15. Chronic Groin Pain Following Anterior Hernia Surgery

Jennifer S. Schwartz, David S. Strosberg, and David B. Renton

Introduction

Inguinal herniorrhaphy is one of the most common general surgery operations performed in the United States at nearly 600,000 repairs annually. An anterior approach is the most common method for surgical repair, and may be performed as either a tissue repair or tension-free repair [1].

Tissue repairs were the first type of repair for inguinal hernias. Since the creation of the Bassini repair in 1887, at least 70 tissue repairs have been described in the literature. This type of repair uses the patient's native tissues to close the hernia defect. Types of tissue repairs include the Shouldice, Bassini, and McVay repairs. The Shouldice repair is based on a multilayer imbricated repair of the posterior wall of the inguinal canal, and has the lowest recurrence of tissue-based repairs in highly selected patient populations. In a Cochrane review, the rate of recurrence in specialized centers for a Shouldice repair is cited between 0.4 and 1.6 %; however, in nonspecialist centers recurrence is as high as 10 % [2]. The Bassini repair, the most popular type of repair prior to the introduction of tension-free repairs, involves suturing the transversus abdominis and internal oblique musculoaponeurotic arches to the inguinal ligament. The McVay repair, or Cooper's ligament repair, approximates the transversus abdominis aproneurosis to Cooper's ligament. This operation may also be used for femoral hernias, as the femoral space is closed with this repair. Tissue repairs are rarely used due to higher recurrence

B.P. Jacob et al. (eds.), *The SAGES Manual of Groin Pain*,
DOI 10.1007/978-3-319-21587-7_15

rates, cited as high as 4–6 % [3], and prolonged postoperative pain and recovery time. However, a tissue repair is useful when prosthetic mesh is contraindicated, including situations of ischemic bowel where resection is necessary, in the presence of ascites, or following a Cesarean section.

Mesh-Based Repairs

Tension-free, or mesh-based, repairs have been the gold standard for inguinal hernia repairs since the early 1990s due to the lower recurrence rate. Tension is eliminated with the placement of a synthetic mesh to bridge the defect, thereby reducing the rates of recurrence to less than 1 % compared to the 4–6 % recurrence rate with tissue repair [3]. Types of tension-free repairs include the Lichtenstein repair, plug and patch, and sandwich technique. The Lichtenstein repair encompasses the placement of a prosthetic mesh in the inguinal canal and re-creation of a new mesh internal inguinal ring. Of note, the ilioinguinal nerve and genital branch of the genitofemoral nerve pass through this newly created ring, and care must be taken to protect these nerves from entrapment during the repair. The plug and patch technique, an extension of the Lichtenstein repair, provides an additional cone-shaped plug of polypropylene mesh that is placed in the hernia defect, which occludes the hernia with Valsalva. This is currently the most common type of anterior herniorrhaphy performed. The sandwich technique utilizes an underlay patch, a plug type connector, and an onlay patch that covers the posterior inguinal floor (Fig. 15.1) [4].

Complications

Complications of inguinal herniorrhaphy are multifold. Intraoperative complications are noted at less than 2 %. Postoperative complications are as high as nearly 20 %, including urinary retention, urinary tract infection, orchitis, surgical site infection, neuralgia, or (rarely) life-threatening complications. Long-term complications are nearly 18 %, and may include seroma formation, chronic orchitis, chronic infection, chronic pain, or recurrence [5].

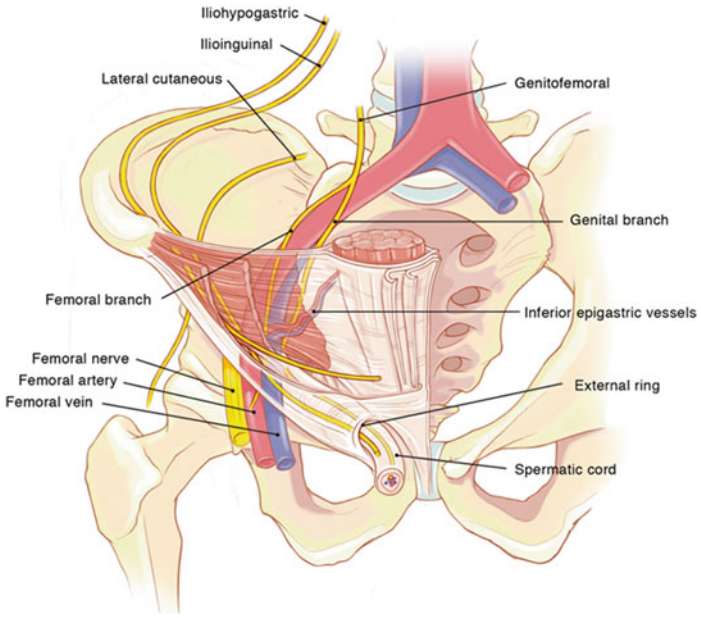

Fig. 15.1. Borders of the inguinal canal (from Wagner et al. [4], with kind permission © McGraw-Hill Education).

Chronic Post-herniorrhaphy Groin Pain: Definition

Chronic post-herniorrhaphy groin pain is defined as pain lasting >3 months following hernia repair. Studies show an incidence of chronic pain of 11 % [6]. Inguinodynia can be neuropathic or non-neuropathic. Neuropathic pain can be caused by nerve entrapment, stretching of nerves, and partial or complete division of nerves with neuroma formation. The three nerves most commonly involved are the iliohypogastric nerve, the ilioinguinal nerve, and the genital branch of the genitofemoral nerve. Non-neuropathic causes include periosteal reaction and mechanical pressure caused by folded mesh [7].

Treatments

Treatments for chronic groin pain include nonoperative interventions such as pain control with or without narcotic pain medications, and injection-based therapies such as nerve blocks and radiofrequency

neurolysis. Additionally, operative intervention has been used for refractory chronic groin pain. Surgical treatments include single nerve resection, triple neurectomy, and mesh removal.

Nonsteroidal anti-inflammatory agents are often first-line therapy for chronic groin pain. NSAIDs are nonselective COX inhibitors that decrease inflammation. These are particularly helpful in the postoperative period. Scheduled NSAIDs for 2 weeks improved pain symptoms in 25 % of patients with chronic groin pain after inguinal hernia repair in one study [7]. For moderate to severe chronic groin pain, opioid analgesia may be required. Treatment with this regimen is recommended for a minority of patients and in conjunction with a pain specialist. Antidepressants are another first-line therapy used for chronic neuropathic pain. At low doses, antidepressants work by blocking neurotransmitter uptake at the presynaptic terminal and function as an analgesic. Tricyclic antidepressants followed by SSRIs are the most commonly used antidepressants. Antiepileptic drugs such as pregabalin, gabapentin, and topiramate have been used for neuropathic pain. The mechanism of action is by modulation of calcium and sodium channels that stabilize neurons involved in rapid firing, thus affecting the intensity of neuropathic pain [8]. However, there are few studies that investigate the efficacy of these treatment modalities for inguinodynia following hernia repair.

Injection-based therapies are another treatment alternative for chronic groin pain following inguinal hernia repair. Multiple studies have been performed looking at the effect of nerve blocks with local anesthetics, often under ultrasound guidance. In a single study, 43 subjects were evaluated for chronic moderate to severe inguinal pain status post open hernia repair. Each was given an ilioinguinal and/or iliohypogastric nerve block with a long-acting local anesthetic (bupivacaine) and a corticosteroid (triamcinolonacetonide). There was an average of two injections per subject. Post-procedure, 32–55 % of subjects reported resolution of their moderate to severe neuropathic pain after 20 months [9]. Other studies have demonstrated patients receiving at least temporary relief from nerve blocks with local anesthetic. Ilioinguinal or iliohypogastric nerve blocks can be an effective treatment modality for chronic groin pain, though multiple treatments may be required. Long-term success of injection-based therapies is still unclear. This treatment is often used for diagnosis of affected nerve and prior to surgical intervention.

Radiofrequency neurolysis (RFN) has become a more common procedure in interventional pain management used for chronic inguinodynia. It has been shown to have some longer lasting pain relief in patients with refractory inguinal neuralgia. Although evidence is limited, one small retrospective review evaluated 42 patients and compared radiofrequency ablation to local infiltrative therapy. RFN showed longer lasting pain relief, with the mean duration of pain relief 12.5 months versus 1.6 months compared to an injection-based therapy control group. Patients required from 1 to 3 radiofrequency neurolysis procedures. Local nerve infiltration may be used to aid the identification of inguinal neuralgia and which nerve is affected prior to RFN treatments. The use of this therapy has been limited secondary to the need for extensive knowledge of the inguinal anatomy and expertise in the technology required to perform this procedure, found predominantly in pain management specialists and radiologists (Fig. 15.2) [4, 10, 11].

Surgical interventions have been reserved for patients with severe chronic inguinal neuropathic pain who have been refractory to nonoperative management. Identification of the involved nerve is often performed using local infiltration. There is no gold standard operative intervention for chronic inguinal pain. Mesh and suture removal, resection of a single nerve, and triple neurectomy have all been proposed as potential treat-

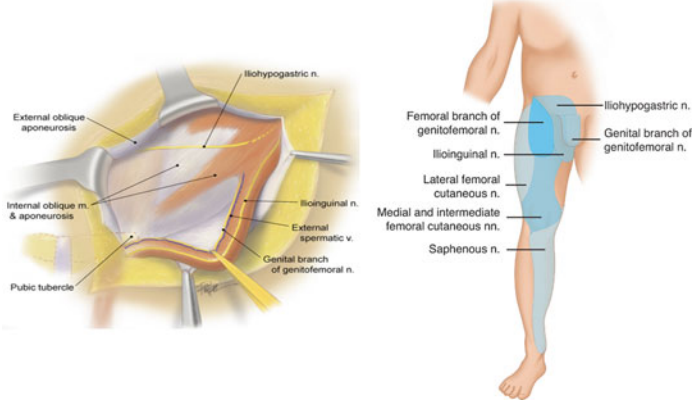

Fig. 15.2. *Left* Retroperitoneal neuroanatomy (from Chen et al. [11] with kind permission Springer Science+Business Media); *Right* corresponding dermatomal sensory distribution of the lumbar plexus (from Wagner et al. [4], with kind permission © McGraw-Hill Education).

ments. Some studies even advocate routine preventive resection of the ilioinguinal nerve at the time of the original hernia repair.

Mesh and suture removal has been proposed as an option, alone or in combination with neurectomy. Reoperative surgery and mesh removal can be very challenging. Identification of the ilioinguinal, iliohypogastric, and genitofemoral nerve and removal of any sutures through the nerve or freeing it from entrapment of mesh can completely or partially relieve chronic neuropathic pain. Additionally, if the nerve can be identified preoperatively, it can be resected and ligated with or without mesh removal. It is essential to ligate the nerve in order to prevent neuroma formation. Although mesh removal can be effective for pain, it causes a high hernia recurrence rate [12].

Triple Neurectomy

Triple neurectomy has become a promising surgical technique for chronic inguinal neuropathic pain after inguinal hernia repair. It involves ligation of the ilioinguinal, iliohypogastric, and genitofemoral nerve. The incision is made through the previous hernia repair, and the external oblique aponeurosis is divided. First, the ilioinguinal nerve is identified between the lateral border of the prosthetic mesh and the anterior superior iliac spine. It may easily be hidden if attached to the inguinal ligament, upper external oblique aponeurosis, within the fat-filled grooves of the internal oblique muscle, or simply under the retractor. The nerve is sharply transected, and the proximal end is buried within the internal oblique muscle to prevent future scarring. Next, the iliohypogastric is identified between the external and internal oblique aponeurosis. The intramuscular segment is followed lateral to the internal ring and divided proximal to the surgical field of the original hernia repair. The iliohypogastric nerve is the most vulnerable to injury due to the inability to visualize it during the hernia repair. The inguinal segment of the genital branch of the genitofemoral nerve can be identified by entering the internal ring through its inferior crus. After transection, the proximal ligated cut end is allowed to retract into the preperitoneal space [13]. In a study of 415 patients, 85 % had complete resolution of pain, with the remaining 15 % having significant improvement of pain after the triple neurectomy performed [14]. Other studies, although smaller, show success rates of this procedure of 80–95 %. Triple neurectomy appears to be a

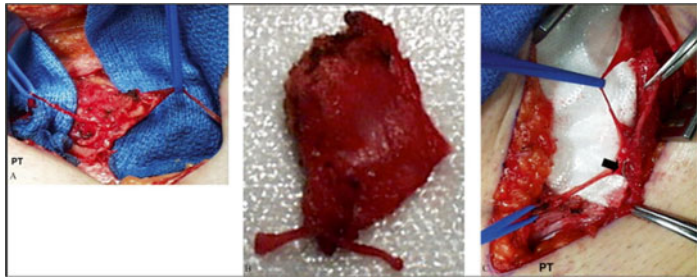

Fig. 15.3. Injuries to the IM segment of the iliohypogastric nerve, left groin, after inguinal hernia repair. (**a**). Nerve entrapped during a tissue repair. (**b**). Nerve sutured to mesh plug. (**c**). Nerve trapped by staple (*arrow*) adherent to upper edge of mesh patch held within forceps (Lichtenstein repair). PT, pubic tubercle (from Amid and Hiatt [14]).

very effective treatment for chronic neuropathic pain after inguinal hernia repair, although this procedure can be quite technically challenging (Fig. 15.3) [14].

Laparoscopic triple neurectomy is performed using a retroperitoneal approach, as described by Santos and Towfigh at Cedars Sinai Medical Center. It is typically performed for patients with inguinodynia following laparoscopic inguinal hernia repair or open posterior inguinal hernia repair. The patient is positioned supine if bilateral neurectomy is performed, or in the lateral decubitus position if unilateral. The ports are placed in the same fashion as a laparoscopic adrenalectomy, with a supraumbilical Hasson and two to three subcostal ports. The retroperitoneum is accessed following detachment of the colon at the white line of Toldt. Once accessed, the 12th rib is identified superiorly, femoral nerve inferiorly, iliac crest laterally, and ureter and medial half of the psoas muscle medially. The iliohypogastric and ilioinguinal nerves arise from the posterolateral border of the psoas muscle caudal to the 12th rib. Care must be taken not to mistake the 12th intercostal nerve for the iliohypogastric nerve, or the lateral femoral cutaneous nerve for the ilioinguinal nerve. The genitofemoral nerve exists from the mid-psoas muscle and branches distally, with the ureter lateral. The nerves are transected at their exit from the psoas, and proximal ends implanted into the muscle, while the distal end is cut 5 cm distally to prevent communication [15].

Conclusion

While treatment modalities vary widely and include medication, injection-based therapy, radiofrequency ablation, and surgical intervention, the most effective treatment for chronic neuropathic pain is prevention. Meticulous identification of all three nerves with careful preservation is essential in preventing the development of chronic pain following inguinal hernia repair.

References

1. Malangoni MA, Rosen MJ. Hernia. In: Townsend Jr CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston textbook of surgery: the biological basis of modern surgical practice. 19th ed. Philadelphia, PA: Elsevier Saunders; 2012. p. 1114–40.
2. Amato B, Moja L, Panico S, Persico G, Rispoli C, Rocco N, Moschetti I. Shouldice technique versus other open techniques for inguinal hernia repair. Cochrane Database Syst Rev. 2012;4:CD001543.
3. Amid P. Groin hernia repair: open techniques. World J Surg. 2005;29(8): 1046–51.
4. Wagner JP, Brunicardi FC, Amid PK, Chen DC. Inguinal hernias. In: Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE, editors. Schwartz's principles of surgery. 10th ed. New York, NY: McGraw Hill Medical; 2014. p. 1495–521.
5. Neumayer L, Giobbie-Hurder A, Jonassen O, Fitzgibbons Jr R, Dunlop D, Gibbs J, et al, Veterans Affairs Cooperative Studies Program 456 Investigators. Open mesh versus laparoscopic mesh repair of inguinal hernias. N Engl J Med. 2004;350(18):1819–27.
6. Nienhuijs S, Staal E, Strobbe L, Rosman C, Groenewoud H, Bleichrodt R. Chronic pain after mesh repair of inguinal hernia: a systematic review. Am J Surg. 2007;194(3):394–400.
7. Palumbo P, Minicucci A, Nasti AG, Simonelli I, Vietri F, Angelici AM. Treatment for persistent chronic neuralgia after inguinal hernioplasty. Hernia. 2007;11(6):527–31.
8. Hansen MB, Andersen KG, Crawford ME. Pain following the repair of an abdominal hernia. Surg Today. 2010;40(1):8–21.
9. Thomassen I, van Suijlekom JA, van de Gaag A, Ponten JE, Neinhuijs SW. Ultrasound-guided ilioinguinal/iliohypogastric nerve blocks for chronic pain after inguinal hernia repair. Hernia. 2013;17(3):329–32.
10. Kastler A, Aubry S, Piccand V, Hadjidekov G, Tiberghien F, Kastler B. Radiofrequency neurolysis versus local nerve infiltration in 42 patients with refractory chronic inguinal neuralgia. Pain Physician. 2012;15(3):237–44.
11. Chen DC, Amid PK. Technique: lichtenstein. In: Jacob BP, Ramshaw B, editors. The SAGES manual of hernia repair. New York, NY: Springer; 2013. p. 41–54.

12. Ferzli G, Edwards E, Khoury G. Chronic pain after inguinal herniorrhaphy. J Am Coll Surg. 2007;205(2):333–41.
13. Amid PK, Chen DC. Inguinal neurectomy for nerve entrapment: triple neurectomy. In: Jones DB, editor. Master techniques in surgery: Hernia. Philadelphia, PA: Lippincott Williams and Wilkins/Wolters Kluwer; 2013. p. 141–8.
14. Amid P, Hiatt J. New understanding of the causes and surgical treatment of postherniorrhaphy inguinodynia and orchalgia. J Am Coll Surg. 2007;205(2):381–5.
15. Santos D, Towfigh S. Laparoscopic retroperitoneal triple neurectomy: a new technique for persistent herniorraphy neuralgia (abstract). SAGES 2011, 30 Mar-2 Apr 2011, San Antonio, Texas. P336. abstract archive. http://www.sages.org/meetings/annual-meeting/abstracts-archive/laparoscopic-retroperitoneal-triple-neurectomy-a-new-technique-for-post-herniorraphy-neuralgia/. Accessed 5 Mar 2015.