Self-fixating Parietex ProGrip mesh in inguinal and paraumbilical hernia repair

Ashraf I.A. El-Sharkawy, Hazem A. Mostafa Badr, Rasha Abd El-Aziz Abd El-Gany

Background Inguinal hernia repair is the most frequently performed operation in general surgery. The standard method for inguinal hernia repair had changed little over a hundred years till using self-fixating Parietex ProGrip mesh. This mesh can be placed by an open approach which is becoming increasingly common in many countries.

Objectives This study investigated the recent surgical treatment of open inguinal and paraumbilical hernia patients using self-fixating ProGrip Parietex mesh.
Immediate complications reported were seroma, cellulitis, postoperative pain, mesh sepsis, testicular atrophy, and recurrence.

Patients and methods This study was conducted between January 2015 and January 2017 at Al-Zahra Hospital Al Azhar University, and Al-Ameen Hospital, KSA with a 1 year follow-up. The patients underwent general, spinal, or epidural anesthesia. A dose of third-generation cephalosporin was administrated during the induction of anesthesia.
Self-fixating Parietex ProGrip mesh with or without lateral slit with a rough surface placed on the floor of the inguinal canal for the repair of inguinal hernias or in subcutenous plane on anterior abdominal wall musculature in paraumbilical hernias.

Results Self-fixating Parietex ProGrip mesh was used with a lateral slit for the spermatic cord, maked right and left for indirect inguinal hernia patients (69.79%) and direct hernia patients (27.01%). Self-fixating ProGrip Parietex mesh without slit with a rough surface was placed in the subcutaneous plane in patients with paraumbilical hernias (3.1%). Immediate complications such as seroma, cellulitis, and postoperative pain were studied.
The mean operative time was ±35 min and the mean hospitalization discharge time was ±1.5 days.

Conclusion The use of self-fixating Parietex ProGrip mesh technique for the repair of inguinal and paraumbilical hernias in this study seemed effective and safe, and is not associated with postoperative pain. No recurrence of hernia and no mesh sepsis were detected, with 1 year follow-up.

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Introduction

Surgery for inguinal hernia is one of the most common operations seen in clinical practice, with an estimated worldwide incidence of more than 20 million each year [1].

Most inguinal hernias happen because an opening in the muscle wall does not close as it should before birth, leaving a weak area that can cause tissue to push through and bulge out. A hernia can occur soon after birth or much later in life [2].

The treatment of inguinal hernias can be subdivided according to the approach used (i.e. open vs. laparoscopic). Open inguinal hernia repair is performed anterior or posterior to the inguinal floor. Numerous techniques are used for inguinal hernia repair. These techniques can be divided into two main categories depending on whether or not a mesh was used [3].

Before the widespread use of prosthetic materials, inguinal hernia repair is based on restoring tissue strength through the use of sutures [4].

Hernioplasty through the anterior approach by Parietex self-fixating ProGrip mesh covering the weak or defect area in the abdominal wall musculature reduce the risk of hernia recurrence to below 3% and does not increase the persisting pain [5].

In the past decade, the outcomes for inguinal hernia surgery have improved dramatically with the routine use of Lichtenstein open tension-free hernioplasty [6].

Lichtenstein described his repair technique as 'tension-free,' wherein a piece of polypropylene mesh is used to strengthen the fascia transversal is.

The Lichtenstein mesh repair has remarkable benefits such as reduced cost, low recurrence rates, and low risk of preoperative morbidity [7].

More recently, self-gripping meshes have been developed, avoiding the need for additional fixation. The Parietex ProGrip self-fixating mesh is composed of monofilament polyester and polybasic acid [polylactic acid (PLA)] grips, and is indicated for use in inguinal and paraumbilical hernia repairs [8].

Parietex ProGrip is a self-fixating mesh that provides immediate fixation for a secure repair. The PLA microgrips enable the surgeons to position and place the mesh in less than 60 s, without the use of additional fixation [9].

Polypropylene is a synthetic nonabsorbable suture; the common brand names include Marlex and Prolene meshes. Differences between them include the filament size, pore size, and weight [10].

The polyester mesh is available commercially as Parietex. The mesh does not promote ingrowth into the viscera and therefore makes it useful in intraperitoneal mesh and minimally invasive, nonlaparoscopic, preperitoneal, sutureless, inguinal hernia repair [11].

Fixation devices can cause postoperative pain, neuralgia, or parasthesia on account of nerve entrapment or injury into the abdominal musculature. Anatomical meshes that provide enough coverage for the hernia defect without fixation have been developed [12].

Using a self-fixating Parietex ProGrip mesh for inguinal and paraumbilical hernia repairs also slightly reduce the operating time and is also safe without any complications [13].

The present work aimed to use a self-fixating Parietex ProGrip mesh for the repair of inguinal and paraumbilical hernia repairs to study its effectiveness, safety, and operative times.

Patients and methods

The study was conducted during the period between January 2015 and January 2017 at Al Zahara Hospital, Al Azhar University, and Al-Ameen Hospital, KSA, investigating the outcomes of open hernia repair with self-fixating Parietex ProGrip mesh (Covidien, Saudi Arabia) on 96 patients who were presented with inguinal and paraumbilical hernias. Patients aged between 30 and 50 years with a mean of ±33 years were eligible irrespective of the sex. Patients were excluded from this study if they had scrotal, incarcerated, or femoral hernia and/or required emergency procedures.

Self-fixating mesh

The Parietex ProGripping Self-Fixating mesh is composed of monofilament polyester and PLA grips. The PLA microgrips enable the surgeons to position and place the mesh in less than 60 s without the use of additional fixation. All patients were conducted to history, abdominal examination, laboratory, and radiological assessment such as chest radiograph and abdominal ultrasound. The type of anesthesia, spinal or epidural or general anesthesia, was selected by the attending anesthesiologist on the basis of individual patient needs. The incision is point two fingerbreadths inferior and medial to the anterior superior iliac spine. Electrocautery divide the subcutaneous tissue, Scarpa's fascia is identified, and then divided. The fibers of the external oblique muscle are sharply divided parallel to the direction of fibers. The scissors are used to incise the fibers laterally and then medially to expose the inguinal canal and its contents. Hemostatic clamps are then applied to the superior and inferior edges of the aponeurosis. Blunt dissection is then performed to separate the superior flap of the external oblique aponeurosis from the internal oblique muscle; the inferior flap of the external oblique aponeurosis is bluntly dissected to show the shelving edge of the inguinal ligament.

The iliohypogastric and ilioinguinal nerves are identified and retracted from the operative field. The pubic tubercle is then identified and the index finger and thumb are placed around the cord, metal cord ring, and then placed around the cord and its contents to elevation from the floor of the canal. Identification and reduction of the sac were done. Direct hernia sac will become evident as the floor of the inguinal canal is reduced into the preperitoneal space and the floor of the inguinal canal suture with 2–0 Vicryl stitches to reduce the direct hernia sac. An indirect hernia sac will be found on the anterolateral surface of the spermatic cord, The vas deferens and the cord are identified to allow dissection of the sac from the cord. The peritoneum grasped with a tissue forceps and the sac bluntly dissected from the cord toward the deep inguinal ring. The sac is opened and inspected, no incarceration of intraabdominal contents, transfixion of sac by 2–0 Vicryl at the internal inguinal ring and excise the sac [14].

Paraumbilical hernia repair

After surgical preparation of the abdominal area, a supraumbilical transverse incision was done, and a dissection down to the fascial defect and dissection of the sac from all directions was done by cleaning of fat of the surrounding fascia. The sac and stretched fascia are excised at the edge of the defect. The omentum is free from loculi within it and excises the irregular peritoneum of the sac. The peritoneum is closed as a separate layer, and the abdominal wall defect is closed by interrupted nonabsorbable sutures in a transverse direction. Self-fixing Parietex Progrip mesh with a rough surface was placed in the subcutaneous plane direct on the anterior abdominal wall musculature; the skin and the subcutaneous tissue were closed using an absorbable running suture. We did not use drains [15].

The modified mesh placement for ProGrip placement is for the surgeon to introduce a flattened ProGrip mesh into the inguinal canal anterior to the transverse fascia and posterior to the spermatic cord covering the inguinal floor. The anterior side of the mesh was placed

Table 1 Patient characteristics

Parameters	*N* (%)
Males	94 (97.9)
Females	2 (2.1)
Mean age (years)	±33
Smoker	28 (29.1)
Nonsmoker	68 (70.9)
Total	96 (100)

Table 2 Indications of using a self-fixating parietex mesh

Parameters	*N* (%)
Indirect hernia	67 (69.8)
Direct hernia	26 (27.1)
Paraumbilical hernia	3 (3.1)
Total	96 (100)

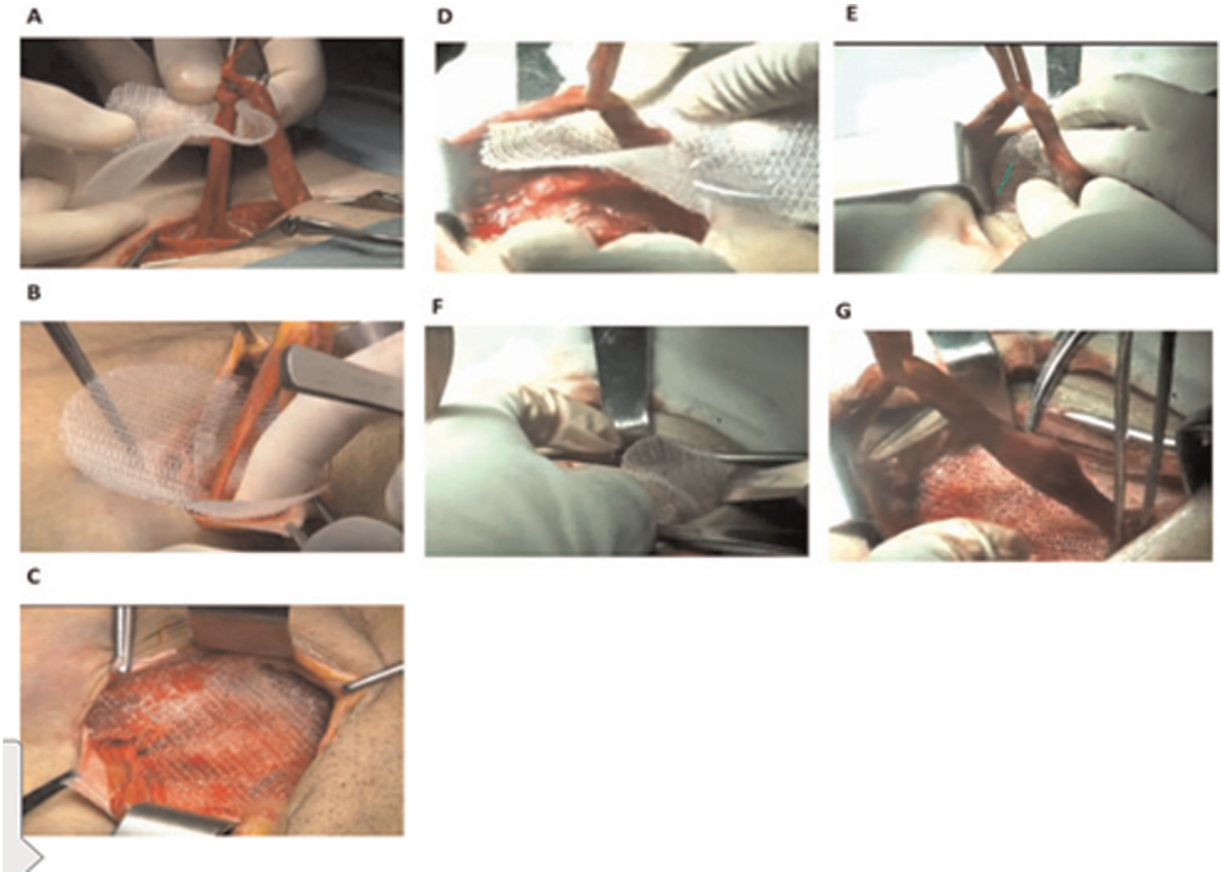
Table 3 Operative data

Parameters	*N* (%)
Spinal	70 (72.9)
Epidural	16 (16.7)
General	10 (10.4)
Total	96 (100)

Table 4 Postoperative complications

Parameters	*N* (%)
Seroma	3 (3.1)
Cellulitis	2 (2.08)

Figure 1



Mesh placement procedure.

on the pubic tubercle with the help of forceps. The posterior side of the mesh was completely unexposed to the tissue until the anterior side of the mesh had been attached to the tissue. The upper edge of the mesh was attached to the conjoined tendon and the lower edge of the mesh was attached to the inguinal ligament.

Results

In all, 96 patients with age range of 33 years diagnosed as indirect inguinal hernias, direct inguinal hernias, and paraumbilical hernias were included in this study during the period between January 2015 and January 2017.

The following tables show the results of this study according to the population of patients: 94 (97.9%) patients were men and 92 (2.1%) patients were women with a mean age of 33 years; 28 (29.1%) patients were smokers and 68 (70.9%) patients were nonsmokers Table 1.

The indications of using self-fixating Parietex ProGrip mesh are 67 (69.8%) patients indirect hernia, 26 (27.1%) patients with direct hernia, and three (3.1%) patients presented with paraumbilical hernia repairs (Table 2).

The patients operated under spinal anesthesia were 70 (72.9%) patients, epidural were 16 (16.7%), and 10 (10.4%) were operated under general anesthesia Table 3.

Immediate postoperative complications were reported: three (3.1%) patients with seroma and two (2.08%) patients with cellulites (Table 4).

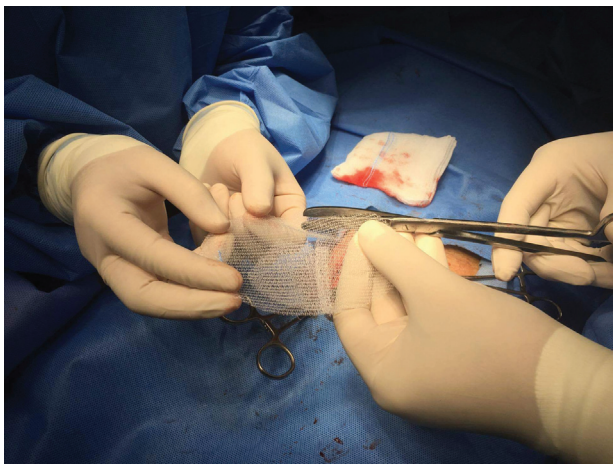
The mean operation time was 35±5 min and the patients were discharged from hospital after ±1.5 days. No anesthesia-related complications or treatment-related mortalities were reported. There was no readmission, hernia recurrence, systemic complications, or death during the 12 months of follow-up.

The iliohypogastric and ilioinguinal nerves are identified and retracted from the operative field. The pubic tubercle is then identified and the index finger and thumb are placed around the cord, metal cord ring, and then placed around the cord and its contents to elevation from the floor of the canal. Identification and reduction of the sac were done. Direct hernia sac will become evident as the floor of the inguinal canal is reduced into the preperitoneal space and the floor of the inguinal canal suture with 2–0 Vicryl stitches to reduce the direct hernia sac. An indirect hernia sac will be found on the anterolateral surface of the spermatic cord. The vas deferens and the cord are identified to allow dissection of the sac from the cord. The peritoneum grasped with a tissue forceps and the sac bluntly dissected from the cord toward the deep inguinal ring. The sac is opened and inspected, no incarceration of intraabdominal contents, transfixion of

Figure 2

The Parietex ProGripping Self-Fixating mesh.

Figure 3



Left Oblique inguinal hernia repair.

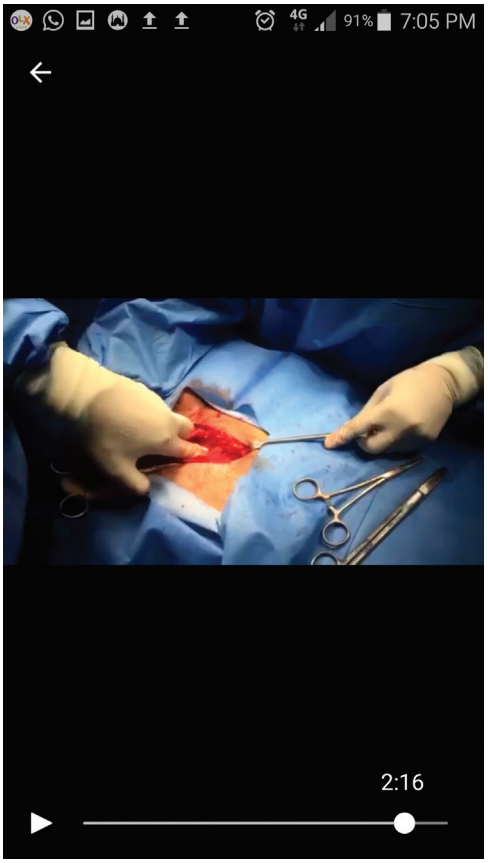
sac by 2–0 Vicryl at the internal inguinal ring and excise the sac [14] (Figs 3–8).

Paraumbilical hernia repair after surgical preparation of the abdominal area, a supraumbilical transverse incision was done, and a dissection down to the fascial defect and dissection of the sac from all directions was done by cleaning of fat of the surrounding fascia. The sac and stretched fascia are excised at the edge of the defect. The omentum is free from loculi within it and excises the irregular peritoneum of the sac. The peritoneum is closed as a separate layer, and the abdominal wall defect is closed by interrupted nonabsorbable sutures in a transverse direction. Self-fixing Parietex Progrip mesh with a rough surface was placed in the subcutaneous plane direct on the anterior abdominal wall musculature; the skin and the subcutaneous tissue were closed using an absorbable running suture. We did not use drains [15] (Fig. 9).

The modified mesh placement for ProGrip placement is for the surgeon to introduce a flattened ProGrip mesh into the inguinal canal anterior to the transverse fascia and posterior to the spermatic cord covering the inguinal floor. The anterior side of the mesh was placed on the pubic tubercle with the help of forceps. The posterior side of the mesh was completely unexposed to the tissue until the anterior side of the mesh had been attached to the tissue. The upper edge of the mesh was attached to the conjoined tendon and the lower edge of the mesh was attached to the inguinal ligament (Figs 1 and 2).

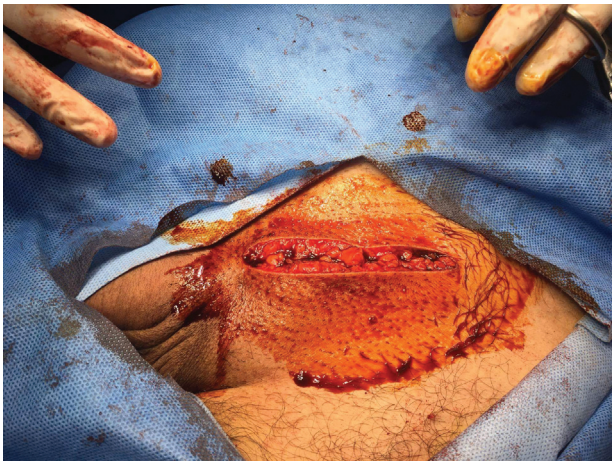
Figure 1: Mesh placement procedures used in our patients. (A) Closing the Parietex ProGripping Self-Fixating mesh flap around the cord prior to lowering and positioning the mesh. (B) Working the mesh under the aponeurosis of the external oblique muscle. (C) The mesh anchors to the tissue with the micro-grips immediately and may not require any additional fixation. (D) ProGrip mesh, placed on the pubic tubercle and inguinal ligament (E) fix ProGrip mesh onto the pubic tubercle and inguinal ligament, make sure the mesh is around the deep inguinal ring. (F) Pull spermatic cord outside of the operation field.

Figure 4



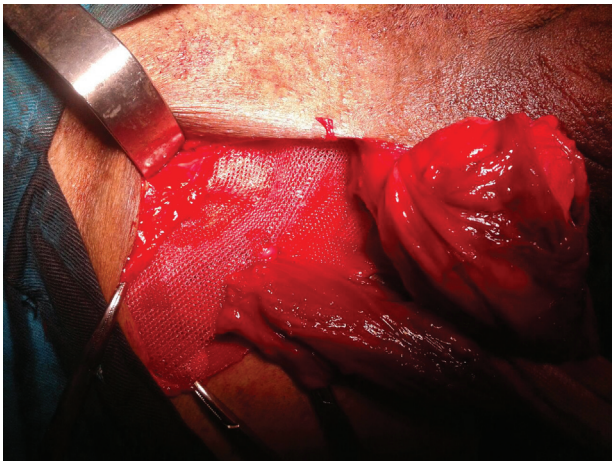
Left oblique inguinal hernia repair.

Figure 5



Left oblique inguinal hernia repair.

Figure 6



Right oblique inguinal hernia repair.

Figure 7

Right oblique inguinal hernia repair.

(G) Affix ProGrip mesh onto the posterior wall of inguinal canal. Finally without drain the external oblique aponeurosis is closed using a non absorbable suture, subcutaneous tissue and skin are closed using an absorbable suture (Molegraaf *et al.*, 2017) [14].

Results In all, 96 patients with age range of 33 years diagnosed as indirect inguinal hernias, direct inguinal hernias, and paraumbilical hernias were included in this study during the period between January 2015 and January 2017. The following tables show the results of this study according to the population of patients: 94 (97.9%) patients were men and 92 (2.1%) patients were women with a mean age of 33 years; 28 (29.1%) patients were smokers and 68 (70.9%) patients were nonsmokers Table 1 (Figs 10 and 11).

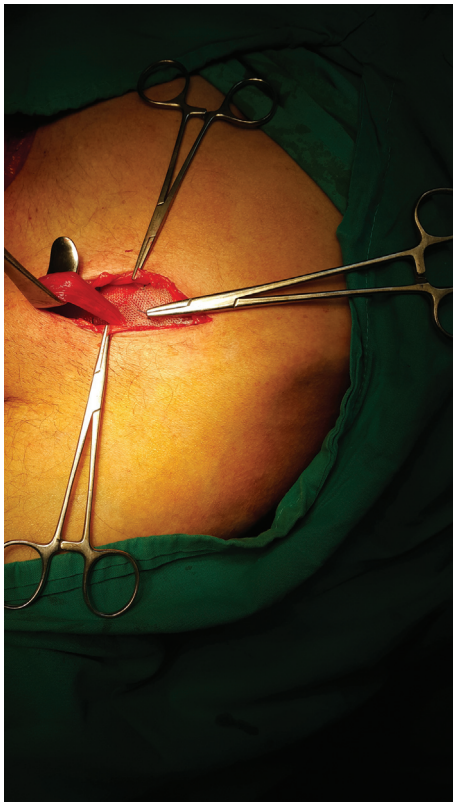
The indications of using self-fixating Parietex ProGrip mesh are 67 (69.8%) patients indirect hernia, 26 (27.1%) patients with direct hernia, and three (3.1%) patients presented with paraumbilical hernia repairs (Table 2 and Fig. 12).

The patients operated under spinal anesthesia were 70 (72.9%) patients, epidural were 16 (16.7%), and 10 (10.4%) were operated under general anesthesia Table 3 (Fig. 13).

Discussion

Polypropylene mesh has been widely used by many surgeons in open and laparascopic hernia repair. Due to the potential for mesh shrinkage and migration, the mesh should cover at least 2–3 cm beyond the hernia defect, and some form of fixation is required to minimize recurrence. The fixation of mesh using staplers has been known to contribute to postoperative pain [16].

Figure 8

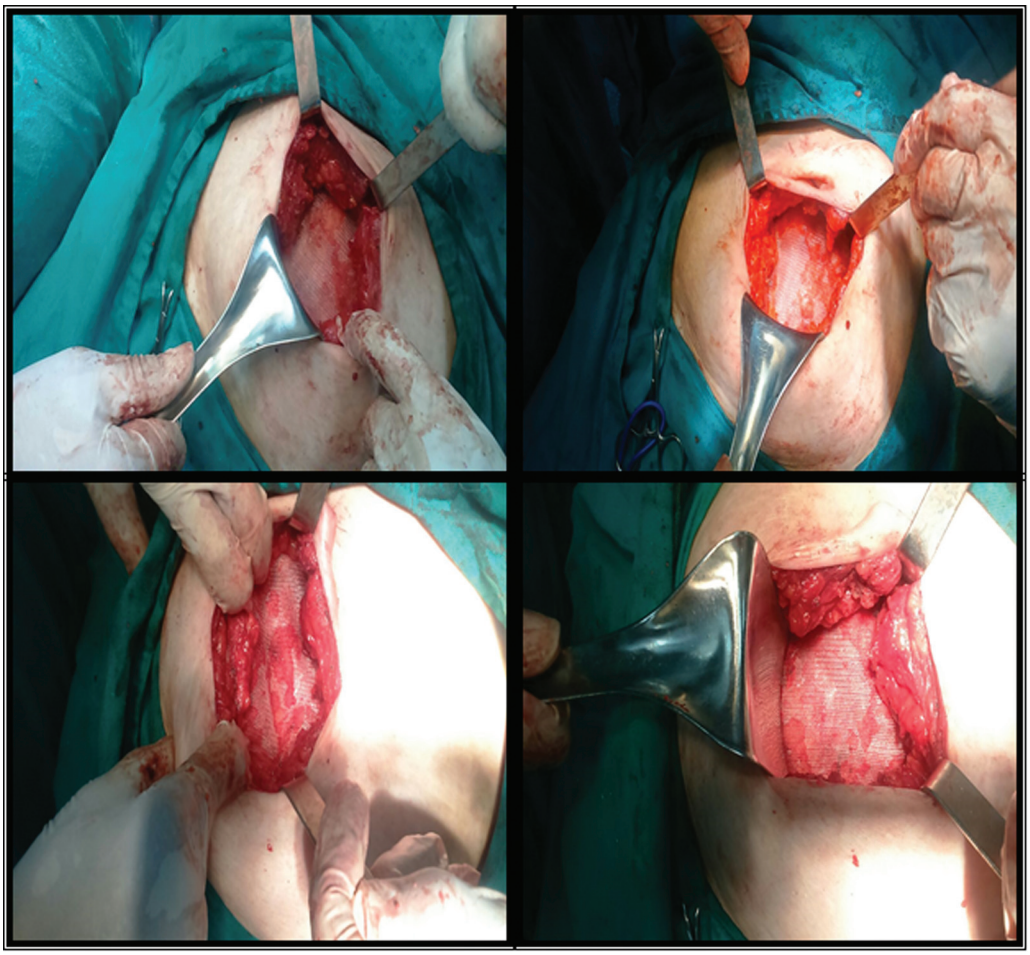


Left direct hernia repair.

In this study, 96 patients were evaluated on the use of Parietex ProGrip self-fixating mesh in open inguinal and paraumbilical hernia repair using the modified method of mesh placement in patients: men (97.9%) and women (2.1%) The mean age was ±33 years in inguinal hernia patients either indirect (69.79%) or direct (27.1%) and paraumbilical hernias (3.11%), and in smoker (29.1%) and nonsmoker patients (70.9%).

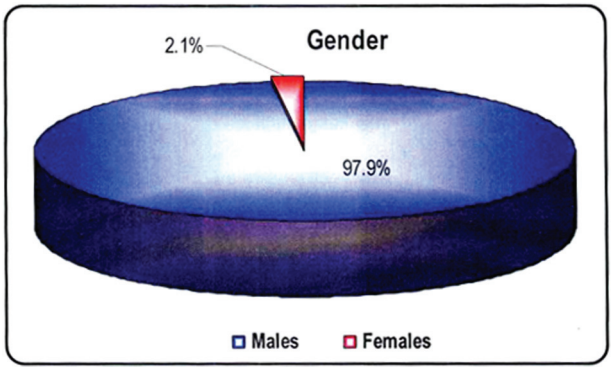
The use of Parietex ProGrip mesh was evaluated in open inguinal hernia repair using a modified method of mesh placement.

Figure 9



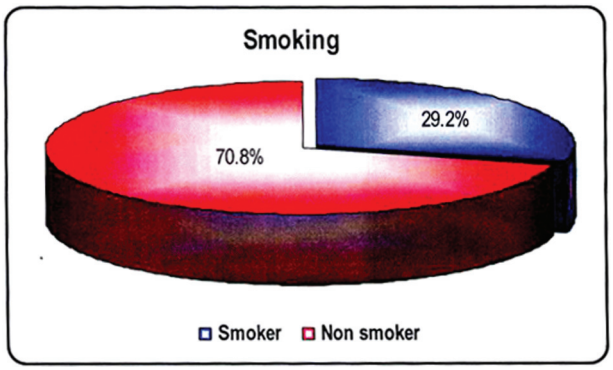
Para umbilical hernia repair.

Figure 10



Gender Distribution.

Figure 11



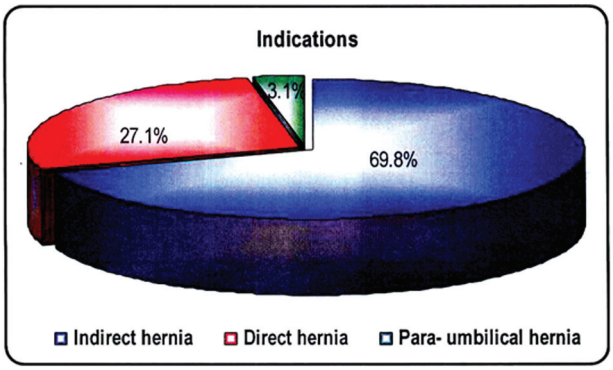
Smoking distribution.

The results of the study suggest that inguinal hernia repair with the Lichtenstein approach using self-cropping meshes is a safe and efficient procedure for patients [17].

The patients operated under spinal, epidural, and general anesthesia were selected by an attending anesthesiologist according to the patient's individual need (72.9%), (16.6%), and (10.5%), respectively.

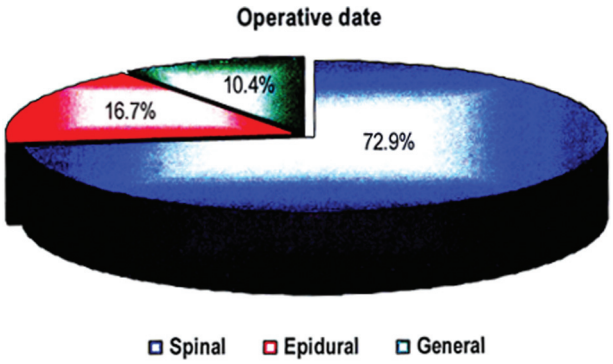
Parietex ProGrip self-fixing polyester mesh with a lateral slit was used for the spermatic cord placed into the inguinal canal anterior to the transverse fascia and posterior to the cord covering the inguinal floor in inguinal hernias, and in subcultures plan on anterior abdominal wall musculature in paraumbilical hernia

Figure 12



Indication for operation.

Figure 13



Type of anesthesia.

[18]. Lichtenstein tension-free mesh repair is the most frequently performed procedure for inguinal hernioplasty. In the past, surgery was aimed to control recurrences. Nowadays, it is important to avoid postoperative chronic pain using Lichtenstein tension-free repair using a self-adhesive mesh (Chatzimavroudis, 2014) [19].

Repeated manipulation of mesh placement may reduce the adherence of the mesh to the tissues, thus increasing the risk of mesh dislocation or migration.

The modified method may avoid mesh dislocation or migration, which may be not associated with hernia recurrence and chronic pain after surgery [20].

The sutureless ProGrip mesh is a revolutionary mesh as it can be secured without a suture, avoiding any risk for nerve entrapment, and preserving anatomical sutureless. Moreover, the non absorbable Parietex microgrips of the ProGrip mesh are substantially adherent to the surrounding tissues.

The self-gripping mesh does no harm to the ductus deferens; there is little or no risk for a detrimental effect on fertility by the application of a ProGrip mesh on the exposed tissue [21].

In general, the ProGrip mesh is disentangled and kept flat using two graspers during placement. This, however, can make operative manipulation more difficult, particularly if the size of the incision is kept to less than 5 cm for esthetic patients. For obese patients, more than three attempts may be needed to attach the mesh in place through the incision in deep flat layers [22].

Repeated manipulation of mesh placement may reduce the adherence of the mesh to the tissues thus increasing the risk of the mesh dislocation of migration [23].

Importantly, this modified method may avoid mesh dislocation or migration, which may be associated with hernia recurrence. The mean operating time in the analysis was 32±8 min, which is comparable to the time reported in other clinical trials using the laparoscopic or open approach .There were also no reports of hernia recurrence or of postoperative complications [24].

The mean operation time in this study was 35±5 min and the discharge time was ±1.5 days.

The self-gripping mesh provides the advantage of obtaining fixation without using any sutures entrapping nerves in the groin. Furthermore, our modified method of mesh placement minimized the time of operative manipulation. All patients reported no pain with good health status after 1 month follow-up [25].Immediate complications reported were seroma in 3.1% patients, cellulitis in 2.08% patients; there was no postoperative pain and no mesh sepsis, no testicular atrophy and no pain that can be disabling and can affect patients' quality life was detected. The patients were discharged from hospital after ±1.5 days. There were no anesthesia-related complications. There was no readmission, hernia recurrence, and/or systemic complications after 12 months of follow-up.

The major reason for post-herniorrhaphy groin pain remains unclear, but it is likely to be associated with certain aspects of the repair technique, such as the preoperative handling of the cutaneous nerves, the type of mesh, and mesh fixation [26].

The retrospective nature of the study may be viewed as a limitation; however, the surgical technique was

standardized, and careful postoperative follow-up was carried out to assess the hernia recurrence rate, pain, general health status, and patient quality of life. Further long-term follow-up studies in Chinese populations need to be undertaken [27].

Conclusion

We report the clinical outcomes related to the self-fixating Parietex ProGrip mesh used in open inguinal and paraumbilical hernia repair in our patients. Additionally, a modified technique of mesh placement was introduced to minimize the size of the incision and facilitate operative manipulation. Our findings demonstrate that open repair of inguinal and paraumbilical hernias using Parietex ProGrip mesh is a simple, rapid, effective, and safe method and improves patient's general health and quality of life.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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