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THE NEW SELF-GRIPPING MESH AND IT'S BENEFITS IN INGUINAL HERNIA REPAIR – REVIEW OF THE LITERATURE

Alexandra TRANDAFIR[1]
Danut VASILE[2]
Dragos DAVITOIU[3]
Ana Laura MANDA[4]
Bogdan SOCEA[5]
Ion GEORGESCU[6]
Vlad BALEANU[7]

ABSTRACT

THERE IS A CONTINUOUS DEBATE ABOUT WHAT TYPE OF MESHES ARE MORE SUITABLE TO BE USED IN INGUINAL HERNIA REPAIR. RECENTLY WAS INTRODUCED INTO CLINICAL PRACTICE A SELF - GRIPPING MESH WHO DOESN'T NEED ADDITIONAL FIXATION.

THE AIM OF THIS REVIEW IS TO EVALUATE THE FEATURES OF THIS SELF-GRIPPING MESH IN TERMS OF RECURRENCE RATE, DECREASED POSTOPERATIVE COMPLICATIONS AND IMPROVED QUALITY OF LIFE.

RANDOMIZED TRIALS, PROSPECTIVE AND RETROSPECTIVE STUDIES, REVIEWS AND GUIDELINES PUBLISHED BETWEEN 2006 AND 2017 WERE ANALYZED IN TERMS OF RECURRENCE RATE, DECREASED POSTOPERATIVE COMPLICATIONS AND IMPROVED QUALITY OF LIFE.

THE USE OF SELF-GRIPPING MESH IN INGUINAL HERNIA REPAIR, BOTH OPEN AND LAPAROSCOPIC TEHNIQUE, IS RAPID, SAFE, SIMPLE AND COST - EFFECTIVE, PROVIDING LOW OR NO RECURRENCE, LOW CHRONIC PAIN AND IMPROVED QUALITY OF LIFE[8]*.*

KEY WORDS: SELF-GRIPPING MESH, INGUINAL HERNIA REPAIR, RECURRENCE RATE, POSTOPERATIVE COMPLICATIONS

[1] MD, University of Medicine and Pharmacy „Carol Davila" Bucharest, Romania; University Emergency Hospital Bucharest, First Surgery Clinic, Romania
[2] MD, University of Medicine and Pharmacy „Carol Davila" Bucharest, Romania; University Emergency Hospital Bucharest, First Surgery Clinic, Romania
[3] MD, University of Medicine and Pharmacy „Carol Davila" Bucharest, Romania; University Emergency Hospital Bucharest, First Surgery Clinic, Romania
[4] MD, University Emergency Hospital Bucharest, First Surgery Clinic, Romania
[5] MD, University of Medicine and Pharmacy „Carol Davila" Bucharest, Romania
[6] MD, Emergency County Hospital Craiova, I[st] Surgery Clinic, Romania
[7] MD, University Emergency Hospital Bucharest, First Surgery Clinic, Romania
[8] Mahmoud Abo Amra, "Outcome of Lichtenstein inguinal hernioplasty with self gripping polyester mesh", *International Journal of Multidisciplinary Research and Development* , 2017; 4(8):50-57

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INTRODUCTION

Inguinal hernia is the most common surgical pathology whose treatment consists in reduction and resection of the hernia sac and rearing the abdominal wall. From the end of 16th century till the end of 19th century the repair of the abdominal wall was done by closing the inguinal canal with different types of suture that joined the muscle and fascia components.

Afterwards the additional reinforcement of the posterior wall with different types of mesh started. Initially meshes were biological (autologous and heterologous) and metal thread. Due to development of biochemical and biotechnological industries, the meshes based on polymers were introduced into practice.

Nowadays, there is a continuous debate about what type of meshes are more suitable to be used in repairing the inguinal defect.

Recently was introduced into practice a self-gripping mesh for repairing inguinal hernia defect that doesn't need additional fixation.

The aim of this review is to evaluate the features of this self-gripping mesh in terms of recurrence rate, decreased postoperative complications and improved quality of life.

MATERIAL AND METHOD

Two randomized trials, two guidelines, one consensus development conference, four reviews, six prospective and seven retrospective studies, published between 2006 and 2017, were analyzed in terms of recurrence rate, postoperative complications and quality of life.

RESULTS AND DISCUSSIONS

There are many studies comparing different types of meshes used in open or laparoscopic inguinal hernia repair. The new self-gripping mesh introduced into clinical practice was evaluated in literature in terms of recurrence rate, decreased chronic pain and improved quality of life.

Self – gripping mesh

In 2008 Covidien launched ProGrip™ mesh, a self-adhesive prosthetic material used in repairing inguinal hernia both open and laparoscopic technique.

It is made of polyethylene terephthalate and has absorbable micro-grips made of monofilament polylactic acid. It is lightweight, isoelastic, macroporous knitted monofilament polypropylene mesh, hydrophilic, with absorbable micro-grips that provide self – adhesive fixation during the first months after implantation.

The weight of the mesh before the absorption of the micro-grips is 82 g/m^2 and after the absorption is 49 g/m^2.The pore size is 1.8 x 1.8 mm. There are 36 micro-grips per cm, cub-shaped 1 mm atraumatic prominences, with an absorption time more than 18 months[9].

The mesh is for left or right side, flat, plug or anatomical, and has different dimensions and shapes.

The laparoscopic self – gripping mesh has a fast absorbing film on the posterior side made of 70% collagen and 30% glycerol, and the time of dissolution is less than one day.

[9] Value analysis Committee 2013 - Product information kit of COVIDIEN -"ProGrip™ Laparoscopic Self- Fixating Mesh" , www.Covidien.com/Hernia

Recurrence rate

ProGrip™ mesh is a new device that combines mesh and fixation device, which eliminates the need for additional glue, tacks or sutures.

The gold standard treatment for inguinal hernias is tension – free repair because of lower recurrence rates and improved quality of life[10]. The introduction of meshes decrease recurrence rate of less than 5% [11]. So, the rate of recurrence using self – gripping mesh was questionable.

Among the factors that influence the recurrence rate of inguinal hernia are type of mesh used, mesh location and migration, extent of mesh overlap, fixation devices and failure to close the parietal defect, as seen in an article published in 2015[12]. Also, the pore size is another factor that may affect the recurrence rate, because larger pore allow a greater ingrowth, increase the pliability and functionality of the mesh[13].

Thanks to thousands of absorbable micro-grips that adhere immediate to entire environment tissue about 0.5 mm below the lower rim of the mesh[14] and provide strong fixation and strength incorporation at five days after implantation, there is no need for additional fixation with glue, tacks or suture[15] comparing with other unfixed meshes.

For a low recurrence rate the features of the mesh used in laparoscopic inguinal hernia repair, according to the recommendations from the International Hernia Society and the European Association for Endoscopic Surgery, must be: monofilament, minimum dimensions of 10x15 cm, minimum pore size of 1.0 – 1.5 mm and minimum tensile strength in all directions more than 16 N/cm^2.[16], conditions respected by the ProGrip™ mesh.

Postoperative complications

The rate of chronic groin pain after inguinal hernia repair ranges from 11% to 40%[17]. Although pain may be eliminated by identification and preservation of inguinal groin nerves, other

[10] Amid PK, Shalman AG, Lichtenstein IL., " Open "tension-free"repair of inguinal hernias: the Lichtenstein technique." *Eur J Surg.*1996;162:447–453

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authors have studied the meshes[18]. The use of lightweight polypropylene mesh is associated with less postoperative pain[19] and low foreign body sensation.

The fixation devices lead to many postoperative complications, including vascular injury, nerve damage, seroma, hematoma, testicular problems, urinary retention, wound infection and chronic groin pain. The self - gripping mesh eliminates the complication risk, increased operation time and expense and low rates of recurrence[20].

ProGrip™ mesh provides a modern alternative to mesh fixation complications in both open and laparoscopic inguinal hernia treatment. Its features eliminate possible fixation devices complications with no increase in recurrence rate[21].

Due to absorption of 40% of the mesh weight, the sensation of foreign body decrease[22].

According to the guidelines of the European Hernia Society, the fixation devices like tacks, sutures and staples must be used with caution because these cause local trauma that may result in nerve injury and chronic pain[23].

Thanks to its features, the micro-grips of the ProGrip™ mesh provides an uniform atraumatic fixation on the entire surface and can decrease the recurrence rate and chronic pain[24]. Once the micro-grips are absorbed, only the macroporous part, made of polyester, remains at the site, having strong incorporation to environment tissue.

Koch et al. reported that self-gripping mesh was not associated with an increased recurrence rate, postoperative complications or increased cost, but with an improved quality of life with low chronic pain[25].

An article published in 2012 sponsored by Covidien, a retrospective study on 169 patients with inguinal hernia treated laparoscopic with ProGrip™ mesh, reported that the mesh is safe and cost - effective, with a recurrence rate of 1.78% , 98.8% of patients had no or low to mild pain and less complication than traditional meshes as seen in table 1[26].

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Table 1 – Postoperative complications and recurrence rate in laparoscopic inguinal hernia repair with ProGrip™

Postoperative complications	**Results**
Trials / Patients	3 / 130
Follow – up (months)	6.2 – 24 (mean 20.8)
Wound infection (%)	0
Seroma (%)	3.9 (0 – 6.7)
Hematoma (%)	2.1 (0 – 3.3)
Chronic pain (%)	0
Testicular problems (%)	0
Urinary retention (%)	2.3 (0 – 16.7)
Recurrence rate (%)	1.3

In a comparative randomized study that evaluates the advantages of ProGrip™ mesh, published by Kingsnorth A. et all in 2010, the preliminary results were reduced operating time low postoperative pain and improved quality of life. The conclusion was that this device makes the inguinal hernia repair simple, fast and economical[27].

In an article comparing self-gripping mesh and staple fixation, a prospective study on 96 patients treated laparoscopic for inguinal hernia, from which 49 patients with ProGrip™ mesh and 46 patients with mesh and staple fixation, the authors reported that the use of mesh with atraumatic fixation may be associated with reduced risk of vascular and nerve injury or chronic pain and improved quality of life. Also the procedure decrease tissue trauma and its cost are relatively low[28].

Another article published in 2015 that followed at least one year 91 patients with inguinal hernia treated laparoscopic with ProGrip™ mesh concluded that this type of mesh can be safely used, with no recurrence, no chronic pain and improved quality of life[29].

[27] Kingsnorth A., Nienhuijs S., Schule S., et al., " Preliminary Results of a Comparative Randomized Study: Benefit of Self – Gripping Parietex Progrip™ Mesh in Open Inguinal Hernia Repair", *Hernia*, 2010; vol 14 Supplement

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CONCLUSIONS

Thanks to its features, ProGrip™ mesh: provide a low or no chronic pain comparing the fixation with tacks, glue or sutures[30]; has a recurrence rate decreased or similar to other prosthetic materials; provide a good preservation of cord and nerve structures[31]; is faster than other fixation devices[32]; is easy to applied; reduce the costs associated with other fixation devices, pain therapy and operation time[33].

The use of ProGrip™ self-gripping mesh in inguinal hernia repair, both open and laparoscopic technique, is rapid, safe, simple and cost-effective, providing low or no recurrence, low or no chronic pain and improved quality of life[34].

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