

Treatment for persistent chronic neuralgia after inguinal hernioplasty

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Received: 19 March 2007 / Accepted: 19 June 2007 / Published online: 1 August 2007
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Abstract Following an inguinal hernia repair with open or laparoscopic technique, 1–15% of patients show persistent neuralgia, a severe, potentially debilitating, complication. Several therapeutic procedures have been proposed, but consensus regarding choice of treatment has not yet been achieved. We performed a prospective study on 32 such cases. Patients underwent anaesthetic infiltration to identify, when possible, the involved nerve, and we then carried out a step-by-step therapeutic protocol. In the initial phase, patients were treated with oral analgesic and afterwards with repeated infiltrations of anaesthetic and cortisone. Surgery was reserved for patients not responding to the infiltrations, though with no good success. The authors believe that noninvasive methods are to be preferred, whereas neurectomy interventions should be reserved for selected cases.

Keywords Hernia repair · Persistent neuralgia · Noninvasive treatment

Introduction

Persistent postoperative neuralgia is a rare but severe complication of inguinal hernioplasty, with prevalence ranging from 1% to 15% [1–4]. The introduction of mesh repair has reduced the hernia recurrence rate, and at present, neuralgia

is the most common cause of failure in groin hernia surgery. Neuralgia is characterised by pain localised in the inguinal area and by sensorial disorders in the inguinocrural area and/or the external genitals. Persistent neuralgia must be distinguished from immediate postoperative pain, which is easily relieved with common analgesics [5]. On the contrary, neuralgia can be diagnosed a few weeks, months or even years after surgery; pain does not tend to decrease and can be accompanied by neurovegetative symptoms. Patients may show mood and behaviour changes, with inability to work and severe alteration in social and personal relationships [6]. This painful syndrome is generally caused by a lesion to or entrapment of nerve structures (iliohypogastric nerve; ilioinguinal nerve; genital branch of the genitofemoral nerve) in the inguinal canal during surgery or following mesh incorporation.

There are many articles in the literature relating to causes and prevention of persistent neuralgia [7–11], but the choice of an adequate therapy is still controversial. Different treatments have been proposed, such as analgesics and antidepressives, local infiltrations of anaesthetics and anti-inflammatories [3], laser therapy, transcutaneous electrical neural stimulation (TENS), neurolysis and neurectomy with or without removal of the mesh.

Considering this, the optimal treatment choice for neuralgia is not clear; thus, a proposed therapeutic protocol for this problem could be useful.

Anatomy

Nerve structures included in the inguinal area are the iliohypogastric nerve, ilioinguinal nerve and genital branch of the genitofemoral nerve. The *iliohypogastric nerve* arises from T₁₂ and the anterior branch of L₁. It emerges from the

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external edge of the psoas muscle at the iliac crest level, pierces the posterior aponeurosis of the transverse abdominal muscle, and lies between it and the internal oblique muscle. Then it divides into its final branches: the abdominal branch, directed to the rectum muscle with muscular and cutaneous branches; and the genital branch. The latter pierces the internal oblique muscle at the anterior superior iliac spine level (ASIS), penetrates the inguinal canal and ends in the pubic area (internal superior side of the thigh and homolateral hemiscrotum or the labium majus). The *ilioinguinal nerve* is formed from the same nerve roots as the iliohypogastric nerve and follows the same route. It does not have collateral branches, and it divides in two final branches, abdominal and genital, having the same endpoint as the iliohypogastric nerve. The *genitofemoral nerve* arises from the anterior branch of L₂ and lies within the fascia of the psoas muscle. Then it divides into two final branches, femoral and genital. The latter follows the funiculus vessels, piercing the inguinal canal on the posterior-internal face of the funiculus, and supplies fibres to the cremaster muscle and the scrotum or labium majus. The iliohypogastric and ilioinguinal nerves can be damaged during different steps of the hernia repair:

- Incision and suture of major oblique aponeurosis, as these structures lie behind it
- Cremaster and sac dissection

Also, the genital branch of the genitofemoral nerve can be damaged during sac dissection or plication of fascia transversalis. Nerves can be damaged in different ways: they can be divided, stretched, entrapped in a ligature, or they can then be involved in the scar tissue that develops after mesh placement.

Materials and methods

In our study we enrolled 33 patients, one woman and 32 men, affected with persistent neuralgia after inguinal hernioplasty, who were observed from January 2000 to December 2005 at the day surgery unit of the Francesco Durante Surgical Department, University of Rome La Sapienza. Nine patients underwent hernia repair at our day surgery unit and 24 at other hospitals. Twenty-six cases were treated with the Lichtenstein procedure, five with the Trabucco repair, and two with the transabdominal preperitoneal (TAPP) approach; in nine cases, a plug was placed in the deep inguinal ring.

Pain assessment was evaluated by a visual analogical scale (VAS), and ultrasound study of the inguinal area was carried to exclude mesh dislocation and/or recurrence. The involved nerve was localised by local anaesthetic block on the arising area of the iliohypogastric and ilioinguinal

nerves, 2–3 cm medially and below the ASIS, and the genitofemoral nerve was found close to the external inguinal ring, almost 2 cm lateral to the pubic tubercle. The treatment protocol was applied through four subsequent phases:

- Nonsteroidal anti-inflammatory drugs (nimesulide 100 mg × 2/day) for 2 weeks
- Next, in presence of persistent pain, local treatment with infiltration at the ASIS level with 5 cc bupivacaine 0.5% + methylprednisolone 40 mg was performed on a weekly basis for 5 weeks. These are achieved at the ASIS level in all patients and near the external inguinal ring, 2 cm lateral to the pubic tubercle, in patients with genitofemoral nerve involvement and in uncertain cases
- In case of failure, patients underwent neurectomy at the level of the inguinal canal
- If all the previous treatments failed, a cycle of TENS and pharmacological therapy with carbamazepine was administered

Results

One patient operated with the Lichtenstein procedure was excluded from the study, as ultrasound of the inguinal area showed medial dislocation of the prosthesis, with subclinical recurrence. Following surgical treatment for the recurrence, he had complete relief of pain. Thus, 32 patients were enrolled in the study.

We identified the affected nerves in 25 patients; 23 ilioinguinal and/or iliohypogastric nerve area, and two in the genital branch of the genitofemoral nerve. In seven patients, (among whom two underwent laparoscopic surgery), it was not possible to achieve a definitive diagnosis.

All patients first received oral therapy (nimesulide), with complete or satisfying pain relief in eight cases. The remaining patients underwent the series of infiltrations. Response was good in 18 cases and satisfying in four. Two nonresponders underwent surgery in order to locate the three nerves involved in the fibrosis. Debridement of the funiculus was performed, and in one case, we needed to remove and replace the mesh. In this patient only, the ilioinguinal nerve was found in the postoperative scar, whereas both the ilioinguinal and the iliohypogastric nerves were identified in the second patient. Neurectomy was performed to the internal ring. The result was moderately satisfying in the second patient only; therefore, after a cycle of TENS, the first patient underwent pharmacological therapy with carbamazepine, with moderately fair pain control.

No retroperitoneal neurectomy was performed. Results are listed in Table 1.

Table 1 Results of treatment for persistent chronic neuralgia after inguinal hernioplasty

Patient	Nerve(s) involvement	Former surgery	Time from surgery (months)	Pain (VAS scale)	Treatment	Result (VAS scale)
1	Ilioinguinal/iliohypogastric	Lichtenstein	3	7	Nimesulide→infiltration	Good (2)
2	Ilioinguinal/iliohypogastric	Lichtenstein	5	5.5	Nimesulide→infiltration	Good (0)
3	Ilioinguinal/iliohypogastric	Lichtenstein + plug	9	5	Nimesulide	Good (1.5)
4	Ilioinguinal/iliohypogastric	Lichtenstein	8	6	Nimesulide→infiltration	Good (2)
5	Ilioinguinal/iliohypogastric	Lichtenstein	6	4	Nimesulide→infiltration	Good (0)
6	Ilioinguinal/iliohypogastric	Lichtenstein	6	8	Nimesulide→infiltration	Fair (3.5)
7	Ilioinguinal/iliohypogastric	Lichtenstein	4	6.5	Nimesulide→infiltration	Good (0)
8	Ilioinguinal/iliohypogastric	Lichtenstein	4	6	Nimesulide→infiltration	Moderately fair (4.5)
9	Ilioinguinal/iliohypogastric	Trabucco (plug)	9	7	Nimesulide→infiltration	Good (2)
10	Ilioinguinal/iliohypogastric	Lichtenstein	7	8.5	Nimesulide	Fair (3)
11	Ilioinguinal/iliohypogastric	Lichtenstein + plug	6	5	Nimesulide→infiltration	Good (1.5)
12	Ilioinguinal/iliohypogastric	Lichtenstein	11	7	Nimesulide	Good (1)
13	Ilioinguinal/iliohypogastric	Lichtenstein	5	8	Nimesulide→infiltration	Good (0)
14	Ilioinguinal/iliohypogastric	Lichtenstein	2	6	Nimesulide→infiltration	Good (2)
15	Ilioinguinal/iliohypogastric	Trabucco (plug)	6	7.5	Nimesulide→infiltration	Good (1.5)
16	Ilioinguinal/iliohypogastric	Lichtenstein	5	7	Nimesulide	Good (0)
17	Ilioinguinal/iliohypogastric	Lichtenstein	8	5.5	Nimesulide→infiltration	Good (1)
18	Ilioinguinal/iliohypogastric	Trabucco (plug)	8	4	Nimesulide→infiltration	Fair (3.5)
19	Ilioinguinal/iliohypogastric	Trabucco (plug)	4	5	Nimesulide→infiltration	Good (1.5)
20	Ilioinguinal/iliohypogastric	Lichtenstein	7	5	Nimesulide	Fair (3.5)
21	Ilioinguinal/iliohypogastric	Lichtenstein + plug	5	6	Nimesulide	Good (0)
22	Ilioinguinal/iliohypogastric	Lichtenstein	9	7.5	Nimesulide→infiltration	Good (1)
23	Ilioinguinal/iliohypogastric	Lichtenstein + plug	6	5.5	Nimesulide→infiltration	Good (0)
24	Genitofemoral	Lichtenstein	5	7	Nimesulide→infiltration→surgery	Moderately fair (4)
25	Genitofemoral	Lichtenstein	10	4	Nimesulide→infiltration	Good (2.5)
26	Uncertain	Lichtenstein	4	5	Nimesulide	Good (2)
27	Uncertain	Laparoscopic	6	7.5	Nimesulide→infiltration	Good (2)
28	Uncertain	Lichtenstein	4	5	Nimesulide→infiltration	Good (0)
29	Uncertain	Trabucco (plug)	5	8.5	Nimesulide→infiltration→surgery→ carbamazepine	Moderately fair (5)
30	Uncertain	Laparoscopic	6	6.5	Nimesulide	Good (0)
31	Uncertain	Lichtenstein	8	6	Nimesulide→infiltration	Fair (3)
32	Uncertain	Lichtenstein	7	5	Nimesulide→infiltration	Good (1.5)

Discussion

Posthernioplasty persistent neuralgia is a well-described and well-known disease, though the pathogenetic processes are not clear as yet, and there are substantial disagreements on the appropriate treatment. Inguinodynia includes neuropathic and non-neuropathic causes. Neuropathic pain can be caused by stretching of nerves, entrapment in knots and staples or in the scar tissue, and partial or complete division, with neuroma formation. Non-neuropathic causes include periosteal reaction and mechanical pressure caused by folded mesh [7]. Sometimes, both kinds of neuralgia are present.

Considering different surveys, it seems that no significant difference on the incidence of persistent chronic neuralgia occurs among different kinds of surgical interventions with anterior access, and plugs do not play a negative role [14–17]. In the literature, a higher risk of nerve structure lesion, especially of the genitofemoral nerve, has been stressed following laparoscopic surgery [2], whereas anterior access more commonly involves the ilioinguinal and iliohypogastric nerves [12, 18]. In our experience, the time interval from surgery and pain is not a predictive factor for treatment results.

With the aim of carrying out the correct treatment, identification of the involved nerve structure can be useful,

although some authors do not agree [7]. Clinical diagnosis is based on identification of the painful area: pain irradiating towards the hypogastrum shows a lesion of the iliohypogastric nerve; pain in the inguinal area irradiating to the internal portion of thigh 1/3 superior and to the scrotum or the labium majus points to a lesion of the ilioinguinal nerve; whereas pain referring to the genital cutis testifies to a lesion of the genitofemoral nerve. Frequently, it is very difficult to find a correlation between the sensitive nerve and competence areas, and advantageous to use the selective nerve bloc with local anaesthetic infiltration. Iliohypogastric and ilioinguinal nerves can be blocked at inguinal level or 2–3 cm medially and below the ASIS [1, 19]. The Genitofemoral nerve can be blocked at the level of L₁–L₂ in the paravertebral seat [6] or near the external inguinal ring, almost 2 cm lateral to the pubis tuberculum [1], although this is slightly difficult. Linking neuralgia to a specific nerve branch can be difficult, and the bloc is not useful for diagnosis [7].

There is major disagreement between authors regarding treatment choice. We suggest a protocol to approach neuralgia in progressive, step by step approach, beginning with slightly invasive therapies. In a preliminary step, oral non-steroidal anti-inflammatory drugs can be administered, which can sometimes be effective: in eight patients receiving nimesulide orally, the pain disappeared. Local nerve block combining cortisone with a local anaesthetic proved useful in patients finding no relief with pharmacological treatment: in many cases, symptoms temporarily or permanently decreased [3, 20]. In our experience, this treatment, repeated 4–5 times weekly, continuing pain relief in almost all patients. In relation to the good results obtained, we believe such infiltrations can be considered as the treatment of choice for neuralgia.

Some authors assert that surgical treatment is better indicated for complete pain regression, although this is a controversial issue [2, 5, 22]. Anterior surgical access is advised in case the iliohypogastric and ilioinguinal nerves are affected, whereas access for the genitofemoral nerve can be both inguinal and retroperitoneal, as those used for lumbar sympathectomy [2, 5, 6, 11]. Surgical treatment consists of complete neurectomy of the nerve involved; Amid [7] advises the triple neurectomy, followed by implantation of the ilioinguinal and iliohypogastric nerves inside the fibres of the internal oblique muscle, and allowing retraction of the proximal cut of the genitofemoral nerves into the internal ring, with very good results. However, we believe the search for nerves involved in the scar tissue can be extremely difficult. Otherwise, mesh removal, often a very difficult procedure, usually is not useful [7]. After surgery, the innervated area of the divided nerve can be anaesthetised. The percentage of success, as total or partial remission of pain, according to literature, varies from 50% to

90% (mean 60%) [7, 12]. After inguinal re-access, a possible complication is created by hernia recurrence, and therefore, extraperitoneal access can be useful to maintain hernioplasty integrity [1, 12]. In our experience, these operations should be reserved only for cases where all noninvasive procedures were unsuccessful, and they must be performed by experienced surgeons.

When even surgery does not succeed, therapy based on an anticonvulsant (carbamazepine) could be effective [21].

Stoppa [20] proposed an antalgic prevention of chronic neuralgia with analgesic oral therapy associated with anxiolytic and myorelaxant drugs in all cases where pain arises in the inguinal area in the immediate postoperative period.

Other authors [6, 23] relate that good neuralgia prevention can be achieved with routine preventive resection of the ilioinguinal nerve during hernia repair, and they show satisfactory results. This implies the anaesthetisation of an inguinal area that could be troublesome, and it is not possible to exclude the possibility that after a little time, a deafferentation syndrome will appear; furthermore this technique cannot remedy genitofemoral nerve neuralgia. If a nerve shows damage during surgery, it can be useful to divide it [13]. Indeed, the best prevention to this complication is represented by identification and protection of nerve structures by performing accurate tissue dissection and careful mesh placement [10].

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