Comparison of self-gripping mesh and sutured mesh in open inguinal hernia repair: A meta-analysis of long-term results

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Background. *Complications after inguinal hernioplasty pose a significant burden on individual patients and society because of high numbers of repair procedures. Recently, the long-term results of a self-gripping ProGrip mesh for open inguinal hernia repair have become available. The aim of this meta-analyses was to compare these long-term results with the results of a Lichtenstein hernioplasty with a sutured mesh focusing on chronic pain, recurrence rate, foreign body sensation, and operation duration.*

Methods. *A systematic review of the literature was undertaken to identify randomized controlled trials comparing open inguinal hernia repair with a self-gripping ProGrip mesh and a conventional Lichtenstein hernioplasty.*

Results. *In the present meta-analysis, the outcomes of 10 randomized controlled trials enrolling 2,541 patients were pooled. The mean follow-up was 24 months (range 6–72 months). There was no significant difference in the incidence of chronic pain (odds ratio = 0.93; 95% confidence interval, 0.74–1.18), recurrence (odds ratio = 1.34; 95% confidence interval, 0.82–2.19), or foreign body sensation (odds ratio = 0.82; 95% confidence interval, 0.65–1.03), between the self-gripping mesh and sutured mesh group at all follow-up time points. The mean operating time was significantly shorter (odds ratio = −7.58; 95% confidence interval, −9.58 to −5.58) in the self-gripping mesh group.*

Conclusion. *The self-gripping mesh has comparable results with a sutured mesh regarding the incidence of chronic postoperative inguinal pain, recurrence and foreign body sensation. However, long-term results still are based on relatively small patient numbers and outcomes measures are heterogenic. The main advantage of the self-gripping mesh is the consistently significantly reduced operation time. (Surgery 2017;■:■-■.)*

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Open hernia repair according to Lichtenstein and endoscopic inguinal hernia techniques still are recommended as the best evidence-based options for the repair of a symptomatic primary unilateral inguinal hernia, providing the surgeon is sufficiently experienced in the specific procedure.[1] Factors popularizing the Lichtenstein technique compared with the endoscopic techniques are its easiness to perform, lower rate of serious complications, and the possibility to perform the operation under local anesthesia.[2-4] Because the recurrence rate for both techniques has been reduced to less than the rate of chronic postoperative inguinal pain (CPIP), CPIP and its consequences for the quality of life (QOL) are the challenges of modern hernia surgery.[5] This is also urged by the high incidence of CPIP, which is ≈ 10%, and because of its socioeconomic effects.[1,5,6] The pathophysiology of CPIP is regarded multifactorial due to patient-related and surgery-related risk factors.[6-9] Among the surgical risk factors are the type of mesh and its fixation technique.[5,10,11] Several meta-analyses have shown that lightweight meshes are associated with less CPIP and less foreign body feeling because of a reduced inflammatory response and a less intense foreign body reaction, although the incidence of severe CPIP is not significantly lower.[12-14] It is thought that fixation of meshes with traumatic devices such as sutures or tacks can cause entrapment and injury of muscles and

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nerve fibers.[15,16] Numerous studies therefore aimed to reduce the need for fixating materials in tension-free hernia repair. Results of meta-analysis examining glue fixation of mesh are heterogeneous.[17-20] Another atraumatic way of mesh fixation may be found in the self-gripping ProGrip mesh (Medtronic, Dublin, Ireland). This component semiresorbable macroporous knit made of monofilament polypropylene (Parietene ProGrip) or polyester (Parietex ProGrip) incorporates a one-sided coating of resorbable micro hooks providing atraumatic anchorage of the mesh in the underlying tissue bed. The self-gripping mesh is supposed to reduce CPIP because of atraumatic mesh fixation and the use of low-weight monofilament mesh, thereby reducing the material-dependent inflammatory reaction. Several randomized controlled trials have compared the Lichtenstein repair using this self-gripping mesh with the Lichtenstein repair using a conventionally sutured mesh, and long-term results of these studies have become available. Because former meta-analyses are based on short-term results, a new meta-analysis was performed to investigate differences in the occurrence of CPIP and recurrence rate between a sutured mesh and a self-gripping mesh in the long term.[21-24]

METHODS

The systematic review and meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement.[25] All trials published up to January 2017 comparing self-gripping mesh and conventional sutured mesh for the Lichtenstein procedure were identified. The literature search was performed in the following databases: Embase, Medline Ovid, CINAHL EBSCOhost, Cochrane, Web of Science, Scopus, and Google Scholar. The search strategy was designed by a biomedical information specialist of the Medical Library (Erasmus University Medical Center, Rotterdam, the Netherlands). A syntax with search terms was prepared; both the syntax and the search strategy are available in Appendix 1.

All identified records were transferred into an EndNote database (EndNote X7.7.1, Thomson Reuters, New-York). Two identical duplicate versions of this database were evaluated individually by 2 independent reviewers (M.M. and R.K.). First, all records were screened by title and abstract for eligibility. After this step, both independent libraries were combined and compared via an EndNote comparing strategy.[26] Then all full-text articles were assessed for eligibility. Any discrepancies were discussed between the 2 reviewers and the senior author (J.F.L.).

Studies were included in the meta-analysis if they met all the following inclusion criteria: randomized controlled trials enrolling adult patients with a unilateral or bilateral primary inguinal hernia; hernia repair according to Lichtenstein comparing either a self-gripping polypropylene or polyester mesh (respectively, Parietene ProGrip and Parietex ProGrip mesh, Medtronic) with a conventional mesh being sutured; CPIP among the primary or secondary outcomes. Articles had to be written in Dutch, English, or German. Interim analyses were excluded if an article with longer follow-up was available.

The following outcomes were extracted from the included trial: CPIP, foreign body sensation (FBS), and recurrence of hernia. The methodologic quality of the included studies was assessed according to criteria specified by the Cochrane handbook for Systematic Reviews of Interventions Version 5.0.1 and the guidelines of Jadad et al[27] and Higgins et al.[28] In addition, all trials were scored on the availability of a baseline pain score, a validated assessment tool for CPIP, a definition of the outcome parameter CPIP, data on extra sutures placed in the self-gripping mesh group and perioperative nerve handling. Both reviewers independently sampled the data of all articles into a standardized database. This database was set up in Review Manager (RevMan, version 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014). A random check was performed by the senior author (J.F.L.).

Data analysis. A random effects model was used to calculate a pooled mean of the data, taking into account both the variance between studies and study populations and the variance within a study.[29] For continuous data, the mean difference with a 95% confidence interval (CI) was calculated; for dichotomous data, the effect measures odds ratio (OR) and risk ratio (RR) with 95% CI were calculated to evaluate the statistical difference between outcomes. Because RevMan 5.3 excludes trials with zero events when calculating an OR or RR, a risk difference (RD) also was calculated in which zero event trials were included. Outcomes were displayed in forest plots. Statistical heterogeneity was assessed by calculating the test statistic Cochran's Q. The consistency of study effects was tested using I^2 statistic.[30] I^2 values of 0% to 25% was assigned as low, 25% to 50% moderate, and 75% to 100% as high. In addition, the overall effect was provided