The Lichtenstein inguinal hernia repair: applicability, antibiotic prophylaxis and complications
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Chapter 1

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Nederlands tijdschrift voor Heelkunde Submitted
Abstract
The first choice for symptomatic primary one sided inguinal hernia is currently the Lichtenstein repair according to the advice from the Dutch Evidence Based Guideline on inguinal hernia repair. This article uses the recent literature to describe a safe method to perform the Lichtenstein repair. Also the most frequently occurring complications and their treatment are presented.
Introduction
The evidence based Guidelines on inguinal hernia repair, published in 2003, recommend a Lichtenstein repair for symptomatic primary unilateral inguinal hernia.\textsuperscript{1,2} This technique was first described in 1989 by Irvin L. Lichtenstein (a surgeon from Los Angeles 1920-2000) who reported the results from 1000 primary inguinal hernia patients operated in his clinic with this tension free repair.\textsuperscript{3} Since this first controversial publication his partner Parviz K. Amid popularized the technique throughout the world through many publications and workshops. Currently the repair is, in many western countries, the first choice in the treatment of inguinal hernia in adults.\textsuperscript{4,5,6,7} In the united states 295,000 Lichtenstein repairs were performed in the year 2003.\textsuperscript{4} Amid reports the technique to be cheap, relatively easy to learn and teach, with low complication rates (recurrence, pain, infection) and easy to perform under local anaesthetics. From the literature it is known that the results are promising with a low percentage recurrences (< 5%)\textsuperscript{8,9,10} and a very low risk of wound infection (<2%).\textsuperscript{7,11} The publications on postoperative pain are however, although presumably not related to the technique, alarming.\textsuperscript{8,12-16} In the long term around 10-30\% of patients has pain complaints in the operated groin and the optimal therapy is still subjective to debate and evidence on this subject is scarce.\textsuperscript{16} In the Netherlands (2001) at least 39\%\textsuperscript{7} of inguinal hernia were corrected with this technique and it is certain that this percentage will rise in the future. The aim of this article is to describe the Lichtenstein inguinal hernia repair and to point out the pitfalls. Also ways of preventing complications and possible treatment when they do occur are described. Much of the data presented here is based on publications of Amid.\textsuperscript{17-21}
Lichtenstein inguinal hernia repair

For the correct technique of operating under local anaesthetics we refer to the article of Amid et al. in the Annals of Surgery. In low risk patients antibiotic prophylaxis is not indicated, for immunocompromised patients (HIV, malignancy, diabetes) there is no evidence based recommendation. It has to be taken into account that clear sight on the medial side of the inguinal canal is important to place the prosthetic mesh with an overlap of at least 2 cm medial to the pubic tubercle. For proper exposition an incision is made with 6-7 cm length starting just medial and above the pubic tubercle following the skin lines towards a point halfway of Poupart’s ligament where the internal annulus is located. It is usually necessary to ligate the superficial epigastric vessels (do not coagulate). The subcutaneous tissue and its fascia are opened until the external aponeurosis is exposed. With attention for the ilioinguinal nerve the aponeurosis externa is opened from the external annulus until 2 cm lateral of the internal annulus. The lower half of the external aponeurosis is freed from the spermatic cord until Poupart’s ligament is reached; the upper half is dissected until 3-4 cm above the inguinal canal. During this part of the operation the external aponeurosis is freed from the internal oblique muscle and attention must be given to the iliohypogastric nerve which preferably is spared. More laterally (5-6 cm from the internal annulus) the external aponeurosis is dissected from the internal oblique muscle for later placement of the lateral parts of the prosthesis. The spermatic cord is freed from the floor of the inguinal canal and here it is important to include the cremasteric vessels, the ilioinguinal nerve and the genital branch of the genitofemoral nerve in the spermatic cord. The genital branch of the genitofemoral nerve is just beside the cremasteric vessels and can be kept protected next to these vessels. Inadequate attention to this nerve may carry the risk of catching the nerve in a stitch with subsequent neuralgia. The spermatic cord must be freed at least 2 cm past the pubic tubercle for proper medial overlap of the prosthesis. By freeing and lifting the spermatic cord it is preferred to leave the ilioinguinal nerve unharmed in the cremasteric sheet. (Figure 1.)
Figure 1
Anatomical plane for the mesh in Lichtenstein repair with lifted spermatic cord and the involved nerves. (P.K. Amid, Lichtenstein hernia institute, LA, USA)

After lifting the spermatic cord from its avascular plane the cremasteric muscle is longitudinally split on the ventral side to identify an indirect hernia sac. If such a sac is present it is freed from the cord until within the internal annulus and repositioned in the preperitoneal space or resected after ligation. Lipoma of the cord can be resected. In large scrotal hernia it is wise to transect the hernia sac and leave the distal section in place after opening it at the ventral side. Dissection of this part of the sac is likely to increase the chance of damage to the spermatic vessels. In the case of a large direct hernia the transversalis fascia can be inverted and with a purse string (Vicryl) kept in place for easier placement of the prosthesis. During this phase of the operation the presence of a second hernia must be excluded (femoral or combined direct and indirect). A polypropylene mesh of 7 by 14 cm is large enough and can be shaped according to the anatomical measurements and hernia type. The mesh is fixed on the lateral rectus sheath with a Prolene 3.0 wire starting 2 cm cranio-medially of the pubic tubercle. The periostal layer of the pubic tubercle itself must be avoided while stitching the mesh on Poupart's ligament with the running suture in a few (3-4) tension free steps until just lateral of the internal annulus. (Figure 2.)
The mesh is stitched on Poupart’s ligament starting 2 cm cranio-medially of the pubic tubercle. (P.K. Amid, Lichtenstein hernia institute, LA, USA)

The mesh is now slit coming from the lateral edge until just medial of the internal annulus to create two tails with the smaller tail (one third of the width) below. The upper wide tail (2/3) of the mesh is passed underneath the spermatic cord. The wide uppertail is crossed and placed over the narrower one. Both tails are stitched on Poupart’s ligament and by doing so a dome shape of the mesh is created and the laxity of the tension free repair is created (figure 3).

The prosthesis is then trimmed to cover 5-6 cm of the transversalis fascia lateral to the internal ring. The mesh is then placed under the external aponeurosis cranially and damage to the iliohypogastric nerve is prevented. In case of interference of the nerve the mesh is adjusted or the nerve is cut and placed (buried) in the underlying muscle. The large variation of the position of the iliohypogastric and ilioinguinal nerve must be kept in mind. One or two Vicryl stitches can be used to keep the mesh in place on the cranial edge of the mesh. Attention must be given to the position of the iliohypogastric nerve which can be intramuscular and therefore caught in these stitches.

The external aponeurosis is closed over the mesh and spermatic cord and entanglement of the ilioinguinal nerve must be prevented. The subcutaneous fascia is approximated and the skin is closed preferably with resorbable stitches. In case of general anaesthetics the wound can be infiltrated with 10 cc
The mesh is fixed in its position. The stitches on the upper edge of the mesh are not obligatory and are meant to safeguard a good position of the mesh. (P.K. Amid, Lichtenstein hernia institute, LA, USA)

Bupivacaine by using 5 cc under the external aponeurosis and 5 cc subcutaneously to reduce postoperative pain. In spinal anaesthetics this seems less useful. Several hours after the operation and after urinating spontaneously the patient can be discharged. Postoperatively no restraints on the part of exercise, what can be done may be done. Especially lifting items is not prohibited.22

**Important technical details**

1. The mesh must have sufficient medial overlap to prevent a direct recurrence. It is demonstrated that meshes shrink up to 30%. Therefore especially a direct hernia is at risk for a direct recurrence.
2. The mesh placement must be tension free and slight dome formation in a supine patient is essential. Tension is a potential cause of pain and traction on Poupart’s ligament may cause femoral hernia.
3. The mesh must be fixed in a flat position and buried under the external aponeurosis.
4. The three inguinal nerves should be spared where possible. But cutting them and then burying in a muscle is a reasonable alternative if needed. When a nerve is damaged or in contact with the mesh it is wise to cut the nerve and bury in the muscles.
Complications

When a postoperative bleeding with tension on the skin occurs it is wise to evacuate the haematoma and attempt to stop the cause of the bleeding. Seroma will resorb spontaneously in most cases. Fine needle aspiration of this seroma will only increase the risk of infection and is not advised. Superficial wound infections (1.4%) are treated, after a culture swab, with antibiotics aimed at the most common bacteria (Staphylococcus Aureus) therefore Flucloxacillin is the first choice of treatment. In the presence of a deep infection (0.3%) not only antibiotics are given but an adequate drainage of the wound is essential. Usually opening of the external aponeurosis is needed and it should be left open. The mesh can remain in place and the wound can be treated according to the local customs and vacuum assisted closure (VAC) can be a good solution. Most of the deep infections can be managed this way. In only a few cases removal of the mesh is necessary for instance in chronic sinus formation or fisteling (0.09%) remarkably enough even after removing the mesh the recurrence is frequently absent because of scar tissue formation.

Postoperative pain can be divided into acute and chronic neuropathic pain or somatic pain. The acute neuralgic pain is usually caused by a nerve caught in a stitch and the patient starts complaining of severe pain with electrical impulses directly after the operation. The treatment of choice is an instant reoperation with identification of the nerve involved and freeing or cutting it. In case of chronic neuropathic pain probably it is best to perform a triple neurectomy. Unfortunately there is little scientific evidence on this subject and a diagnostic episode with temporarily nerve blocks should be performed before this intervention. The somatic pain covers a wide area of complaints and pain medication together with watchful waiting is probably the best treatment. If an osteitis pubicum is present a percutaneous corticosteroid injection could be of therapeutic value.

Conclusion

The Lichtenstein inguinal hernia repair is currently the first choice for primary unilateral hernia. Like every surgical technique a learning curve is present. In this article frequently appearing perioperative difficulties and several postoperative complications together with the therapy are described.
References


Je moet in feite gewoon niet te diep nadenken en dan klopt alles.

*Herman Finkers*