain during sexual activity versus 187/707 (26.4%; 11 responders missing) of patients without pain during sexual

Table 1 Part three of the questionnaire specifically investigating dysejaculation and pain during sexual activity in 88 patients who reported pain during sexual activity after laparoscopic herniorrhaphy

Modality	Questions	Compulsory response options	Results
Intensity of pain ($n = 88$)[a]	Please mark the pain intensity on a 0- to 10-point scale, where 0 is "no pain" and 10 "worst pain imaginable"	Mean average pain: NRS 0–10	3.9 (0–9)
		Mean maximum pain: NRS 0–10	5.2 (2–10)
Prevalence of pain ($n = 88$)[a]	How often do you experience pain during sexual activity?	Seldom (every 4 times or less)	28 (31.8%)
		Often (every 2 or 3 times)	31 (35.2%)
		Always (every time)	29 (33.0%)
Location of pain[b,c] ($n = 85$)[a]	Where is the sexual-related pain located?	Inguinal region	67 (78.9 %)
		Scrotum/testis	35 (41.1 %)
		Penile shaft	7 (8.2 %)
		Penile glans	2 (2.4 %)
		Anus	1 (1.2 %)
		Lower abdomen	34 (40.0%)
		Thigh	8 (9.4 %)
		Other	4 (4.7 %)
Occurrence of pain ($n = 85$)[a,c]	When do you experience pain during sexual activities?	During erection	12 (13.6 %)
		During physical contact	46 (52.3 %)
		During ejaculation	25 (28.4 %)
		Following ejaculation	26 (29.5 %)
Duration of pain (n = 87)[a]	For how long is the pain present during and following sexual activities?	Pain ceases when I change position	18 (20.7%)
		Pain ceases when the sexual activity stops	12 (13.8%)
		Pain ceases seconds after the sexual activity	12 (13.8%)
		Pain ceases minutes after the sexual activity	28 (32.2%)
		Pain ceases hours after the sexual activity	17 (19.5%)
Description of pain ($n = 85$)[a]	Is it the same pain as you experience with other physical activities?	The pain is always the same as I experience with other physical activities	30 (35.3%)
		The pain is sometimes the same as I experience with other physical activities	36 (42.4%)
		The pain is never the same as I experience with other physical activities	6 (7.1%)
		I only have sexual-related pain	13 (15.3%)
The pain influence on sex life ($n = 87$)[a]	Has the pain influenced your sex life?	Not at all	32 (36.8%)
		Minimally	36 (41.4%)
		Moderately	12 (13.8%)
		Severely	7 (8.0%)
Consulted a physician ($n = 85$)[a]	Have you consulted a medical doctor in regard to the sexual related pain?	Yes	26 (30.6%)
		No	59 (69.4%)

The pain intensity [numerical rating scale (NRS), 0–10] is shown as mean with range in parenthesis. All other variables are shown as *n* (%)

[a] Number of patients who completed this section

[b] Patients were also asked to mark the area where the pain is located on a figure

[c] Since some patients stated more than one answer, the number is higher than 85

activity. Pain during sexual activity was correlated with concomitant pain from other regions ($P = 0.005$). Five patients with pain during sexual activity had a diagnosed depression or anxiety disorder, but no relationship with pain during sexual activity was observed [5/88 (5.7 %) vs. 29/717 (4.0%); $P = 0.41$].

Discussion

The present study of dysejaculation and pain during sexual activity in patients with previous primary laparoscopic herniorrhaphy represents to our knowledge the first large-scale epidemiological study in a nationwide population.

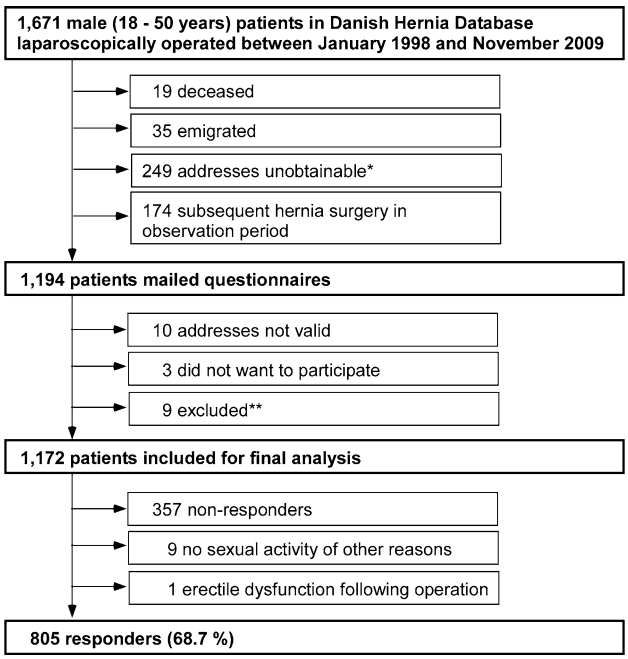

Fig. 1 Flowchart of patients with a primary laparoscopic herniorrhaphy. *Address unobtainable due to Danish privacy protection legislation. **Patients excluded due to mental retardation reported by the relatives, previous testicular surgery or suspicion of present hernia

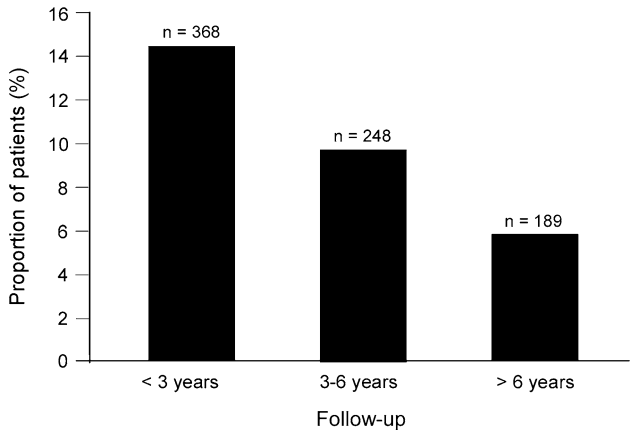

Fig. 2 Proportion of patients who reported pain during sexual activity at follow-up. Patients were categorized into three groups (<3 years, 3–6 years, >6 years) based on follow-up time since surgery

Our study demonstrated a decrease in prevalence of pain during sexual activity with longer follow-up (Fig. 2). Interestingly, this decrease has been reported in a number of studies in regard to non-sexual post-herniorrhaphy pain [3, 8, 9]. Thus, in a follow-up questionnaire study after inguinal herniorrhaphy, Aasvang et al. [8] found that pain-related impairment of daily activities decreased from 16.6% 1 year after surgery to 5.9% 6.5 years after surgery. In another follow-up study, 5 years after either totally extraperitoneal (TEP) laparoscopic repair or open mesh surgery, Grant et al. [9] reported that severe or very severe pain was observed in 3.8% of patients at 1 year and 2.1% at 5 years in the TEP group, and in 2.2% of patients at 1 year and 1.5% at 5 years in the open mesh group. Eklund et al. [3] followed patients 5 years after laparoscopic (TEP) or Lichtenstein inguinal herniorrhaphy. Moderate or severe pain was reported by 2.7% of patients at 1 year and 1.9% at 5 years in the TEP group, and by 7.1% of patients at 1 year and 3.5% at 5 years in the Lichtenstein group.

Several publications have shown that there is a reduced risk of developing chronic pain after laparoscopic compared with open inguinal herniorrhaphy [3, 5, 10–12]. Whether this advantage of laparoscopic inguinal herniorrhaphy, in terms of reduced risk of development of chronic pain, also applies to the risk of development of dysejaculation and pain during sexual activity has not been well established. The reported prevalences in the present study of 3.1% of patients with dysejaculation and 2.4% of patients with moderate or severe pain-related impairment of sexual activity are less than those reported after open inguinal herniorrhaphy. Aasvang et al. [1] reported in a study, after mainly open inguinal herniorrhaphies, that 4% of patients had dysejaculation and 2.8% had moderate or severe impairment of sexual activity, but the follow-up time was 1.4–1.7 years and thus shorter than in the present study, which hinders direct comparison. Recently, two prospective studies have shown that the risk of development of pain during sexual activity seems to be attenuated by laparoscopic surgery. In a detailed prospective study on predictive risk factors for post-herniorrhaphy pain, Aasvang et al. [5] observed the prevalence of dysejaculation to be 0.5% in the laparoscopic (TAPP) operated patients and about 1.5% in open mesh (Lichtenstein) operated patients at 6-month follow-up. Bittner et al. [4] reported that after laparoscopic (TAPP) inguinal herniorrhaphy less than 1% of the patients had moderate or severe pain during sexual activity when assessed at 6 months follow-up. In these two last studies from the same cohorts, where the risk of development of dysejaculation and pain during sexual activity were low, the laparoscopic (TAPP) inguinal herniorrhaphies were predominantly performed with implantation of a lightweight mesh with glue fixation, suggesting the importance of the laparoscopic mesh fixation technique for the risk of development of chronic pain and pain during sexual activity [4, 13]. In the present study, no information is available on type of mesh or fixation technique, although glue fixation was not used before the last 2–3 years.

The etiology behind dysejaculation after inguinal herniorrhaphy is largely unknown. It has been suggested that compression or dilation of vas deferens caused by an inflammatory process in the mesh, or lesion of nerves in the surgical field (i.e. genitofemoral, iliohypogastric or

ilioinguinal nerve), may lead to dysejaculation following open mesh repairs [1, 2, 14, 15]. Although the prevalence of dysejaculation following a laparoscopic procedure compared with the open mesh technique seems smaller, the pathogenic factors behind these results still need to be established.

Predictive factors of dysejaculation and pain during sexual activity are not well described, but in accordance with the increased risk of non-sexual-related post-herniorrhaphy pain in younger patients [3, 16, 17], we found an increased risk of pain during sexual activity in younger patients. We also observed an increased risk of pain during sexual activity in patients with other chronic pain syndromes. This corroborates findings from a study regarding post-herniorrhaphy pain [18], and from a study investigating pain during sexual activity in patients with previous inguinal herniorrhaphy [1].

The present study may overestimate the prevalence of dysejaculation and pain during sexual activity since the prevalences may be higher among responders. If we had used the total number of patients included in the analysis ($n = 1{,}172$) assuming that non-responders had no pain during sexual activity, the prevalence of dysejaculation and moderate or severe impairment of sexual activity would be 2.1 and 1.6% compared with 3.1 and 2.4%, respectively.

Another relevant point to discuss is the possibility of mass significance due to multiple comparisons leading to high probability of type I error. In the present study six comparisons were calculated, but even when the *P*-values are corrected with the conservative Bonferroni method [19], two out of three uncorrected significant comparisons were still significant at the 0.05 level.

In conclusion, we have found that dysejaculation is reported in 3.1% of patients after laparoscopic inguinal herniorrhaphy, and 2.4% of patients have moderate or severe pain-related impairment of sexual activity. Recent studies have suggested that the risk can be reduced with improved laparoscopic technique, especially with focus on non-invasive mesh fixation and use of lightweight meshes, which needs to be confirmed in large-scale detailed prospective studies.

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