

A new mesh design for plug and patch groin hernia repair: Parietene®PP



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Plug and patch hernioplasty is a technique showing very good results. Actually some criticisms mainly concern the amount of prosthetic material and the shrinkage of the plug resulting in recurrence of hernia, groin pain, and/or migration. The new tridimensional mesh Parietene® PP allows to achieve a plug and patch hernioplasty, without any risk of plug migration.

The Parietene® PP hernia repair is simple and easy to learn. Preliminary results are very satisfactory and comparable with the best outcome from mesh plug repair, without any risk of plug migration.

KEY WORDS: Parietene PP - Plug and patch repair - Polypropylene mesh - Plug migration

Introduction

Plug and patch technique is one of the standard procedures in groin hernia repair. Results from wide series are satisfactory^{1,2} but there are some criticisms concerning the outcome of the plug. Plug shrinkage is a consequence of incorporation of biomaterial into surrounding tissue. The large amount of prosthetic material could be difficult to infiltrate with connective tissue. Shrunken plug could result in recurrence of hernia or in groin pain³. Moreover it could migrate and erode into close anatomic structures⁴. To overcome these criticisms a new tridimensional device for plug and patch repair is hereby presented.

Methods

THE MESH

Parietene® PP consists of a unique soft device made of low weight polypropylene.

The mesh is formed by a combination bidimensional flat surface of 12x6 cm (patch) and a tridimensional cylindrical device having a base diameter of 2 cm and a height

of 2 cm (plug), all in one product. The rectangular mesh needs to be trimmed during the operation in order to be placed on the posterior wall of inguinal canal. The density of the device is 85 gr/m², which represents less than 0.65 gr for Parietene® PP (Fig. 1).

The mesh is made of a knitted macroporous monofilament polypropylene with controlled flexibility and rigidity. The plug is configured as a cylinder with blunt edges. Parietene® PP was conceived and designed in our Department and it is manufactured by Covidien Tyco (former Sofradim Research Laboratories, Villefranche sur Saone, France).

SURGICAL TECHNIQUE

An oblique (4 to 6 cm) incision is made under local or epidural anaesthesia. The external oblique aponeurosis is opened. The spermatic cord is mobilized and a loop is placed around the cord structures. If the ilioinguinal and the genitofemoral nerves are found, they are preserved.

The mesh is removed from the package and the surgeon tests it in the operative field to adjust it in shape to the posterior wall of the inguinal canal (Fig. 2). A keyhole slit close to the plug is vertically performed to permit the passage of the spermatic cord (Fig. 3).

In indirect hernia the highly, freely dissected, unopened sac is reduced into the abdominal cavity.

The plug is then inserted into the internal ring by the surgeon's finger (Fig. 4) The previously trimmed onlay patch is laid on the posterior wall of the inguinal canal overlaying the pubic tubercle to prevent direct hernias.

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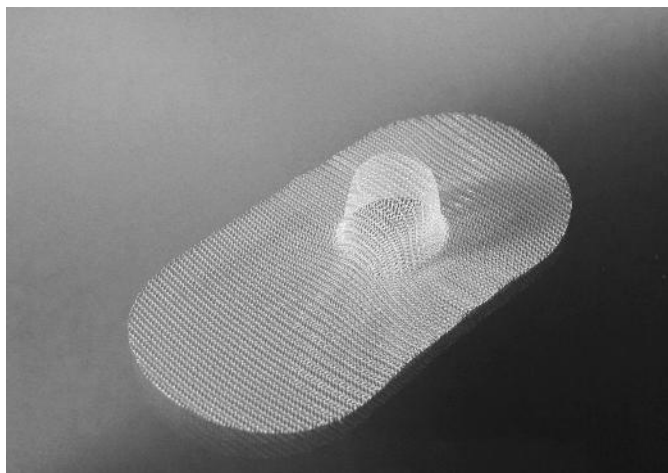


Fig. 1: Parietene® PP.



Fig. 2: The mesh is tested in the operative field to adjust it in shape.

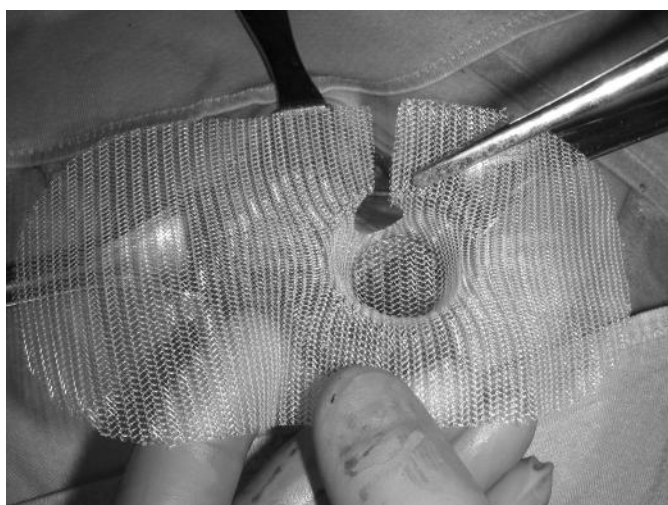


Fig. 3: A keyhole slit has been performed to permit the passage of the spermatic cord.

Mesh fixation is realized using fibrin sealant. One ml of Tissucol (Baxter, Germany) is sprayed from the pubic tubercle upper to the internal ring (Fig. 5). A particular care is for spraying the glue to the margins of the internal ring keeping in place the plug with the finger (Fig. 6). The patient is then invited to cough on command to test the repair. Parietene® PP preserves the shutter mechanism.

In direct hernia the sac is reduced and a tension-free reinforcement of the posterior wall is performed using continuous polypropylene suture. The internal ring is explored to exclude an indirect component of hernia. Parietene® PP is then laid and fixed as above described. In this case the role of plug is to prevent indirect hernias.

The external oblique aponeurosis is reapproximate over the prosthesis with continuous suture. The wound is finally closed in a routine fashion with adsorbable sutures for subcutaneous and skin layer.

PERSONAL SERIES

Since January 2007, Parietene® PP was used in 84 groin primary hernia repairs. The last 40 cases were included in a prospective study.

Primary end-point of this study was the assessment of the postoperative pain. Secondary end-points were the evaluation of patient's quality of life and the complications related to this technique (recurrence and late pain). Pain was measured using a 10 cm Visual Analogue Scale (VAS), graduated from 0 (no pain) to 10 (unbearable pain). Pain was evaluated at rest and when standing up. VAS was evaluated after 7 days, one month, 6 and 12 months. Return to daily activities was also registered. Patient's quality of life was measured using Quality of Life Questionnaire SF36 and it was evaluated at one month, 6 and 12 months.

Inclusion criteria were: primary inguinal hernia, Nyhus classification over II, age from 18 to 70 and compliance with necessary follow-up.

Results

The prospective study included 40 patients, 39 males and one female, aging from 18 to 69 years. All inguinal hernia repairs were performed under epidural anaesthesia. Hernia type was classified as type II (45%), IIIA (22.5%), IIIB (30%) and IV (2.5%), according to Nyhus. All patients were discharged within 24 hours. Baseline and postoperative pain (VAS) and quality of life (SF36) scores are reported in table 1.

Return to daily activity was within one week in 97.5% of patients (40% within 3 days). Only for one patient the return to daily activity was longer (15 days).

No postoperative complications were observed. For 37 patients with one year follow-up recurrence rate was 0%.



Fig. 4: The plug is inserted into the internal ring.

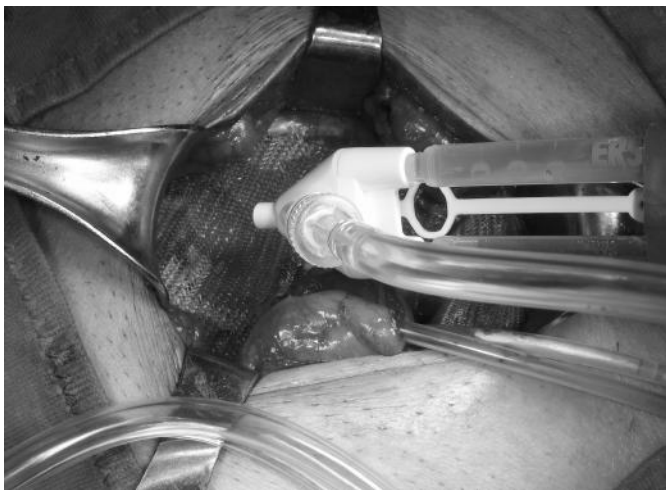


Fig. 5: Tissue glue is sprayed over the pubic tubercle.



Fig. 6: The plug is kept in place by the finger during the fixation to the margins of the internal ring.

Discussion

Mesh plug repair is an effective method for the treatment of groin hernias. The technique is well standardized and easy to learn⁵. In indirect hernia it prevents reversion of previously inverted sac avoiding any subprosthetic recurrence^{6,7}. Although specialists who use the plug do not generally refer complications^{1,2}, some adverse effects associated with the plug and patch repair have been described⁴. Shrunken plug could act as a foreign body (meshoma) and then it could result in prosthesis awareness, numbness and chronic groin pain. More dramatically it could migrate and erode into surrounding anatomic structures (bowel, bladder, iliac and femoral vessels).

In recent years new implants have been proposed to realize “a plug effect” without the risk of migration. All these techniques showed to be effective although some of them appear less simple and require a longer learning curve than traditional plug repair^{8,9}. More recently results of a new plug-like mesh repair were published¹⁰. The technique is simple but in indirect large hernias it requires the plasty of the internal ring.

Parietene®PP is an implantable polypropylene mesh shaped to perform a plug and patch repair. The all-in-one device avoids the risk of plug migration. In indirect hernia the cylindrical shaped mesh obliterates the hernia defect while the onlay patch prevents the reversion of a previously inverted direct hernia.

The mesh is made by low weight polypropylene and the amount of prosthetic material is less than other tridimensional devices thus reducing the local inflammatory reaction.

The Parietene® PP hernia repair is easy to perform with a learning curve requiring only 3 cases.

TABELLA I - VAS and SF36 (VAS: Visual Analogue Scale; SF36: Short Form questionnaire; PF: physical functioning; RF: role physical; BP: bodily pain).

	Baseline	7 days	1 month	6 month
VAS (%) at rest				
0	72.5	57.5	85	100
1-3	17.5	32.5	15	–
4-5	10.0	7.5	–	–
6-7	–	2.5	–	–
8-10	–	–	–	–
VAS (%) when standing up				
0	45.0	22.5	67.5	95.0
1-3	32.5	60.0	32.5	5.0
4-5	10.0	12.5	–	–
6-7	10.0	5.0	–	–
8-10	2.5	–	–	–
SF36 (average score)				
PF	87.2		89.8	93.5
RF	64.4		50.4	86.0
BP	66.2		72.9	86.6

The technique is quick. Less than 1ml of fibrin glue allows a rapid and effective adhesion of the mesh to the inguinal canal. Mesh fixation by suturing is possible but it is time consuming.

Short and medium term clinical results are very satisfactory, comparable with the best series of mesh plug repair [1].

Postoperative pain (VAS score) ranged from 0 to 3 at 7 days in 90% of patients, VAS score was 0 in 100% of patients at one month..

At six months, quality of life average measurement showed an improvement of physical components of SF36 (PF, RP, BD).

Riassunto

L'ernioplastica plug and patch è una tecnica ben standardizzata ed efficace.

Nonostante ciò, le maggiori critiche all'intervento riguardano lo shrinkage del materiale protesico, ritenuto eccessivo, cui si può correlare dolore tardivo e/o migrazione del plug.

La riparazione con Parietene® è semplice e di facile apprendimento. I risultati preliminari sono buoni e sovrapponibili ai migliori relativi alle altre tecniche, senza la possibilità di migrazione del plug.

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