Evaluation of lightweight polypropylene mesh in Stoppa pre-peritoneal repair of bilateral inguinal hernias

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Abstract: Background: Repair of bilateral inguinal hernias (recurrent or primary - direct or indirect) is associated with a high recurrence rate. Giant prosthetic reinforcement of the visceral sac (Stoppa GPRVS) with heavyweight polypropylene mesh is popular in America and Europe, but there are no prospective data concerning the use of lightweight polypropylene mesh in Stoppa repair. **Patients and Methods:** Twenty patients with bilateral inguinal hernias (40 hernias) underwent repair using a large lightweight polypropylene mesh based on Stoppa pre-peritoneal technique. Mean age was 48 years (range 40 to 65) and 40% had one or more comorbid conditions. In the 20 patients, 36 hernias were primary, 3 were recurrent and one was re-recurrent. **Results:** Mean hospital stay after surgery was 4.5 days (range 2-14 days). The mean operative time was 75 minutes (range 52-95 minutes). There were no intestinal or pulmonary complications. Local complications consisted of two cases of seroma in the dead space of the distal part of the hernia sac, and one case of pre-peritoneal hematoma. No inguino-scrotal neuropathies, chronic testicular pain or atrophies occurred. No postoperative stiffness, foreign body sensations, or pain related to the groin. Mean time of return to work after surgery was 3 weeks (range 3-5 weeks). The recurrence rate was 0% per inguinal repair and 0% per patient after one year of follow up. **Conclusion:** Stoppa pre-peritoneal repair of bilateral inguinal hernias is anatomic, sutureless, and tension-free procedure that completely eliminates all types of groin hernias especially recurrent and re-recurrent. The use of lightweight polypropylene mesh instead of traditional heavyweight one induces less fibrosis with no postoperative stiffness, foreign body sensations, or pain. Patient satisfaction and the absence of limitation in the level of activity postoperatively were impressive.
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1.Introduction

Surgical repair of inguinal hernias is a common procedure in adult men. However, recurrence of hernias has been reported to occur after repair in 15 percent or more cases, and postoperative pain and disability are frequent. When traditional surgical methods are used, outcomes after repair of recurrent hernias have been worse than after primary repair [1].

In 2002, Papadakis and Greeburg exclaimed about the growth of hernia treatment "Since the epoch making contribution of Basini in 1880s, no less than 81 inguinal and 79 femoral operative techniques have been described [2]. More than decade later surgeons must humbly accept that despite latest success in repair, they are still in shadow [3]. Groin hernioplasties are the commonest surgical operation performed by general surgeons. Worldwide 20 million hernioplasties are performed each year, 80% by mesh repair, and 1/3rd of mesh recipients are under 40 years of age. With or without mesh, infection rate varies between 1% and 5% [4]. Around the year, hernia recurrences, nerve entrapment and groin pain continue to plague the patients and frustrate the surgeons. So a need of possible revolution for repair of even the worst cases ceases to exist [5].

The reconstruction of the posterior wall of the inguinal canal represents one of the major objectives in groin hernia repair. There are 2 primary methods used to achieve this objective: "tissue-repair technique" and "tension-free repair". Recently, tension-free repair has become the gold standard procedure for repairing inguinal hernias. Many techniques have been described by different authors [6].

Tension-free repair involves the use of synthetic prosthetic materials for rebuilding the posterior inguinal wall. The prosthetic materials, now disposable, have a well-tolerated bioreactivity, allow efficient fibroplasia, diminish postoperative pain, and significantly reduce the recurrence rate and convalescence period [7].

The development of polypropylene prosthetics revolutionized surgery for the repair of abdominal wall hernias. A tension-free mesh technique has drastically reduced recurrence rates for all hernias compared to tissue repairs and has made it possible to reconstruct large ventral defects that were previously irreparable. The repair of abdominal wall defects is one of the most commonly performed general surgical procedures, with over 1 million polypropylene implants inserted each year. Surprisingly, little research has been performed to investigate the interaction of abdominal wall forces

on a hernia repair or the required amount or strength of the foreign-body material necessary for an adequate hernia repair. The long-term consequences of implantable polypropylene prosthetics are not without concern. The body generates an intense inflammatory response to the prosthetic that results in scar plate formation, increased stiffness of the abdominal wall, and shrinkage of the biomaterial. Reducing the density of polypropylene and creating a "light weight" mesh induces less foreign-body response, results in improved abdominal wall compliance, causes less contraction or shrinkage of the mesh, and allows for better tissue incorporation [8].

The Stoppa procedure, or giant prosthetic reinforcement of the visceral sac (GPRVS), is performed by wrapping the lower part of the parietal peritoneum with large heavyweight polypropylene prosthetic mesh (84-100 gm/m^2) **(Fig. 1)**. The mesh contributes to a physiological healing process that creates a special bilateral anatomical reinforcement in the inguinal region, which effectively prevents inguinal hernia recurrence. The procedure's rationale is based on an elegant surgical and anatomical prosthetic placement that occludes the myopectineal ostium of Fruchaud. The GPRVS procedure requires wide dissection of the subfascial preperitoneal space. As a corollary, the GPRVS operation calls for the use of suction drainage. Sometimes this drainage procedure is responsible for longer hospitalization that may be as long as 10 days [9].

Since the description of GPRVS procedure, and after meticulous internet search, there were no published trials to date on the use of lightweight polypropylene prosthetic mesh (40 gm/m^2) **(Fig. 1)** in the Stoppa GPRVS procedure.

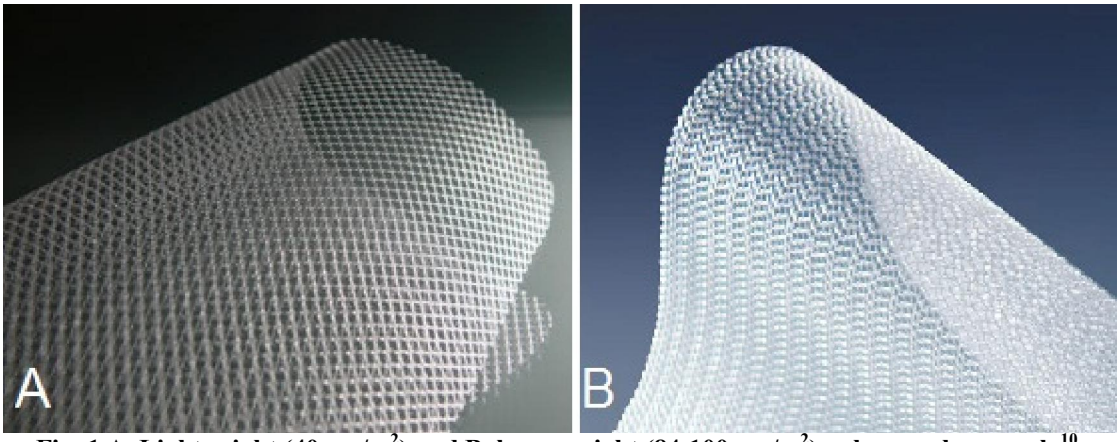

Fig. 1 A. Lightweight (40 gm/m^2) and B. heavyweight (84-100 gm/m^2) polypropylene mesh [10].

Recent studies agreed that the use of lightweight polypropylene prosthetic mesh in the open anterior repair of inguinal hernias diminished limitation in the level of activity postoperatively which allow patients, to return earlier to full activity and decreases the incidence of stiffness, foreign body sensation, and groin pain at 1 year after surgery for primary inguinal hernia. [11-14]

Purpose of the Study:

To evaluate outcome and post-operative complications of open preperitoneal lightweight polypropylene mesh repair for bilateral inguinal hernias (Stoppa GPRVS).

2. Patients and Methods

Patients

A prospective, non-randomized interventional and descriptive study was carried out in Al-Azhar University Hospitals. Total of 20 patients with bilateral inguinal hernia (ASA I or II surgical risk) were included in the study with particular reference to indications, postoperative hospital stay, postoperative complications of open pre-peritoneal lightweight polypropylene mesh repair (Stoppa GPRVS) of bilateral inguinal hernias, including recurrent ones.

Selection Criteria:

- Primary bilateral inguinal hernia.
- Recurrent inguinal hernia (unilateral or bilateral).
- Associated risk factor.
- Large size > 4 cm.
- Age 40-65 years.
- Male patients only.
- No associated intra-abdominal pathology.
- No systemic disease leading to impairment of immunity (e.g., chronic liver and hepatic diseases, steroid therapy, and malignant diseases).

Exclusion Criteria:

- Primary unilateral inguinal hernia.

- Complicated inguinal hernia i.e, incarcerated, strangulated.
- Sepsis or dermatosis of abdominal wall.
- Midline abdominal scar from previous operation.
- Patients unfit for general anesthesia.

Diagnosis:

Diagnosis of hernia was based upon history and clinical examination of patients. Symptoms and signs were recorded on a Diagnosis Performa.

Patient Population and Hernia Characteristics:

- Number of patients 20
- Number of hernias 40
- Male/Female: all males
- Size R/L: 3.6 cm/3.2cm
- Large size > 4 cm: 16 (8 of 20)
- Failure of one or more previous repairs: 20% (4 of 20)
- COPD: 10% (2 of 20)

Investigations:

For the purpose, all patients underwent the following investigations.

- Complete blood picture.
- Urine examination.
- Serum urea and creatinine.
- Serum bilirubin, albumin, SGOT, SGPT.
- Fasting and postprandial blood glucose.
- Electrocardiogram.
- Chest X-ray.
- Abdominal ultrasound.

Additional tests like intravenous urography for urinary tract, trans-rectal ultrasound for prostate and computed tomography for abdominal mass were carried out depending upon the personal history of the patient and clinical data.

Counseling:

Counseling of the patients was done explaining them in detail the surgical technique including advantages and disadvantages of the procedure.

Operative Technique

Preoperatively: Patient was fasting for 8 hrs before operation. Hairs were shaved form the abdomen where skin incision was planned, just before operation. The skin was then prepared using povidone iodine scrub (Betadine) and painted for 3 minutes. A urinary catheter was positioned before surgery after induction of anesthesia in all patients. Prophylactic intravenous antibiotic (1 gram cephalosporin every 8 hours) was administered in all patients before, during, and after the procedure, until the drains were removed.

Anesthesia: All patients were fit for general anesthesia as all repairs were done under general anesthesia; Diprivan (Propofol) was used for induction. Pavlon (pancurronium bromide) was used as a muscle relaxant. Fluothane (Halothane) was used for maintenance. Endotracheal intubation was done.

Operation Steps: The technique developed by Stoppa was used without modifications [15]. Midline incision made extending from the umbilicus to the symphysis pubis. Dividing, skin, subcutaneous tissue and linea alba. Patient is tilted 20^{o} head down.

The preperitoneal space is entered with blunt dissection aided by sharp dissection when the peritoneum is scarred from prior operations (appendectomy, herniorrhaphy, prostatectomy or lower abdominal laparotomy). The dissection includes the retropubic space of Retzius and Bogros, and continued laterally, dissecting the posterior portion of the rectus abdominis muscle on the far side of the operator, proceeding behind the epigastric vessels, progressing to the retroinguinal space and further exposing the iliopsoas muscle. Sacs of direct hernias are identified and reduced. Sacs of indirect hernias divided and the proximal peritoneum over sewn, leaving the distal peritoneum in place undissected and attached to the cord. In sliding indirect hernias, the sac is dissected from the cord structures. The spermatic cord and the testicular vessels are parietalized by dissecting them from their peritoneal attachment to allow them to lay tension-free in the posterior pelvis. This step averts the need for mesh splitting. The lightweight polypropylene mesh is fashioned as a chevron, and placed in the pre-peritoneal space with long clamps. The size of the prosthesis is measured on the patient without touching his skin. The width equals the distance between the anterior superior iliac spines, and vertically measures the distance between the umbilicus and the symphysis pubis plus 6 cm. In obese patients, the mesh should be several centimeters wider than the interspinous dimension. The mesh is held in place without the need for fixation since the intra-abdominal pressure forces the mesh to lay flat between the peritoneum and the fascial layers. The mesh is oriented so that it stretches transversally. The assistant retracts the parietal wall while the surgeon depresses the peritoneal sac with the left hand to open the parietoperitoneal space. The patient is in the Trendelenburg position to facilitate exposure. First, the inferior midline clamp is placed in the space between the pubis and bladder (Retzius space), then the inferior lateral clamp, and then the lateral angel clamp (over the iliac vessels). Finally, the upper lateral clamp extends the length as far as possible to unfold the prosthesis laterally. Each time a clamp is inserted, the assistant immobilizes it until the operator releases the visceral sac, abdominal wall retractor, and the clamp is removed. The process is repeated on the opposite side. The patient is placed in the reversed Trendelenburg position, and the clamps

are removed. The mid-portion of the superior border of the prosthesis is then sutured with a single stitch of absorbable suture to the posterior rectus sheath. None of the hernial defects were repaired. Closed suction drainage was positioned in all patients and was removed postoperatively. Wound closed with vicryl 0 and skin closed with subcuticular vicryl 3/0.

Eight hours following the procedure, patients received clear liquids and were advanced to regular diet as tolerated. Patients without comorbid conditions were discharged after 24 hours of observation if they could void and tolerate liquids. Closed suction drainage eliminates seromas and hematomas and is not necessarily an indication for hospital admission.

Follow Up: Following operation no limitation of physical activity was imposed. Patients were evaluated one week after operation by interval history and focused physical examination. Further follow up in surgical out-patient clinic for any complaints in accordance with the proforma given to the patient. Complications in the early postoperative period at each follow up visit were maintained in a 'follow up proforma'.

Statistical Analysis

Descriptive statistics i.e percentage, mean, were used to describe the data using SPSS (Statistical Package for the Social Sciences) ver-10.0.

3. Results:

A total of 40 inguinal hernias (20 patients with bilateral hernias) were repaired using open pre-peritoneal approach (Stoppa GPRVS) **(Table 1)**. All patients were men (100%). The mean age of patients was 48 years (range, 40 to 65). Mean BMI (Body Mass Index) of the patients was 21.6 (rang, 16.8-26.4). Age distribution of the 20 patients who underwent hernias repair is shown in **(Fig. 2)**.

Concomitant medical problems were observed in 8 patients (40%). Cardiovascular diseases were the most frequent in 4 cases (20%), followed by benign prostatic hypertrophy in 2 cases (10%) and chronic obstructive pulmonary disease in 2 cases (10%).

Risk factors predicating a high risk for recurrence included a large hernia size (>4 cm) in 40% of patients (8 of 20), unilateral failure of one or more previous repairs in 20% of patients (4 of 20), bilateral failure of one or more previous repairs in 0% (0 of 20), and associated femoral or obturator hernia in 0% (0 of 20). In the 20 patients with 40 groin hernias, 36 hernias were primary, 3 were recurrent and one was re-recurrent.

GPRVS was completed in all 20 patients, and no patient required conversion to another technique. Bilateral GPRVS was used in all patients to repair 40 hernias, of which 4 were recurrent and 36 were primary groin hernias. Surgical characteristics of mesh placement were summarized in **Table 2**.

General anesthesia was used in all patients. The mean operative time was 75 minutes (range 52-95), and there was no complication related to anesthesia **(Table 3)**. No anterior counter incision was required. All patients were repaired with lightweight polypropylene mesh.

Overall patients were very satisfied with the operation. The absence of limitation in the level of activity post-operatively is based on the safety provided by wide tension free mesh forces against the lower abdominal wall (Pascal's hydrostatic principles) and further fixing the prosthesis against the posterior abdominal wall.

The mean length of hospital stay was 4.5 days (range, 2-14 days). Six patients without co-morbid conditions were discharged 48 hours after the operation **(Fig. 3)**. One patient developed pre-peritoneal hematoma due to blockage of the drain and needed prolonged hospital stay (14 days) **(Fig. 4)**. There were no intestinal or pulmonary complications. Local complications consisted of two cases of seroma in the dead space of the distal part of the hernia sac, which were resolved with repeated needle aspiration without delaying recovery or patient discharge **(Table 4)**.

No deep or superficial infections occurred in all patients. No inguino-scrotal neuropathies, chronic testicular pain or atrophies occurred. Mean time of return to work after surgery was 3 weeks (range 3-5 weeks). The recurrence rate was 0% per inguinal repair and 0% per patient after one year of follow up.

Table 1 Type of groin hernias in 20 patients who underwent Stoppa groin hernia repair.

Type of groin hernias	Number
Bilateral indirect inguinal hernia	6
Bilateral direct inguinal hernia	9
Bilateral inguinal hernia (right: direct, left: indirect)	2
Bilateral inguinal hernia (right: indirect, left: direct)	3
Total	20

Table 2 Surgical characteristics of mesh placement.

Mesh width (cm)	24.5 (22-28)
Mesh height (cm)	16.2 (15.8-17.2)
Peritoneal perforation	12
Resection of the hernia sac	6

Table 3 Mean operative time in 20 patients underwent Stoppa groin hernia repair.

Operative time	No. (%)
50-<60 min	2 (10%)
60-<70 min	5 (25%)
70-<80 min	7 (35%)
80-<90 min	4 (20%)
>90 min	2 (10%)

Table 4 Postoperative complications in 20 patients underwent Stoppa groin hernia repair.

Postoperative complication	No. (%)
Intestinal	0 (0%)
Pulmonary	0 (0%)
Hematoma	1 (5%)
Seroma	2 (10%)
Recurrence	0 (0%)

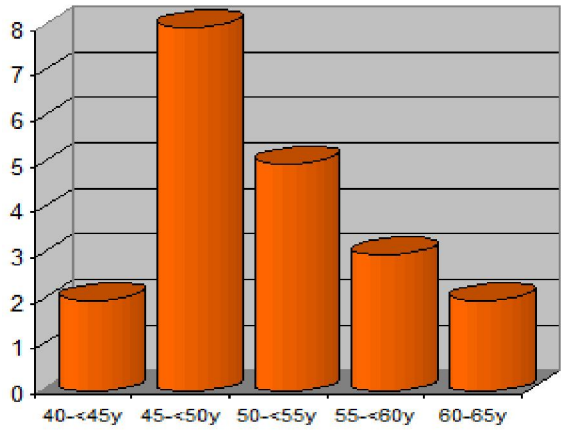

Fig. 2 Age distribution in 20 patients who underwent Stoppa groin hernia repair.

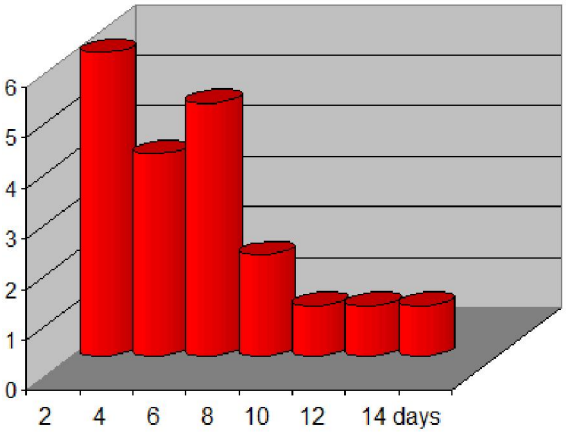

Fig. 3 Postoperative hospital stays in 20 patients.

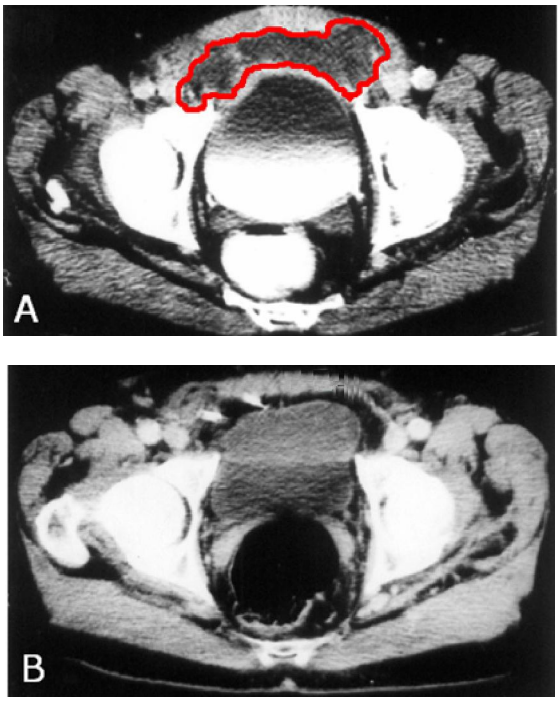

Fig. 4 A. Ct showing collection in the pre-peritoneal space. B. CT of the same patient after proper drainage.

4. Discussion

Inguinal hernias represent 75% of all hernias. It has a disabling affliction with a lifetime prevalence of 25% in men and 2% in women. Incidence of incarceration is 10%. First time recurrent hernia ranging from 1 to 10% of the cases, second time recurrent repairs ranging from 3% to 30% and third time or more recurrent repairs ranging from 50 to 70% [16, 17].

Efficacy is both an ethical and economic obligation in the treatment of hernias and efficacy is not easily achieved without proper mesh in patients with weak inguinal tissues. The Stoppa procedure (Great Prosthetic Reinforcement of the Visceral Sac) utilizes the many advantages of the pre-peritoneal approach in inguinal hernia repair. It has many advantages, particularly in cases of recurrent or bilateral inguinal hernias. The genius feature of GPRVS is the application of Pascal's principle (A change in pressure at any point in an enclosed fluid at rest is transmitted undiminished to all points in the fluid) in mesh placement that reinforces the lower abdominal wall with a well-designed anatomical approach that does not disturb groin structures, even in cases that were dissected before. However, the GPRVS procedure requires a very extensive dissection of the pre-peritoneal space for the insertion and wrapping of the visceral sac in large bilateral mesh prosthesis [18].

Nyhus [19] points out that modern hernia surgery should individualize the repair to each clinical situation, and some would add, to each social and economic circumstance. In the present study, the GPRVS was mostly used in a group of older patients, with multiple medical problems as well as recurrent or complex bilateral hernias. Miller [20] and colleagues demonstrated that the simultaneous repair of bilateral inguinal hernias is safe and does not result in an increased recurrence rate.

The risk of recurrent herniation must be balanced against the risks, the complexity and the magnitude of the hernioplasty. Some patients do not want general anesthesia and others do not want mesh. For primary inguinal hernias of all types, anterior inguinal hernioplasty with the aid of local anesthesia and without prosthetic reinforcement will remain the first choice of surgeons and patients because it is simple and safe and produces acceptable results. It can be done in an ambulatory surgical center in selected patients, and can be successfully performed in even the most debilitated patient, if necessary. On the other hand, primary as well as recurrent hernias have been successfully repaired using prosthetic material with the safe utilization of open or laparoscopic approaches. In recent commentary, Beets stated that the recurrence rate has been the major, if not sole, criterion on which the efficacy of any herniorrhaphy is judged despite the fact that over the last half century, recurrence rates have been similar regardless of which technique is used. In addition to recurrence rates, socioeconomic factors, technical difficulty, complication rates, short and long-term postoperative discomfort, time of return to daily activities should also play a role in the equation [21].

Argument over the inguinal or transabdominal routes for the repair of groin hernias as the best surgical approach is the modern expression of old age duality [22]. Subumbilical midline propertioneal approach provides facility of separation of retrofascial spaces, direct access to bilateral posterior inguinal structures, clear understanding of hernial lesion and good exposure of musculopectineal opening [23]. Placing a large bilateral light-weight polypropylene 30 x 30 cm mesh in the naturally cleaved retrofascial space able to enwrap the visceral sac, as does natural endoabdominal fascia, making the peritoneum inextensible so that herniation could no longer appear. Using in advantage the same intra abdominal pressure which caused herniation to fix prosthesis against posterior abdominal wall [24].

In multirecurrent hernia, surgeons progressed from normal anatomy (virgin tissue) to abnormal anatomy. There is no additional deterioration of already weakened inguinal structures and no risk of injury to cord or superficial nerves, thus the number of testicular atrophy and painful sequelae are decreased [25].

This technique also preserves the mechanisms that protect inguinal region from the effects of increased abdominal pressure and does not impede further operations on abdomen [26].

Surgeons test the veracity of literature in the laboratories of their own operating room, but the studies comparing diverse techniques will not lead us to an exclusive choice because hernias are polymorphous lesions [27].

So considering its logically based conception, its scientific base of a physical rule (Pascal's law), its easy correct performance, short learning curve and satisfactory reproducible results, can be trusted as an irreplaceable one [28].

Although polypropylene has been used as a hernia repair material for nearly 50 years, very little science has been applied to studying the body's effect on this material. It is possible that oxidation of mesh occurs as a result of the chemical structure of polypropylene and the physiological conditions to which it is subjected; this leads to embrittlement of the material, impaired abdominal movement, and chronic pain. It is also possible that lightweight polypropylene meshes undergo less oxidation due to a reduced inflammatory reaction. The objective of Costello study was to characterize explanted hernia meshes using techniques such as scanning electron microscopy, differential scanning calorimetry, thermogravimetric analysis, and compliance testing to determine whether the mesh density of polypropylene affects the oxidative degradation of the material. Costello concluded that heavyweight polypropylene incite a more intense inflammatory response than lightweight polypropylene and thus undergo greater oxidative degradation [29].

Sajid and his colleagues randomized trials containing 2310 patients underwent hernioplasty using either polypropylene lightweight mesh (LWM) or polypropylene heavyweight mesh (HWM). They found no difference in duration of operation, postoperative pain, recurrence rate, testicular atrophy and time to return to work between LWM and HWM groups. The two mesh types had a similar risk of peri-operative complications, but LWM was associated with a reduced risk of developing chronic groin pain (risk ratio (RR) 0·61, 95 per cent confidence interval 0·50 to 0·74) and a reduced risk of developing other groin symptoms, such as stiffness and foreign body sensations (RR 0·64, 0·50 to 0·81). They concluded that the use of LWM for open inguinal hernia repair was not associated with an increased risk of hernia recurrence. LWM reduced

the incidence of chronic groin pain as well as the risk of developing other groin symptoms [30].

The posterior approach allows a bilateral approach through a single incision and reduces the risk of nerve injury, neuralgia, ischemic orchitis, testicular atrophy and chronic pain. In the present study, the choice of GPRVS for primary bilateral inguinal hernias was individualized. Primary bilateral hernias were considered as complex if they were associated with factors predicating a high risk for recurrence such as multiplicity, large size or were associated with comorbid aggravating factors (e.g., COPD) based on the recurrence rate reported after traditional hernia repair. The GPRVS takes advantage of the unique properties of the lightweight polypropylene mesh: (1) it does not encapsulate, thus minimizing the formation of fluid collections; (2) it has no plastic memory and adapts to the endopelvis; and (3) it induces minimal fibrous in growth and minimal contructure preventing extensive adhesions, discomfort, foreign body sensation and pain. The same material (heavyweight polypropylene) has a long track record of safety, and has been used for many years in general surgery to replace major defects [31].

The GPRVS was evaluated prospectively using traditional heavyweight polypropylene mesh because this technique is popular in America and Europe. There are no prospective data concerning the use of lightweight polypropylene mesh. The complication rate (5% hematoma and 10% seroma) is comparable with other reports using traditional heavyweight polypropylene mesh [32-34]. There were no mesh or superficial wound infections. The mean length of stay (4.5 days) reflects the population of elderly patients with complex medical and socio-economic situations. In comparison, 6 (30%) of 20 patients without comorbid conditions were discharged after 24 hours of the operation. Overall, the patients were very satisfied with the procedure. The absence of limitation in the level of activity postoperatively allowed all patients, including industrial and agriculture workers, to return earlier to full activity. This lack of restriction in activity is based on the safety provided by the lightweight tension-free mesh prosthesis, which evenly distributes the intra-abdominal forces against the lower abdominal wall (Pascal's hydrostatic principle).

Recently, with the advent of laparoscopic repair, the armamentarium of the surgeon has increased and so has the confusion as to which technique is best to use. In patients presenting with large chronic or recurrent hernias, laparoscopy is often technically challenging because the difficulties associated with reduction of the hernia or adhesions, especially in cases where mesh has been previously used. Prior abdominal interventions (e.g. appendectomy) often complicate laparoscopic dissection of the retroperitoneum. Laparoscopy uses smaller prostheses and requires mesh fixation with the attendant risk of nerve injury. The technique of GPRVS with large lightweight polypropylene mesh cannot be readily transferred to laparoscopy because of the reduced size of the operative field and limited exposure, and the need for parietalization of the cord structures [35].

In the present series, the 0% recurrence rate is lower than other studies using the GPRVS technique and compares well with recurrence rates reported with other techniques. In the experience of Stoppa and others, all recurrences occurred within 6 months and were ascribed to technical failures. In the present study follow up for one year revealed no recurrences. This may be duo to small number of the patients. In GPRVS, the replacement of the endoabdominal fascia with the lightweight polypropylene mesh seals the inguinal, femoral, and obturator canals as well as all other potential sites of weakness in the lower abdomen. For this reason, late recurrences are not reported. In contrast, recurrences after anterior techniques accumulate over time, and long-term follow-up is mandatory. In the present study, 100% of patients were followed up for one year without recorded recurrence. Later recurrences in these patients were unlikely [36].

Recurrences after GPRVS are inconceivable, nevertheless, they occur [37]. Although other factors may be at play, most recurrences can be attributed to technical errors, most often related to the size and placement of the mesh. No other hernioplasty produces better results for recurrent and especially re-recurrent groin hernias.

Conclusion

For excellent results of Stoppa GPRVS, the mesh must be lightweight polypropylene that is correctly sized, shaped and placed. The GPRVS is a safe and effective way to treat selected patients with recurrent unilateral or complex bilateral inguinal hernias. The lightweight polypropylene mesh induces less fibrosis with no postoperative stiffness, foreign body sensations, or pain. All patients were very satisfied with the procedure. The absence of limitation in the level of activity postoperatively allowed patients, to return earlier to full activity.

References

1. Feliu X, Torres G, Viñas X, Martvnez-Ródenas F, Fernández-Sallent E, Pie J. Preperitoneal repair for recurrent inguinal hernia: laparoscopic and open approach. Hernia. 2004;8:113–116.

2. Papadakis K, Greeburg AG. Properitoneal Hernia repair. In: Fitzgibbons RJ. Greeburg AG, editors. Nyhus and Condon's Hernia. 5th ed. Philadephia: Lippincot and Wilkins; 2002. p.182.
3. Schwab R, Conze J, Willms A, Klinge U, Becker HP, Schumpelick V. Management of recurrent inguinal hernia after previous mesh repair- A challenge. Chirurg. 2006; 77:523–530.
4. Rutkow IM, Robbins AW. Demographic, classificatory, and socioeconomic aspects of hernia repair worldwide. *Surg Clin North Am*. Jun 2013;73(3):413-26.
5. Schumpelick V, Klinge U, Klosterhalfen B. Biomaterials for the repair of abdominal wall hernia. Structural and compositional considerations. In: Fitzgibbons RJ, Greenburg AG, editors. Nyhus and Condon's Hernia. 5th ed. Philadeiphia: Lipponcott and Wilkins; 2002. p.182.
6. Wiese M, Kaufmann T, Metzger J, et al. Learning curve for Lichtenstein hernioplasty. *Open Access Surgery*. Jul 2 2010;3:43-6.
7. Haque SS, Islam MT, Haque MN, Rahman MM, Ahmed A. Tension Free Mesh Repair is an Effective Treatment of Inguinal Hernia: An Observational Study. Medicine Today. 2013 Volume 25 Number 01:6-8.
8. Cobb WS, Kercher KW, Heniford BT. The argument for lightweight polypropylene mesh in hernia repair. Surg Innov. 2005 Mar;12(1):63-9.
9. Thapar V, Rao P, Prabhu R. Giant prosthesis for reinforcement of visceral sac for complex bilateral and recurrent inguinal hernias: A prospective evaluation. J Postgrad Med 2000;46:80-82.
10. Van Damme JPJ. A preperitoneal approach in the prosthetic repair of inguinal hernia. Int Surg 2005; 70:223-226.
11. Hirose T, Takayama Y, Komatsu S, Shingu Y, Sakamoto E, Norimizu S, Hasegawa H. Randomized clinical trial comparing lightweight or heavyweight mesh for mesh plug repair of primary inguinal hernia. Hernia. May 2013;1-5.
12. Sajid MS, Leaver C, Baig MK, Sains P. Systematic review and meta-analysis of the use of lightweight versus heavyweight mesh in open inguinal hernia repair. Br J Surg. 2012, 99:29–37.
13. Uzzaman MM, Ratnasingham K, Ashraf N. Meta-analysis of randomized controlled trials comparing lightweight and heavyweight mesh for Lichtenstein inguinal hernia repair. Hernia. 2012,16:505–518
14. Silvestre AC, de Mathia GB, Fagundes DJ, Medeiros LR, Rosa MI. Shrinkage evaluation of heavyweight and lightweight polypropylene meshes in inguinal hernia repair: a randomized controlled trial. Hernia. 2011,15:629–634
15. Stoppa RE. The preperitoneal approach and prosthetic repair of groin hernia. In Nyhus LM, Condon RE (eds): Hernia, ed 4 Philadelphia, JB Lippincott, 1995, p. 312.
16. Karatepe O, Acet E, Altiok M, Adas G, Cak A, and Karahan S. Preperitoneal repair (open posterior approach) for recurrent inguinal hernias previously treated with Lichtenstein tension-free hernioplasty. Hippokratia. 2010 Apr-Jun; 14(2): 119–121.
17. Koning GG, Vriens WH. Anterior preperitoneal repair of extremely large inguinal hernias: An alternative technique. International Journal of Surgery Case Reports. Volume 3, Issue 2, 2012, 45–48.
18. Sevonius D, Gunnarsson U, Nordi P, Nilsson E, Sandlom G. Repeated groin hernia recurrences. Ann Surg. 2009;249:516–518.
19. Nyhus LM. Individualization of hernia repair: a new era. 2003,114:1-2.
20. Miller AR, van Heerden JA, Naessens JM, O'Brien PC. Simultaneous bilateral hernia repair. A case against conventional wisdom. Ann Surg. 1991, 213:272-276;.
21. Beets GL, van Seldere D, Baeten CG. Long-term results of giant prosthetic reinforcement of the visceral sac for complex recurrent inguinal hernia. Brd Surg. 1996, 83:203.
22. Papadakis K, Greeburg AG. Properitoneal Hernia repair. In: Fitzgibbons RJ. Greeburg AG, editors. Nyhus and Condon's Hernia. 5th ed. Philadephia: Lippincot and Wilkins; 2002. p. 182-98.
23. Stoppa RE. The midline propertoneal approach and prosthetic repair of groin hernia. Philadelphia: Lippincot and Wilkins; 2002. p. 200-17.
24. Kurzer M, Belsham AA, Kark AE. Prospective study of open properitoneal mesh repair for recurrent inguinal hernia. Br J Surg 2002; 82: 90-3.
25. Amid PK. Groin hernia repair: open techniques. World J Surg. 2005;29:1046–1051.
26. Sondenaa K, Nesvik I, Breivik K, Korner H. Long-term follow-up of 1059 consecutive primary and recurrent inguinal hernias in a teaching hospital. Eur J Surg 2001; 167:125-129.
27. Beitler JC, Gomes SM, Coelho ACJ, Manso JEF. Complex inguinal hernia repairs. Hernia (2009) 13:61–66.
28. Memo AS, Memon JMA, Ali SA. Management of inguinal hernia: experience of 334 cases at

hyderabad. J Coll Physicians Surg Pak 2003; 3(2): 50-3.
29. Costello CR, Bachman SL, Grant SA, Cleveland DS, Loy TS, and Ramshaw BJ. Characterization of heavyweight and lightweight polypropylene prosthetic mesh explants from a single patient. Surg Innov. 2007 Sep;14(3):168-76.
30. Kumar S, Wilson RG, Nixon SJ, Macintyre IM. Chronic pain after laparoscopic and open mesh repair of groin hernia. Br J Surg 2002; 89:1476-1479.
31. Mohammad Nadeem Aslam, Sidra Shoaib. A Practical Experience with the Stoppa Repair in our Set. Uphttp://pjmhsonline.com/a_practical_experience_with_the.htm
32. Ahmed M, Shahid M. Early Postoperative Complications Of Stoppa's Repair. Pak Armed Forces Med J Jun 2008;58(2):141-6.
33. Hair A, Duffy K, McLean J, Taylor S, Smith H, Walker A, et al. Groin hernia repair in Scotland. Br J Surg. 2000;87:1722–1726.
34. Neumayer L, Giobbie-Hurder A, Jonasson O, Fitzgibbons R Jr, Dunlop D, Gibbs J, Reda D, Henderson W. Open mesh versus laparoscopic mesh repair of inguinal hernia. N Engl J Med. 2004 Apr 29;350(18):1819-27.
35. Mahran KM, Hassaneen AM, Amro H. Morsy, Osman S, and Ahmed GA. Stoppa Preperitoneal Approach (GPRVS) Versus Laparoscopic Tapp Approach In Management Of Bilateral Inguinal Hernia: A Multicenter Study. El-Minia Med., Bull., VOL. 15, NO. 2, JUNE, 2004;114-127.
36. Rodrigues AJ, Yoo JH, Utiyama EM, Rodrigues CJ. The Stoppa procedure in inguinal hernia repair: to drain or not to drain. Rev. Hosp. Clin. 2003.58(2)
37. Maghsoudi H, Pourzand A. Giant prosthetic reinforcement of the visceral sac:the Stoppa groin hernia repair in 234 patients. Ann Saudi Med. 2005;25(3):228–232.

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