

# Surgical Management of Inguinal Neuralgia After a Low Transverse Pfannenstiel Incision

Maarten J. A. Loos, MD, Marc R. M. Scheltinga, MD, PhD, and Rudi M. H. Roumen, MD, PhD

**Objective:** The authors assessed the long-term pain relief after local nerve blocks or neurectomy in patients suffering from chronic pain because of Pfannenstiel-induced nerve entrapment.

**Summary Background Data:** The low transverse Pfannenstiel incision has been associated with chronic lower abdominal pain because of nerve entrapment (2%–4%). Treatment options include peripheral nerve blocks or a neurectomy of neighboring nerves. Knowledge on adequate (surgical) management is scarce.

**Methods:** Patients treated for iliohypogastric and/or ilioinguinal neuralgia after a Pfannenstiel incision received a questionnaire assessing current pain intensity (by 5-point verbal rating scale), complications, and overall satisfaction.

**Results:** Twenty-seven women with Pfannenstiel-related neuralgia were identified between 2000 and 2007. A single diagnostic nerve block provided long-term pain relief in 5 patients. Satisfaction in women undergoing neurectomy ( $n = 22$ ) was good to excellent in 73%, moderate in 14%, and poor in 13% (median follow-up, 2 years). Complications were rare. Successful treatment improved intercourse-related pain in most patients. Comorbidities (endometriosis, lumbosacral radicular syndrome) and earlier pain treatment were identified as risk factors for surgical failure.

**Conclusions:** Peripheral nerve blocking provides long-term pain reduction in some individuals. An iliohypogastric or ilioinguinal nerve neurectomy is a safe and effective procedure in most remaining patients.

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Worldwide millions of low transverse Pfannenstiel incisions are performed each year in obstetric and gynecological practice. Ever since its introduction, this approach has been a successful access path for lower abdominal surgery with an exceptionally low incisional hernia rate (0%–2%) and an esthetically pleasing appearance (“bikini cut”).<sup>1,2</sup> Thereby, Pfannenstiel incisions are frequently used in laparoscopic procedures for removal of resected specimens.<sup>3,4</sup>

From the Department of General Surgery, Máxima Medical Centre, Veldhoven, The Netherlands.

Reprints: Loos, MD, Department of General Surgery Máxima Medical Centre PO Box 7777, De Run 4600, 5500 MB, Veldhoven, The Netherlands. E-mail: loosmaarten@hotmail.com.

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The Pfannenstiel technique harbors one serious drawback, it being “nerve entrapment.”<sup>2</sup> According to recent reports chronic pain is more commonly observed than previously thought (12.3%–33%).<sup>2,5–8</sup> One study with a 2-year follow-up reported that 8% of patients with a Pfannenstiel incision graded their pain as moderate or severe leading to limitations in daily functioning.<sup>5</sup> As laparoscopy with concomitant Pfannenstiel incision is gaining popularity in general surgery, the incidence of nerve entrapments will probably rise as well.

Treatment consists of nerve blocks or neurectomy. Aim of the present study was to assess long-term pain relief after these treatment modalities in patients suffering from chronic pain because of Pfannenstiel-induced nerve entrapment.

## Anatomy and Pathophysiology<sup>5</sup>

The cutaneous innervation of the lower abdomen is mainly supplied by 2 nerves, the iliohypogastric and the ilioinguinal nerves (Fig. 1). Originating from 12th thoracic and first lumbar roots, they run on the anterior aspect of the lumbar quadratus muscle and penetrate the transverse and internal oblique muscles. Endings of these nerves can be found subcutaneously or subfascially at the lateral margin of the abdominal rectus muscles. If dissection during a Pfannenstiel incision is executed too laterally, these nerves may be harmed potentially creating a neuroma.<sup>2</sup> Moreover, nerves may be traumatized because of perioperative retraction or after constricting sutures. Development of fibrotic tissues later on can also initiate nerve entrapment. Considerable anatomic variability and overlapping cutaneous innervation areas complicate localization and identification of affected nerves and render clinical discrimination of iliohypogastric and ilioinguinal nerves exceedingly difficult.<sup>9,10</sup> In women, the genitofemoral nerve accompanies the round ligament and is nearly always unaffected during Pfannenstiel surgery. A neurectomy of the genital branch is therefore unnecessary. However, concurrent ipsilateral inguinal hernioplasty mandates a triple neurectomy according to Amid.

## Clinical Presentation and Diagnostic Work-Up

Pain may be reported immediately postoperatively or may develop over time. Neuropathic pain initiated by entrapped or damaged nerve tissue is characterized by lancinating, sharp, or stabbing pain sensations at the incisional corners irradiating to pubic area and/or upper leg. Hyperextension or twisting upper body movements can induce pain by

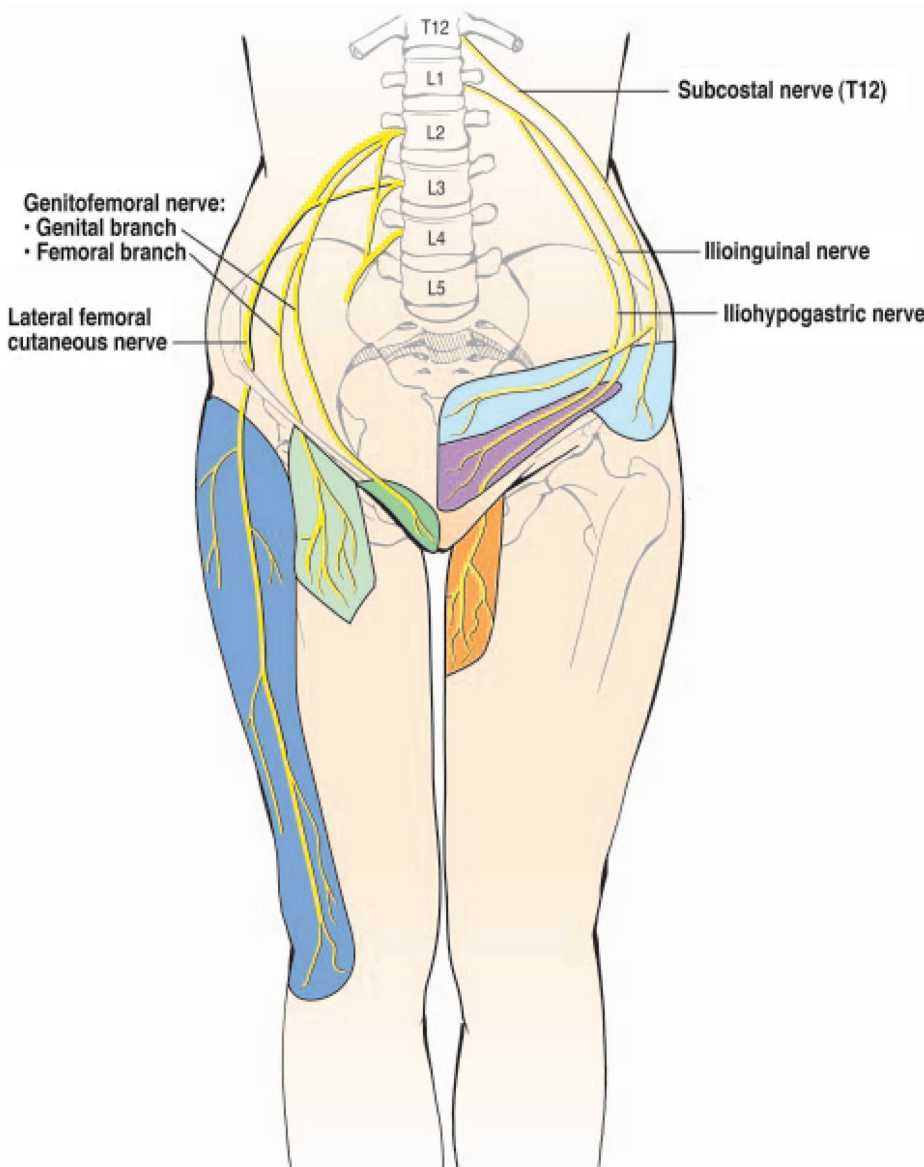


FIGURE 1. Cutaneous innervation of lower abdomen.<sup>23</sup>

means of nerve traction or compression. Menstruation may increase pain sensations because of hormone-induced neurotransmitters. However, cutaneous endometriosis should also be considered.<sup>11</sup>

At physical examination neurophysiological disorders such as hypoesthesia, hyperesthesia, or allodynia are often present. Remarkably, patients may not be aware of these neurologic abnormalities. Pressuring the incisional edge(s) at the abdominal rectus margin may reveal a distinct trigger point. If active abdominal muscle contraction intensifies pain (positive Carnett's sign), the pain is probably located in the abdominal wall. If nerve entrapment is likely, the diagnostic work-up should include a nerve block using a short-acting anesthetic (eg, lidocain) placed into the trigger point. Such injections ideally provide immediate pain relief and contribute to the diagnosis.<sup>5</sup>

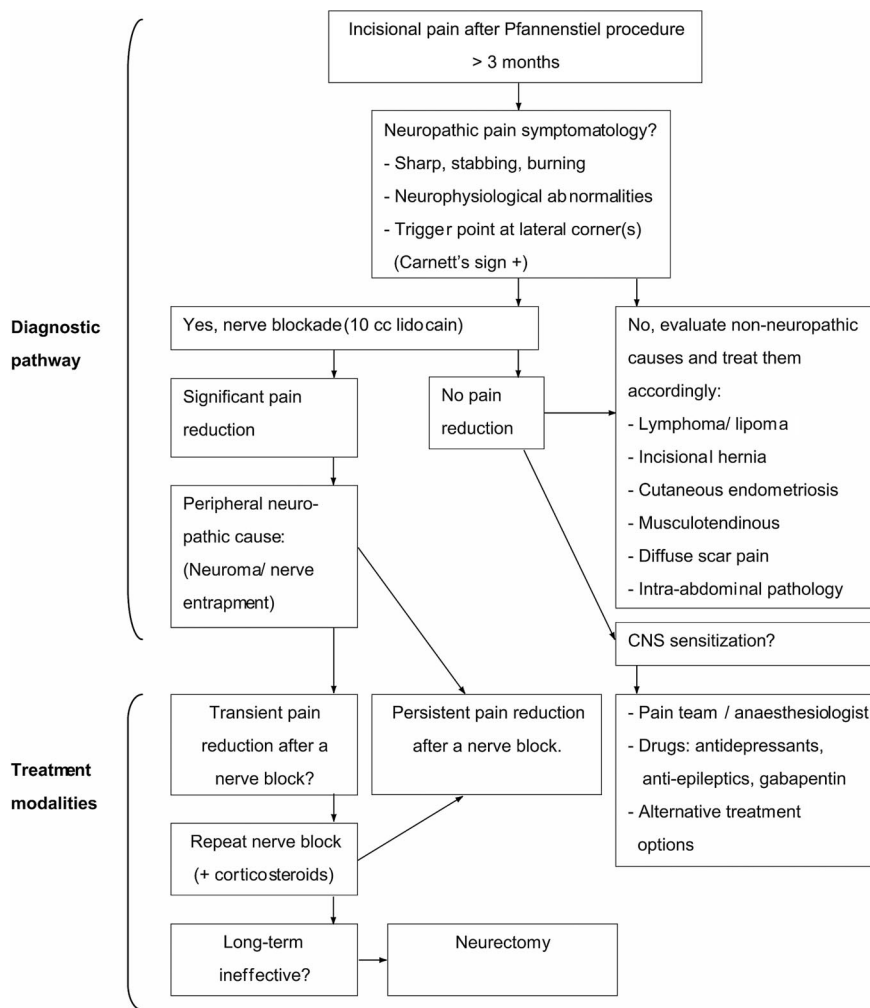
## PATIENTS AND METHODS

A retrospective database search was performed extracting all consecutive patients of the Máxima Medical Centre (Veldhoven, The Netherlands) who were treated for neuralgia of the iliohypogastric and/or ilioinguinal nerve after a Pfannenstiel incision since 2000. All medical charts were reviewed for pain history, physical examination, additional tests, comorbidities (defined as endometriosis and lumbosacral radicular syndrome), and previously received pain treatments. Patients were excluded if other known causes of pain such as cutaneous endometriosis were suspected.

## Treatment Algorithm<sup>12</sup>

All patients were evaluated according to a standard algorithm (Fig. 2). If pain of neuropathic origin was suspected, patients received a nerve block using a local anes-

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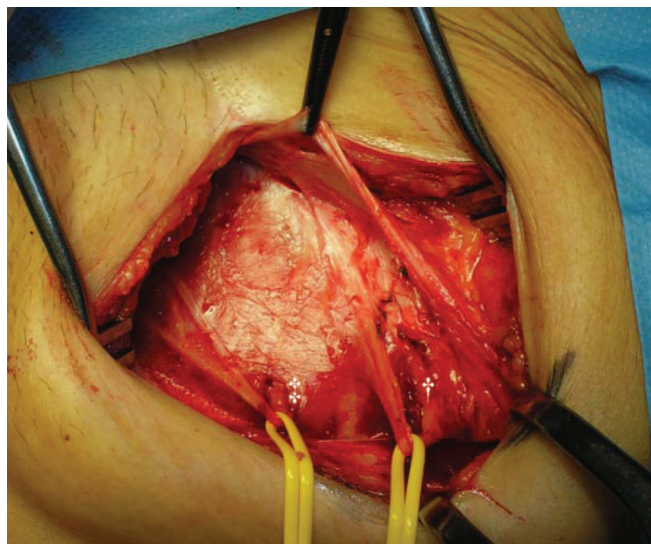


**FIGURE 2.** Diagnostic and therapeutic algorithm for neuropathic Pfannenstiel pain.

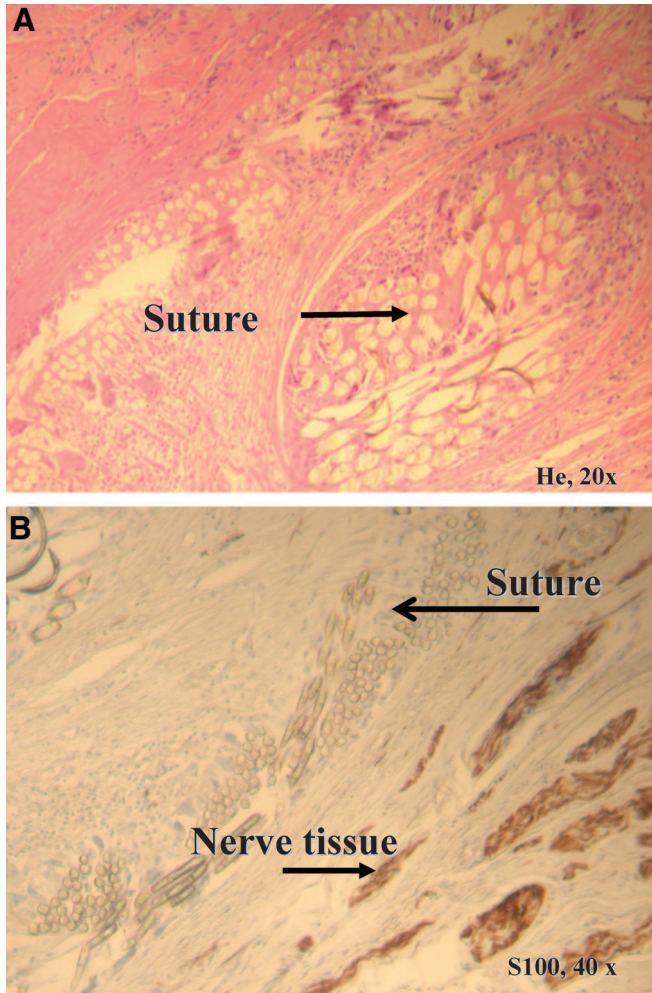
thetic into the trigger point. A substantial but temporary pain reduction led to a repeat nerve block also using corticosteroids. If these nerve blocks did not result in long-term pain reduction, patients were offered a neurectomy of the affected nerve (ilioinguinal and/or iliohypogastric). This procedure was performed in day-care setting under spinal or general anesthesia by general surgeons specialized in groin and abdominal wall pain pathology (R.R. and M.S.). Before operation, the responsible nerve was localized by marking the skin overlying the trigger point. A portion of the scar was incised and lateralized if deemed necessary. The overlying subcutaneous tissue and external oblique fascia were dissected and the nerve was identified and removed up to the anterior superior iliac spine (Fig. 3). For hemostatic purposes, nerve endings were cauterised. In an attempt to prevent recurrent fibrotic encasement, the proximal nerve end was buried in healthy muscular tissue. Nearly all removed specimens underwent pathologic examination (Fig. 4).

**Questionnaire**

Between September 2007 and November 2007 all treated patients received a questionnaire that was composed of parts of previously published pain studies.<sup>13-15</sup> The fol-



**FIGURE 3.** Neurectomy of the left iliohypogastric† and ilioinguinal nerve‡.



**FIGURE 4.** Microscopic examination of removed tissue revealing suture material and nerve tissue; A, H and E staining 20× magnification; B, S100 staining 40× magnification. This case concerned a woman with a 32 years in duration previously unrecognized pain syndrome, caused by inappropriate (nonresorbable) suture placement at the lateral border of a Pfannenstiel incision.

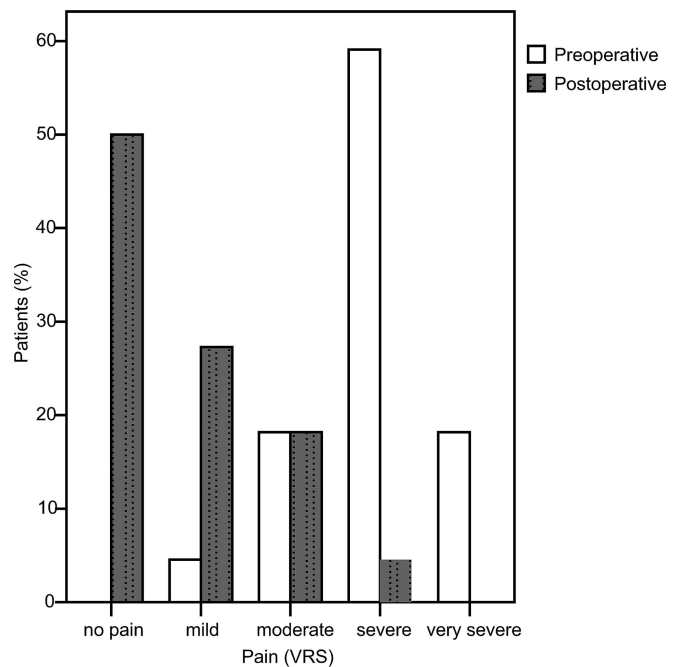
lowing items were assessed: pain reduction (expressed in a 5-point verbal rating scale and percentages), complaints associated with sexual activities, perceived complications, overall satisfaction,<sup>14</sup> and current need for pain medication.

**RESULTS**

From January 2000 to September 2007 27 women presenting at the surgical outpatient department were diagnosed with neuralgia after a Pfannenstiel incision. During the standard work-up, 5 patients attained long-lasting pain relief with a single “diagnostic” nerve block. A 1-stage neurectomy was performed in the remaining 22 cases. Two patients underwent a second surgical exploration as the first operation (neurolysis and resection of possible neuroma, which was not sent for histopathological examination) did not have the desired effect.

Median age was 43 years (range, 22–67 years) and the initial surgery was a cesarean delivery (n = 19), abdominal hysterectomy (n = 6), or other (n = 2). Women were suffering from pain for a median period of 2 years (range, 4 months–32 years). Sensory abnormalities including hypesthesia (41%), hyperesthesia (26%), or allodynia (4%) were usually present. In all women a trigger point was present. Two patients also harbored a paresthetic meralgia. Additional imaging including CT scan was performed in 37% of patients but did not contribute to the diagnosis apart from excluding other diagnoses.

Figure 5 shows pain intensity before neurectomy (70% suffering from severe pain or very severe pain) and after neurectomy (80% no/mild pain; median follow-up, 2 years). The median pain reduction was 90%. Complications were rare: wound infection (n = 1), bulge (n = 3), and onset of pain elsewhere (n = 6). Treatment satisfaction in patients undergoing neurectomy (n = 22) was good or excellent in 73% of women, moderate in 14%, and poor or worse in 13% (Table 1). Because of mild recurrent pain elsewhere in the



**FIGURE 5.** Pain intensity before and after neurectomy for Pfannenstiel-associated nerve entrapment (n = 22).

**TABLE 1.** Patient Satisfaction With Neurectomy<sup>14</sup> (n = 22)

	n (%)
Excellent—I am pain-free	11 (50%)
Good—I am almost pain-free	5 (23%)
Moderate—although there is some pain reduction, I am still frequently bothered by pain complaints	3 (14%)
Poor—the operation had no effect and the pain is virtually the same	1 (4%)
Worse—the operation has worsened my pain	2 (9%)

**TABLE 2.** Factors Possibly Related to Satisfaction With Neurectomy (n = 22)

	High Satisfaction (n = 16) (Good/Excellent) n (%)	Low Satisfaction (n = 6) (Moderate/Poor/Worse) n (%)	P
Duration of pain complaints			0.262*
≥5 yr	4 (25%)	3 (50%)	
<5 yr	12 (75%)	3 (50%)	
Co-morbidities†			<0.001
No	15 (94%)	1 (17%)	
Yes	1 (6%)	5 (83%)	
Previous received treatment‡			0.029
No	11 (69%)	1 (17%)	
Yes	5 (31%)	5 (83%)	

\*χ<sup>2</sup> test.

†Co-morbidities = endometriosis, lumbosacral radicular syndrome.

‡Previous treatment = sympathectomy, lumbar facet denervation, paravertebral nerve blockade, transcutaneous electric nerve stimulation, endometriosis treatment, adhesiolysis, Lichtenstein procedure, laparoscopic femoral hernioplasty (or a combination of several).

**TABLE 3.** Sexual Pain Assessment Based on Questionnaire Results (n = 27)

	n (%)
Before the intervention, I experienced pain:	
During intercourse	9 (33%)
During and after intercourse	4 (15%)
After an orgasm	3 (11%)
No preoperative pain during sex/not appropriate	11 (41%)
The intervention had the following effect on my sex-induced pain:	
Total pain reduction	5 (32%)
Certain amount of pain reduction	7 (43%)
Similar pain	4 (25%)

groin/lower abdomen, 3 women graded their initial excellent postoperative results as “good” during questionnaire enrolment.

Possible negative determinants for satisfaction with neurectomy results were presence of comorbidities (endometriosis, lumbosacral radicular syndrome) and previous invasive pain treatment (eg, sympathectomy, lumbar facet denervation, Table 2). Table 3 demonstrates that intercourse-induced pain was commonly reported before surgery (58%). Invasive treatment reduced these pain symptoms in 75% of the women. Histopathology revealed the following findings: perineural fibrosis (n = 2), degenerative nerve tissue (n = 3), neuroma (n = 2), normal nerve tissue (n = 8), and fibrosis without nerve tissue (n = 1). In 6 patients, no pathologic examination was obtained. These findings did not seem to correlate with pain outcome. Currently, a quarter of the patients reported the occasional use of pain medication.

**DISCUSSION**

In the present study, a neurectomy of the ilioinguinal and/or iliohypogastric nerve(s) provided good to excellent results in nearly three-quarters of all women suffering from Pfannenstiel-induced neuralgic pain. Apart from a few case reports,<sup>16-21</sup> literature is scarce. One study described a large number of neurectomies including 36 that were Pfannenstiel-induced with similar favorable results.<sup>22</sup> In another recent study, all 7 reported patients were pain free after a neurectomy.<sup>23</sup> Neurectomy of the genital branch of the genitofemoral nerve is unnecessary. There is increasing evidence that a neurectomy constitutes a safe and effective treatment for postoperative Pfannenstiel-related neuralgia in most patients.

Using the presented algorithm, total pain relief occurred in 5 cases after administering a local nerve block omitting the need for neurectomy.<sup>12</sup> The anesthetic agent probably pushes the pain threshold back to its normal level. This finding further stresses the conditional need for using diagnostic nerve blocks as they seem to have therapeutic value as well.

Inguinal neuralgia caused pain during sexual activities in over half of the women, possibly because of compressed nerve tissue during muscle contraction. A neurectomy or therapeutic nerve block provided intercourse-related pain relief in a substantial portion of the patients. Remarkably, to the author’s knowledge, this entity has never been reported in medical literature. Since these forms of inconvenience greatly affect quality of life, proper attention should be given to these issues. Moreover, inguinal neuralgia should be included into the differential diagnosis of dyspareunia as well.

Results of the present study indicate that surgery was ineffective in a quarter of the patients. Various factors possibly contributing to unsuccessful neurectomy must be considered. First of all, before proceeding to surgery, pain reduction (albeit temporary) after a peripheral nerve block is a “sine qua non.” A recent study suggested a treatment algorithm using pain history and physical examination as main parameters for surgery, omitting diagnostic nerve blocks.<sup>23</sup> In our experience, some patients do not react on nerve blocks, as their central nervous system may be sensitized. These patients suffer from “central neuropathic pain,” and this separate population will not respond to peripheral nerve surgery, leaving only drug therapy (antidepressants, antiepileptics, gabapentin) as therapeutic measures. Second, a neurectomy should probably include all pain conducting nerve structures as also promoted for pain syndromes after groin hernia surgery.<sup>24</sup> Third, pain may recur after an initially successful neurectomy or present elsewhere on the abdominal wall. Possible explanations involve neuroma formation at the nerve stump, or revelation of a previously suppressed non-neuropathic pain cause (eg, periostitis pubis). Moreover, as nonresponders differ from responders in number of associated comorbidities and earlier invasive pain treatments, these aspects may act as denominators for surgical failure. Taking these considerations into account, a positive nerve block followed by a thorough neurectomy in patients with few risk factors will likely lead to satisfying surgical results.

Which preventive measures can be taken by the surgeon performing the Pfannenstiel incision? A solid knowledge of neuroanatomy, meticulous tissue dissection, avoidance of extreme lateral incision,<sup>2</sup> and prevention of suturing beyond the rectus margin will help to avoid nerve entrapment. In case of immediate severe postoperative pain, surgical exploration of the painful area may be performed without delay as nerve entrapment by suture material must be excluded. Since nerve entrapment may also occur over time because of fibrosis, knowledge on clinical presentation, and treatment of this debilitating pain syndrome is warranted.

In conclusion, peripheral nerve blocking provides long-term pain reduction in some individuals. An iliohypogastric or ilioinguinal nerve neurectomy is a safe and effective procedure in most remaining patients.

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