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Ejaculatory Pain

A Specific Postherniotomy Pain Syndrome?

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Background: **Sexual dysfunction due to ejaculatory and genital pain after groin hernia surgery may occur in approximately 2.5% of patients. However, the specific psychosexological and neurophysiologic characteristics have not been described, thereby precluding assessment of pathogenic mechanisms and treatment strategies.**

Methods: **Ten patients with severe pain-related sexual dysfunction and ejaculatory pain were assessed in detail by quantitative sensory testing and interviewed by a psychologist specialized in evaluating sexual functional disorders and were compared with a control group of 20 patients with chronic pain after groin hernia repair but without sexual dysfunction, to identify sensory changes associated with ejaculatory pain.**

Results: **Quantitative sensory testing showed significantly higher thermal and mechanical detection thresholds and lowered mechanical pain detection thresholds in both groups compared with the nonpainful side. Pressure pain detection threshold and tolerance were significantly lower in the ejaculatory pain group compared with the control group. The maximum pain was specifically located at the external inguinal annulus in all ejaculatory pain patients, but not in controls. The psychosexual interview revealed no major psychosexual disturbances and concluded that the pain was of somatic origin. All patients with ejaculatory pain had experienced major negative life changes and deterioration in their overall quality of life and sexual function as a result of the hernia operation.**

Conclusions: **Postherniotomy ejaculatory pain and pain-related sexual dysfunction is a specific chronic pain state that may be caused by pathology involving the vas deferens and/or nerve damage. Therapeutic strategies should therefore include neuropathic pain treatment and/or surgical exploration.**

CHRONIC postoperative pain has been recognized as a severe frequent adverse outcome occurring after many surgical procedures[1] and probably caused by a nerve lesion. After groin hernia repair, approximately 10% of patients report chronic pain affecting daily functions.[2] Chronic genital and ejaculatory pain (dysejaculation) has previously only been sporadically reported.[3–17] However, genital and ejaculatory pain impairing sexual activity to a moderate or severe degree was found in 2.5% of 1,015 patients in a recent nationwide questionnaire study 1.5 yr after groin hernia repair.[18] Although some of the pathogenic mechanisms may be related to surgical technique,[19] most studies on chronic postsurgical pain syndromes are performed by anesthesiologists.[1] In addition, many of these patients are referred to pain clinics,[20] and detailed information on characteristics in such patients is therefore relevant for anesthesiologists.

Because none of the case reports or the recent large questionnaire study[18] performed detailed sensory testing or psychosexual evaluation, we conducted a study using a detailed quantitative sensory testing protocol to fully characterize the pathogenic mechanisms of these serious complaints in younger men. The protocol was designed to examine the presence of sensory loss (small and large fiber function) and neuroplasticity (hyperalgesia, allodynia) from cutaneous and deep structures in 10 patients with severe pain-related sexual dysfunction and dysejaculation 2 yr after groin hernia repair, and compared them with a control group of 20 patients with chronic pain after groin hernia repair but without dysejaculatory or genital pain. A psychosexual evaluation was also performed to assess psychological comorbidities that may explain the sexual dysfunction. By assessing these parameters, we may identify specific sensory changes that could guide future research and treatment strategies specific for this severe chronic pain syndrome.

Materials and Methods

Study Design

After approval from the ethics committee for Copenhagen and Frederiksberg county, Denmark, patients from a previous study reporting severe sexual dysfunction due to ejaculatory pain after groin hernia repair[18] were asked to participate in the study. A control group consisting of patients with chronic pain after groin hernia repair, but without pain-related sexual dysfunction, were also recruited from the previous nationwide survey.[18] Patients and controls were included after written and verbal informed consent. Examinations took place in May and June 2005 at Rigshospitalet, Copenhagen, Denmark. Pain medication and central nervous system–active drugs were stopped 1 week before testing. Patients were examined by a physician performing the quantitative sensory testing and were interviewed by a psychologist specialized in evaluating and treating sexual functional disorders. The Danish version of the Hospital Anxiety and Depression Scale[21] was filled out by the patients and controls at home. Before testing, groin and

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genital hair was trimmed down by the patient, using an electrical trimmer, taking care not to lesion the skin, thereby possibly affecting the quantitative sensory testing. After a 15-min pause to allow any irritation from the hair trimming to wear off and for the patient to be positioned in a comfortable, semireclined position, patients were asked to locate the area of groin or genital pain. Pain intensity was assessed on a 0- to 10-point numerical rank scale, with 0 representing no pain and 10 representing the worst pain imaginable.

Sensory Mapping and Quantitative Sensory Testing. The following sensory disturbances, indicative of nerve damage, were investigated: hypoesthesia, hyperesthesia, allodynia, and hyperalgesia. The presence of the above-mentioned sensory dysfunctions were examined by first performing mapping of the painful area according to the recommendations by Jensen and Baron,[22] starting well outside the painful area along four different paths converging toward the center of the painful area. To get the patient well acquainted with the testing procedure, all tests began with a demonstration of the testing sequence on the lower forearm. The patient was instructed to keep his eyes closed and focus on the evoked sensations from the stimulation. The patient was unaware of the test results throughout the testing session.

A 20°C metal roll (Thermoroll; Somedic AB, Hörby, Sweden) was rolled over the area at 1–2 cm/s to map changes in cold sensitivity. A cotton swab 1.5 cm in width was dragged over the skin at a speed of 1–2 cm/s, thereby mapping brush tactile sensitivity.[23] This was chosen over the normally used brush for hygienic reasons. A von Frey fiber (Semmes-Weinstein monofilaments; Stoelting Co., Wood Dale, IL; ranging from 0.078 to 2,941.176 mN) was used for punctuate tactile mapping. Areas of hypoesthesia, hyperesthesia, or allodynia were mapped and transferred onto paper.

Quantitative Sensory Testing. Quantitative sensory testing was performed in accordance with previous studies,[16,23] focusing on the area with sensory changes using the contralateral side as reference.

Tactile Detection and Pain Detection Thresholds. Seventeen progressively rigid monofilament von Frey fibers were used to determine tactile detection and tactile pain detection thresholds: The tactile detection and pain detection threshold was defined as the least force that elicited a sensation of touch or pain, respectively. This was done by repetitive testing using the ascending approach, until the same von Frey fiber elicited two similar responses in succession.

Thermal Detection and Pain Detection Thresholds. A thermal stimulus (Modular Sensory Analyser; Somedic AB) was used to assess cold and warm detection thresholds, and cold and heat pain detection thresholds. A Peltier thermode with an area of 12.5 cm^2 was applied to the skin at a fixed application pressure. The testing was performed in triplicate with a randomized interstimulus interval of 4–6 s, starting from baseline temperature of 32°C with a ramp rate of ±1°C/s. Cutoff limits were 52° and 10°C for warm and cold measurements. The patient pressed a button when experiencing a cold or warm sensation, thereby assessing detection thresholds. When cold or warmth became painful, the patient pressed the button, thereby assessing pain detection thresholds. Failure to respond before the cutoff limit was reached resulted in assignment of the cutoff value.

Response to Repetitive Mechanical Stimulation (Windup). A cotton swab was used for brush stimulation, and a von Frey fiber (Sensory evaluator, No. 5.88, nominal buckling force 588.235; Stoelting Co.) was used for tactile stimulation at 2 Hz for 1 min. The patients were asked to continuously report the pain intensity on an 0- to 10-point numerical rank scale 1 min before, during, and a minimum of 3 min after stimulation stopped or for as long as the pain continued.

Mechanical Pain Detection and Tolerance Thresholds. A pressure algometer (Bridge amplifier, neoprene tip 0.18 cm^2; Somedic AB) was pressed down over the maximum pain area until pain was reported or the pressure exceeded 350 kPa. The testing was performed in triplicate, and the average value was calculated. Mechanical pain tolerance was assessed as long as the patient could withstand pain or until the pressure exceeded 350 kPa.

Psychosexual Evaluation. Patients were interviewed regarding psychosocial and sexological history and current psychosexual status. The evaluations were performed as an interview and supplemented by results from the Hospital Anxiety and Depression questionnaire[21] (Danish version).

Statistics

Data were analyzed using SPSS version 13 software (SPSS Inc., Chicago, IL). Differences in sensory thresholds and evoked pain by repetitive stimulation between the painful and unaffected contralateral side were analyzed by paired *t* test (parametric data) and by Wilcoxon signed rank test (nonparametric data). Data are presented as means with 95% confidence intervals, or as medians with 25th and 75th percentiles. Box plots are used to describe the data. Differences in frequencies are compared using the Fisher exact test. *P* values less than 0.05 are considered statistically significant. The test results from each side were compared for each group and between groups. The sensory differences between the two sides were calculated as (sensory $threshold_{painful\ side}$ − sensory $threshold_{contralateral\ side}$), thereby correcting for variation within individuals, and differences were compared between groups.

Results

Forty-one patients reported ejaculatory pain of various intensity in the original study,[18] whereof 13 experienced severe sexual dysfunction due to dysejaculation, of whom 10 patients aged 20–42 yr agreed to participate in the current study. The control group consisted of 20 patients with moderate to severe pain, but without dysejaculation and pain-related sexual dysfunction. The postoperative observation period was between 2.1 and 2.7 yr for patients and between 1.7 and 3.2 yr for controls. All subjects (patients and controls) had undergone open mesh surgery, and 2 patients had surgery for recurrent hernia and developed pain thereafter. There were no signs of hernia recurrence in any subject. At the time of examination, the patients reported a median pain score of 6 (3–10) points occurring daily, and 10 (7–10) when worst in intensity, and controls reported a median pain score of 5 (1–10) occurring daily and 8 (4–10) when worst in intensity ($F = 1.6$; $df = 28$; $P = 0.3$ and $F = 1.8$; $df = 28$; $P = 0.1$, respectively, when compared between groups). Eight patients experienced pain during sexual activity and before ejaculation, and all patients had pain when ejaculating, from the operated groin and/or genitals (testis/penis). The pain persisted for minutes to hours after sexual activity had stopped.

Pain was unilateral in all but one patient, who experienced pain stretching to the medial part of the contralateral groin, although only operated on one side. In all patients, the maximum pain was located at the external inguinal annulus (fig. 1), whereas this was the case in only 4 (20%) of the controls. The other control patients had a maximum pain location in other areas surrounding the herniotomy scar.

Sensory Mapping (Cold Roll, Brush, and Punctuate Stimulation)

Areas with sensory disturbances were found more often on the painful side than on the contralateral side in both groups. For details, see table 1 and figure 1.

Quantitative Thermal Sensory Testing

Cold and Warm Detection Threshold and Cold and Heat Pain Detection Threshold. All patients and controls had significantly increased cold and warmth detection thresholds on the painful side compared with the contralateral side, and heat pain detection threshold was significantly increased on the painful side in the control group but not in patients. Cold pain detection threshold was not different between sides in patients or controls. There were no significant differences in cold/warmth detection thresholds or cold/heat pain detection thresholds between groups when each side and differences between sides were compared across groups (table 2 and fig. 2).

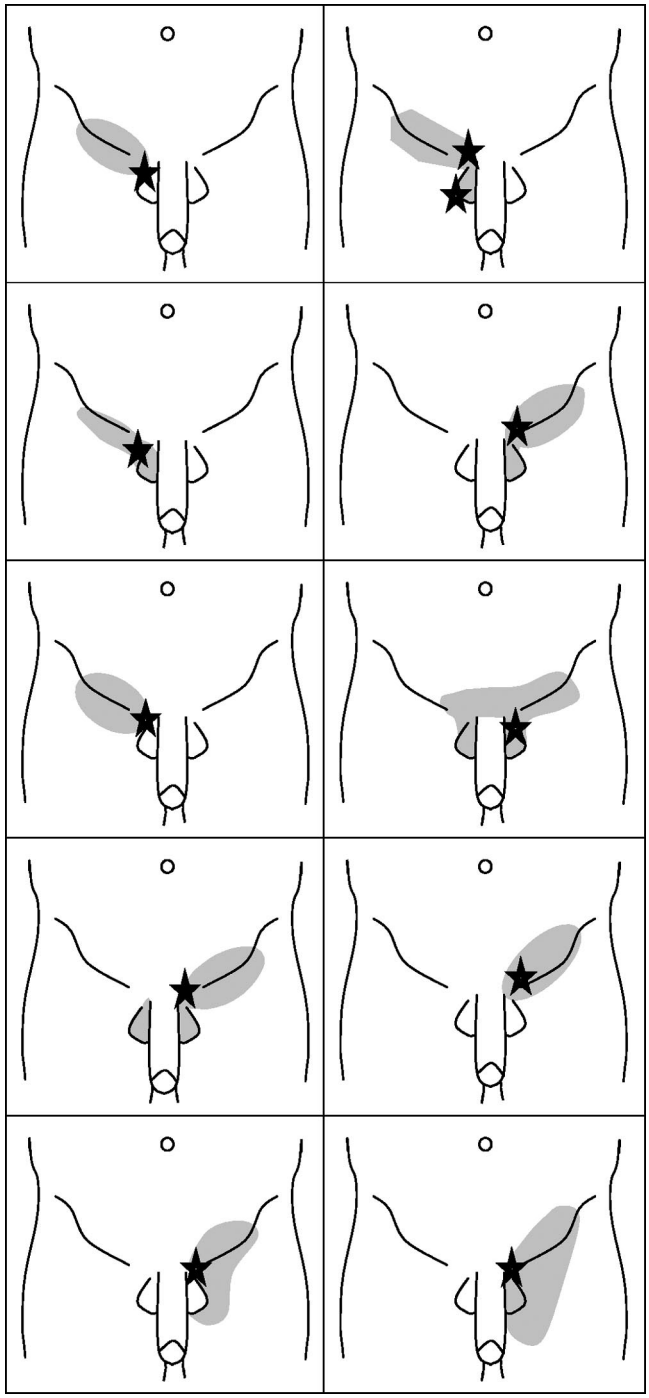

Fig. 1. Pain location during ejaculation, and area of sensory disturbances found by sensory mapping, in 10 patients with severe pain-related sexual dysfunction and chronic pain after groin herniotomy. A *star* indicates the maximum pain location, and the *shaded area* is where sensory disturbances or pain is present.

Quantitative Mechanical Sensory Testing

Tactile Detection and Pain Detection Threshold and Mechanical Pain Threshold and Mechanical Pain Tolerance Threshold. All patients and controls had significantly decreased mechanical pain and mechanical pain tolerance threshold on the painful side

Table 1. Sensory Mapping in 10 Patients with Severe Pain-related Sexual Dysfunction/Dysejaculation and Postherniotomy Pain, Compared with 20 Patients with Chronic Postherniotomy Pain Only

		Hypoesthesia		Hyperesthesia		Allodynia/Hyperalgesia	
Sensory Test	Group	Pain Area	Contralateral	Pain Area	Contralateral	Pain Area	Contralateral
Cold roll	Dysejaculation	10 (100.0)	None	None	None	1 (10.0)	None
	Control	15 (75.0)	None	3 (15.0)	None	2 (10.0)	None
Cotton swab	Dysejaculation	9 (90.0)	2 (20.0)	1 (10.0)	None	6 (60.0)	None
	Control	15 (75.0)	None	2 (10.0)	None	3 (15.0)	None
von Frey fiber	Dysejaculation	10 (100.0)	None	None	1 (10.0)	8 (80.0)	1 (10.0)
	Control	14 (70.0)	1 (5.0)	9 (45.0)	None	6 (30.0)	None

Sensory mapping was performed at the maximum pain located by the patient and on the contralateral side, shown as number of patients with percentages in parenthesis. Cotton swab was 1.5 cm in width and dragged at 1–2 cm/s. Allodynia was recorded for the 20°C cold metal roll and the cotton swab. Hyperalgesia was recorded for the 588.235-mN von Frey fiber. Cumulative percentages for each parameter exceed 100 because some patients experienced more than one sensory dysfunction.

compared with the contralateral side, and tactile detection threshold was significantly increased on the painful side in the control group, but not in patients. Tactile pain detection thresholds were not different between sides in both groups. There were no significant differences in tactile detection and tactile pain detection thresholds when each side and differences between sides were compared between groups. A significantly lower mechanical pain detection (62 *vs.* 151 kPa, $F = 8.3$; $df = 28$; $P = 0.002$) and mechanical pain tolerance threshold (124 *vs.* 223, $F = 0.17$; $df = 28$; $P = 0.009$) were found on the painful side in patients compared with controls. However, this difference was no longer significant when differences in mechanical pain and mechanical pain tolerance threshold between sides were compared across groups ($F = 0.04$; $df = 28$; $P = 0.14$ and $F = 0.2$; $df = 28$; $P = 0.3$, respectively) (table 2 and fig. 2).

Windup. Eight patients (80%) *versus* 11 controls (55%) experienced increased pain during repetitive von Frey fiber stimulation. Thirty percent of patients and 20% of controls reported painful aftersensations lasting longer than a minute after stimulation was stopped. Six patients with ejaculatory pain could not complete the 1-min test because of intolerable pain. Five patients and one control also experienced increased pain during repetitive brush stimulation (table 3).

Psychosexological Evaluation. The interview did not reveal any chronic psychiatric diseases such as depression or schizophrenia. However, one patient was diagnosed as having personality disorder since childhood, but without hospitalization, and one patient had been exposed to torture before seeking asylum in Denmark. Three patients were classified as having had transient depressive periods as adults without medication or hospitalization. Three patients reported they had re-

Table 2. Thermal and Mechanical Quantitative Sensory Testing in 10 Patients with Severe Pain-related Sexual Dysfunction/Dysejaculation and Postherniotomy Pain, Compared with 20 Patients with Chronic Postherniotomy Pain Only

Test Parameter	Group	Painful Area	Control Area	*t* Value (*df*)	*P* Value
Thermal					
Cold detection threshold, °C	Dysejaculation	23.9 (19.1–28.7)	29.8 (29.0–30.7)	3.1 (9)	0.012
	Control	23.7 (20.6–26.7)	28.4 (27.2–29.6)	−4.9 (19)	< 0.0001
Cold pain detection threshold, °C	Dysejaculation	11.0 (6.5–15.5)	12.0 (7.6–16.4)	−0.6 (9)	NS
	Control	8.8 (6.7–10.9)	10.4 (7.9–13.0)	−1.2 (19)	NS
Warmth detection threshold, °C	Dysejaculation	39.7 (37.0–42.4)	35.3 (34.4–36.2)	3.7 (9)	0.005
	Control	40.7 (38.1–43.2)	35.5 (34.8–36.3)	4.4 (19)	< 0.0001
Heat pain detection threshold, °C	Dysejaculation	47.4 (45.0–49.8)	45.0 (42.6–47.4)	2.2 (9)	NS
	Control	47.8 (46.4–49.2)	44.4 (42.6–46.3)	3.9 (19)	0.001
Mechanical					
Punctuate detection threshold, mN	Dysejaculation	9.8 (0.2; 58.8)	2.7 (0.2; 39.2)		NS
	Control	16.7 (0.2; 98.0)	3.9 (0.2–9.8)		< 0.0001
Punctuate pain detection threshold, mN	Dysejaculation	421.6 (5.9; 2,941.2)	980.4 (13.7; 2941.2)		NS
	Control	201.0 (13.7; 2,941.2)	588.2 (78.4; 2941.2)		NS
Pressure pain detection threshold, kPa	Dysejaculation	62 (34–91)	146 (88–204)	−3.4 (9)	0.008
	Control	151 (105–197)	189 (153–226)	−2.4 (19)	0.03
Pressure pain tolerance threshold, kPa	Dysejaculation	124 (63–185)	245 (171–320)	−4.0 (9)	0.003
	Control	223 (178–268)	306 (275–338)	−4.7 (19)	< 0.0001

Thermal and mechanical thresholds are presented as mean (95% confidence interval). Tactile thresholds are medians (25th and 75th percentiles). All tests were compared by paired *t* test (two-tailed), except tactile tests, which were compared by Wilcoxon signed rank test ($P < 0.05$ is significant).

NS = not significant ($P \geq 0.05$).

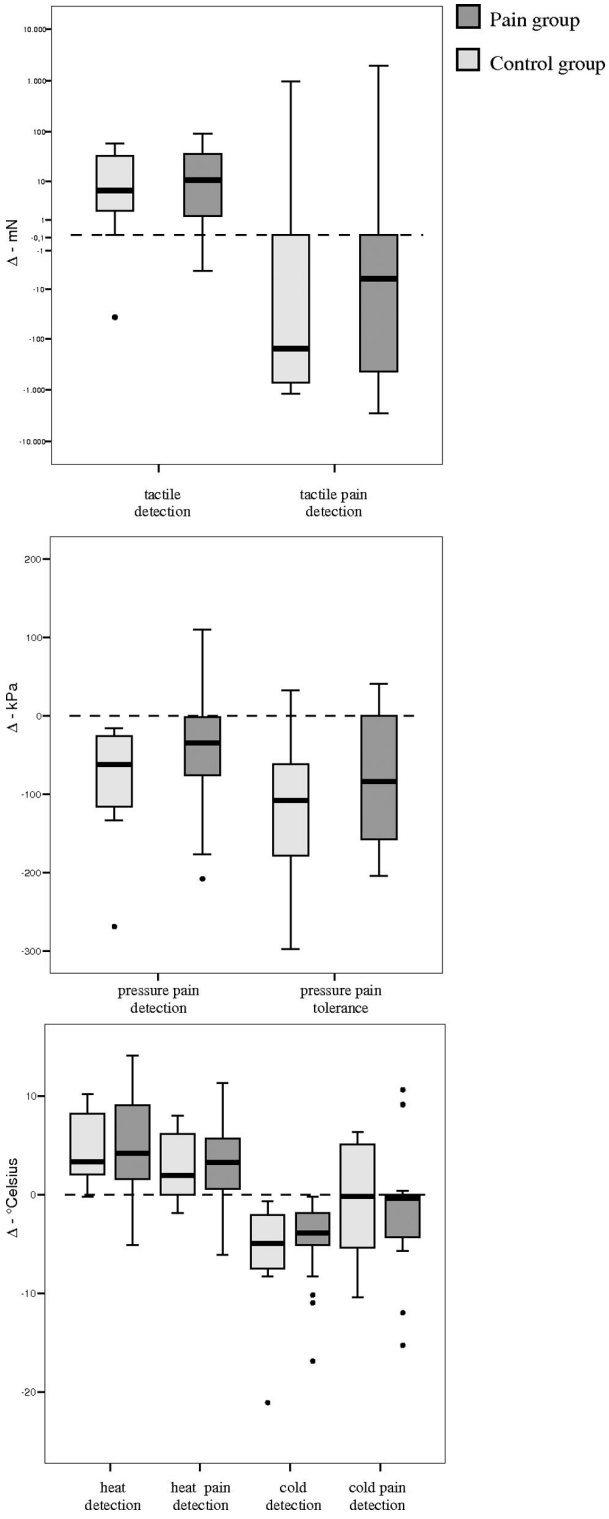

Fig. 2. Differences in sensory thresholds/tolerance between the painful and contralateral side in 10 patients with severe pain-related sexual dysfunction/dysejaculation and postherniotomy pain, compared with 20 patients with chronic postherniotomy pain only (controls). Sensory differences were found by subtracting the contralateral side from the painful side. *Bottom symbol* = values below the 5th percentile; *bottom of vertical line* = 5th percentile; *bottom of box* = 25th percentile; *median line* = 50th percentile; *top of box* = 75th percentile; *top of vertical line* = 95th percentile; *symbol above vertical line* = values above the 95th percentile.

Table 3. Results of Repetitive (Windup) Punctuate and Brush Stimulation in 10 Patients with Severe Pain-related Sexual Dysfunction/Dysejaculation and Postherniotomy Pain, Compared with 20 Patients with Chronic Postherniotomy Pain Only

	Dysejaculation	Control
Punctuate		
Windup yes/total	8/10 (80%)	11/20 (55%)
Aftersensations yes/total	3/10 (30%)	4/20 (20%)
Brush		
Windup yes/total	5/10 (50%)	1/20 (5%)
Aftersensations yes/total	1/10 (10%)	2/20 (10%)

Punctuate windup by 588.235-mN von Frey fiber and brush windup by cotton swab dragged across skin at 2.0 Hz for 1 min. Aftersensations were present if pain ratings 1 min after stimulation were higher than baseline pain.

ceived psychiatric treatment as a result of the hernia operation. One patient was in a long-term relationship, and seven patients were working or studying. Seven patients had experienced a major negative life situation change (*e.g.*, divorce, job change, inability to perform sports) due to the groin hernia repair. All patients had experienced a decline in their quality of life and a severe decline in their sexual function due to pain, whereof eight patients reported a general decline in libido and seven had a decrease in erectile function due to pain, not present before the hernia operation. Occurrence of definite depression as evaluated by the Hospital Anxiety and Depression Scale was only found in one ejaculatory pain patient and in two control patients, respectively. Definite anxiety was not seen in the ejaculatory pain group and in one control patient.

The conclusion from the psychosexological interview was that the pain was definitely of somatic origin in eight patients. In two patients, a somatic origin was also the most likely reason for their present sexological problems, although the presence of other psychological factors (sequelae from torture and previous depression) may have contributed.

Discussion

We have recently shown in a nationwide study that moderate or severe pain-related sexual dysfunction occurred in approximately 2.5% of younger males after groin hernia repair.[18] When adding this specific adverse outcome to the well-described risk of approximately 10% of developing chronic postherniotomy pain affecting everyday activities,[2,24,25] these sequelae may be the most important, because many patients are young males and there is no known effective therapy for chronic postherniotomy pain.[19]

The current study has for the first time explored the underlying pathophysiologic as well as psychosexological mechanisms of postherniotomy dysejaculation and pain-related sexual dysfunction. Because this is the first

study of its kind, a sample size calculation could be not be performed, and the statistical results should therefore be treated with reservation because of potential inadequate power from the small sample size.

The psychosexological evaluation did not reveal any previous or present psychosexological dysfunction to explain the specific problem. The conclusion in all patients, including the two patients with previous psychological traumas (torture and depression), that the current problem was of somatic origin, was supported by the neurophysiologic examination. Therefore, compared with the contralateral side, all patients had sensory disturbances, especially a combination of hypoesthesia and hyperalgesia suggesting damage to large and small fiber nerves,[26] similar to findings in postmastectomy pain patients.[23] Also, our finding of a positive windup phenomenon and painful aftersensations supports the hypothesis of a neuropathic pain state.[22,26] However, sensory disturbances are common after hernia surgery in patients with or without pain,[3,16] suggesting nerve damage to be a necessary but not a sufficient factor for developing chronic postherniotomy pain.[1] A possible methodologic caveat in this study is our use of the contralateral side for reference, because a unilateral trauma has been suggested to cause bilateral sensory changes,[27,28] implying that by using the exact same side for reference, we may have missed important sensory changes. However, the sensory changes we did find may be even more pronounced, because they are detectable despite the mirror effect.

The psychosexological interview revealed that all but two patients had experienced a major negative life change in the form of divorce, change of job, or inability to perform regular leisure activities such as sports, and all patients reported a decline in sexual function as a consequence of the pain after hernia repair. This contrast the study by Zieren *et al.*[8] in 224 patients asked about various factors affecting sexual function including pain or discomfort during sexual intercourse, where 52 patients (23%) reported unspecified preoperative sexual dysfunction, and 36 patients (16%) reported unspecified postoperative sexual dysfunction that resolved or improved over the following 6 months. The sexual dysfunction was not described in detail or quantified, and the study population was older than ours (53 ± 17 *vs.* 33 ± 10 yr), making comparisons difficult because of the possibility of a less frequent sexual activity together with a possible higher frequency of erectile disorders. The study did not investigate whether patients were sexually inactive, in order to avoid pain, or whether specific ejaculatory or genital pain was present. Except for groin hernia repair,[18] dysejaculation has previously only described after vasectomy,[29] suggesting trauma to the nerves and vas deferens to be necessary for this syndrome to occur. Postoperative damage to the vas deferens or nerves due to occlusion/compression from scar tissue or an inflammatory response from the mesh has been demonstrated in several studies,[30–32] but the consequences for pain and dysejaculation have not been studied.

Our findings that pressure pain detection and tolerance thresholds were significantly lower in the dysejaculatory patients and that all patients located their maximum pain to the external inguinal annulus supports the hypothesis that the pain may be caused by a lesion to the vas deferens or related nerve structures (*i.e.*, the genitofemoral, iliohypogastric, or ilioinguinal nerve), and that the pain state is maintained by ongoing peripheral pathology. Future studies should therefore include imaging techniques such as magnetic resonance imaging or surgical exploration to help uncover specific peripheral changes that may be responsible for this pain state. Treatment strategies for chronic postherniotomy ejaculatory pain may include drugs targeting the contractility of the vas (*i.e.*, α-receptor blockers) or agents effective in neuropathic pain.[33] Nonpharmacologic treatment options could be surgical reconstruction and/or decompression of the vas deferens and related structures,[19] or open-ended vasectomy,[29] but so far this has not been not evaluated.

In conclusion, postherniotomy genital and ejaculatory pain impairing sexual activity is of neuropathic origin and anatomically related to the vas deferens and related structures.

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