Self-gripping versus sutured mesh fixation methods for open inguinal hernia repair: A systematic review of clinical trials and observational studies

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Background. *We performed this systematic review and meta-analysis to compare the outcomes of Lichenstein hernia repair using either self-gripping mesh or techniques of sutured mesh fixation.*
Methods. *We searched PubMed, Cochrane CENTRAL, Scopus, Embase, and Web of Science for all clinical trials and observational studies that compared self-gripping mesh versus sutured mesh fixation in Lichtenstein hernia repair. Combined outcomes were pooled as odds ratios or mean differences in a fixed-effect model, using Comprehensive Meta-Analysis software for Windows.*
Results. *Twelve randomized, controlled trials and 5 cohort studies (*n *= 3,722 patients) were included in the final analysis. The two groups, using self-gripping mesh or sutured mesh fixation, did not differ significantly in terms of recurrence rate (odds ratio = 0.66, 95% confidence interval 0.18–2.44;* P *= .54) or postoperative chronic groin pain (odds ratio = 0.75, 95% confidence interval 0.54–1.05;* P *= .09). The operative time was less in the self-gripping mesh group (mean difference = −7.85, 95% confidence interval −9.94 to −5.76;* P *< .0001). For safety analysis, there were comparable risks between self-gripping mesh and sutured mesh fixation groups in terms of postoperative infection (odds ratio = 0.81, 95% confidence interval 0.53–1.23;* P *= .32), postoperative hematoma (odds ratio = 0.97, 95% confidence interval 0.7–1.36;* P *= .9), and urinary retention (odds ratio = 0.66, 95% confidence interval 0.18–2.44;* P *= .54).*
Conclusion. *Data from our analysis did not favor either of the two fixation techniques over the other in terms of recurrence or postoperative chronic groin pain. Decreased operative time in the self-gripping mesh group cannot justify a recommendation for its routine use. Longer follow-up studies are needed to compare the risk of long-term recurrence for both meshes. (Surgery 2017;162:18-36.)*

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Tension-free hernia repairs, described initially by Lichtenstein[1,2] are the gold standard techniques for open inguinal hernioplasty because this approach has a significantly less recurrence rate of 0.3% to 2.2% in comparison to 4.4% to 17% for classic herniorrhaphies.[3,4] In this procedure, the surgeon reduces the hernia sac, inserts a prosthetic mesh to strengthen the inguinal canal, and fixates it with sutures to the pubic tubercle and inguinal ligament.[1]

Considering the low recurrence rates after this procedure, postoperative chronic groin pain (CGP) is the most relevant outcome,[5] with remarkable variation in the reported frequency among published clinical trials, ranging between 11% and 54%, due to the variable terminology and assessment scales used in these trials.[6,7] This

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chronic pain has a negative impact on the patient quality of life, causing job loss in up to 25% of pain sufferers as an ultimate result.[8-10]

Several theories exist to explain the etiology of CGP after hernia repair. Injury of inguinal nerves due to faulty intraoperative handling, entrapment by fixation sutures, or irritation by the closely positioned mesh or scar tissue are the most established theories.[11-13] Therefore, novel, atraumatic, sutureless fixation techniques have been developed in an attempt to decrease the risk of suture-related neurapraxia, such as surgical glues, biomaterials, and self-gripping meshes (SGM).[14,15]

Sutureless fixation using *N*-butyl-2-cyanoacrylate or human fibrin glue has been proven effective,[16,17] but a recent meta-analysis reported no difference in the incidence or severity of postoperative CGP with the use of *N*-butyl-2-cyanoacrylate in comparison to mesh fixation with absorbable sutures.[18] Currently, there are no international guidelines supporting the use of surgical glue in hernia repair.[19]

Another common theory for CGP is the induction of a foreign body reaction by the alloplastic mesh, which is more prominent in heavyweight meshes with small pores.[14] Based on these theories, a macroporous, lightweight, self-adhesive mesh theoretically would decrease the incidence and severity of postoperative CGP. In 2006, Chastan introduced a novel, SGM (Parietene Progrip, Covidien, Inc, Dublin, Ireland) made of a low-weight, isoelastic, large-pore, monofilament polypropylene fabric with resorbable microhooks that attach to the underlying tissue at the time of mesh insertion and for up to 12 months after.[6]

During the repair, the surgeon fixes the mesh around the spermatic cord with a self-gripping flap. Generally, the SGM appears to be more comfortable to handle, requires less dissection than sutured mesh fixation (SMF), and provides a high quality of attachment.[20] Moreover, the SGM avoids the need for fixation sutures, resulting allegedly in a milder local inflammatory reaction and a lesser incidence of injury to inguinal nerves.[21]

Recently, a number of randomized controlled trials (RCTs) were published comparing this new SGM fixation method with the conventional SMF method in open inguinal hernia repair. Published trials are not consistent, showing that SGM is either superior to[22-24] or equal to[7,25-27] SMF in terms of the incidence of postoperative CGP.

We performed this systematic review and meta-analysis to collate the evidence from published randomized clinical trials and observational studies comparing the results of Lichtenstein inguinal hernia repair using SGM or SMF fixation techniques in terms of operative time, recurrence rate, and the incidence of CGP, wound, and perioperative complications.

METHODS

We performed all steps of this systematic review in strict accordance with the Cochrane handbook of systematic reviews and meta-analysis.[28] We also followed the preferred reporting items for systematic reviews and meta-analyses (PRISMA statement guidelines) during the drafting of our manuscript.[29] All steps of this study were prespecified, and the protocol was registered on PROSPERO (CRD42016045426).

Literature search strategy. We searched the following electronic databases: PubMed, Cochrane CENTRAL, Scopus, Embase, and Web of Science through July 2016 using the following query: "(Self-gripping mesh OR Progrip OR Progrip mesh OR Parietex OR Self-adhesive mesh OR autoadhesive mesh OR semi-resorbable mesh) AND (Sutured mesh OR Lichtenstein mesh OR Suture fixation of mesh OR Suture fixation OR Conventional Lichtenstein mesh OR Classic Lichtenstein technique OR Lightweight mesh OR Polypropylene mesh OR Lightweight polypropylene mesh OR Sutures and Polypropylene mesh) AND (Inguinal hernia OR Hernia OR Herniorrhaphy OR Hernioplasty OR Lichtenstein hernia repair)." We also searched the bibliography of eligible studies for any relevant articles.

Eligibility criteria and study selection. We included all clinical trials and observational studies that met all the following criteria: (1) enrolled patients who were undergoing open inguinal hernia repair and (2) compared SGM versus SMF for the Lichtenstein hernia repair technique. We excluded (1) studies in which hernia repair was performed with other operative approaches, (2) studies performed on animal models, (3) reviews, case reports, or case series, and (4) non-English articles and duplicate references. Eligibility screening was conducted in 2 steps, each by 3 independent reviewers (S. M., H. A., A. M.): (1) title and abstract screening for matching the inclusion criteria, and (2) full-text screening for eligibility to meta-analysis. Disagreements were resolved on the opinion of a third reviewer (I. A.).

Data extraction. Three independent reviewers (H. A., S. M., A. M.) extracted relevant data, and another reviewer (I. A.) resolved disagreements. The extracted data included the following: (1) baseline characteristics of enrolled patients,