Mesh Technology in Hiatal Hernia

Ferdinand Köckerling, Beat Müller-Stich, and Bruce Ramshaw

39.1 Suture Versus Mesh Repair – 410

39.2 Complications of Mesh Implantation – 410

39.3 Biologic Versus Synthetic Meshes Versus Suture – 410

39.4 Risk-Benefit Analysis for Mesh Augmentation – 411

References – 413

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39.1 Suture Versus Mesh Repair

Laparoscopic repair of large hiatal hernias is associated with high recurrence rates [1]. In the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Guidelines for the management of hiatal hernia [2, 3] is stated on the basis of a moderate level of evidence that the use of mesh for reinforcement of large hiatal hernia repairs leads to decreased short-term recurrence rates. There is inadequate long-term data on which to base a recommendation either for or against the use of mesh at the hiatus [3].

In the meta-analysis of Antoniou et al. [4], three randomized controlled trials reporting the outcome of 267 patients were identified. The follow-up period ranged between 6 and 12 months. The weighted mean recurrence rates after primary and mesh-reinforced hiatoplasty were 24.3% and 5.8%, respectively.

In the meta-analysis of Memon et al. [5], 4 RCTs were analyzed, totaling 406 patients (suture = 186, prosthesis = 220). For only one of the four outcomes, i.e., reoperation rate (OR 3.73; 95% CI 1.18; 11.82; $p = 0.03$) did the pooled effect size favor prosthetic hiatal herniorrhaphy over suture cruroplasty. For other outcomes, comparable effect sizes were noted for both groups which included recurrence of hiatal hernia or wrap migration, operating time, and complication rates.

In a systematic review by Furnée et al. [6], 26 studies were included. Laparoscopic hiatal hernia repair was performed with mesh in 924 patients and without mesh in 340 patients. The type of mesh used was very different: polypropylene in six, biomesh in nine, polytetrafluoroethylene (PTFE) in two, expanded PTFE (ePTFE) in two, and composite polypropylene-PTFE in another two. Radiological and/or endoscopic follow-up was performed after a mean period of 25.2 ± 4.0 months. There was no, or only a small, recurrence <2 cm in 385 of the 451 available patients (85.4%) in the mesh group and in 182 of 247 (73.7%) in the non-mesh group.

In a meta-analysis of Müller-Stich et al. [7], 3 RCTs and 9 observational clinical studies (mesh types: PTFE, biological, polypropylene, composite) including 915 patients with paraesophageal hernia repair revealed a significantly lower recurrence rate for laparoscopic mesh-augmented hiatoplasty (pooled proportions, 12.1% vs 20.5%; odds ratio 0.55 [0.34–0.89]; $p = 0.04$). The authors concluded that mesh application should be considered for laparoscopic paraesophageal hernia repair.

In a further systematic review and meta-analysis, Tam et al. [8] identified 13 studies with 1194 patients, 521 with suture and 673 with mesh repair. Odds of recurrence (OR 0.51; 95% CI 0.30–0.87; overall $p = 0.014$) but no need for reoperation (OR 0.42; 95% CI 0.13–1.37; overall $p = 0.149$) were less after mesh cruroplasty. The authors concluded that the quality of evidence supporting routine use of mesh cruroplasty was low.

39.2 Complications of Mesh Implantation

Erosion and mesh migration are rare but devastating complications of synthetic mesh repair [1]. Stadlhuber et al. [9] reported about 17 cases of intraluminal mesh erosion, esophageal stenosis in 6 cases, and 5 patients with dense fibrosis. The authors concluded that complications related to synthetic mesh placement at the esophageal hiatus were more common than previously reported. Likewise, several case reports have drawn attention to severe complications following the use of synthetic meshes for hiatal hernia repair [10, 11]. Additionally, hiatal mesh is associated with major resection at revisional operation [12]. In the meta-analysis of Müller-Stich et al. [7], the complication rates of laparoscopic mesh-augmented hiatoplasty and laparoscopic mesh-free hiatoplasty for paraesophageal hernias were comparable (pooled proportions, 15.3% vs 14.2%, OR = 1.02 [0.63–1.65]; $p = 0.94$). The systematic review of laparoscopic mesh-augmented hiatoplasty data yielded a mesh-associated complication rate of 1.9% for those series reporting at least one mesh-associated complication [7]. No erosions, strictures, or dysphagia were identified on follow-up after 6, 45, and 58 months of using biological meshes [13, 14, 15], nor did a systematic review find evidence of any material-specific side effects of biological meshes on using such biological meshes for mesh-augmented hiatoplasty [16].

39.3 Biologic Versus Synthetic Meshes Versus Suture

A prospective randomized trial did not find any significant difference in the recurrence rate between the groups with suture repair vs absorbable mesh vs nonabsorbable mesh repair [17]. However, the sample size of around 40 patients per group was relatively small.

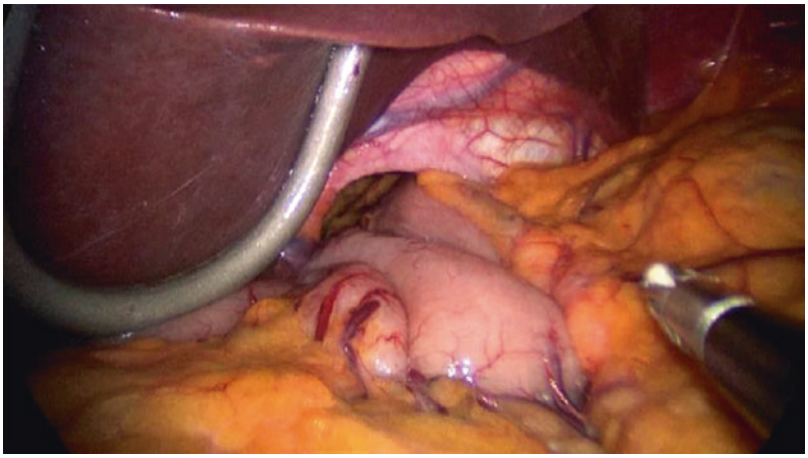

Fig. 39.1 Typical clinical finding of a large paraesophageal hernia

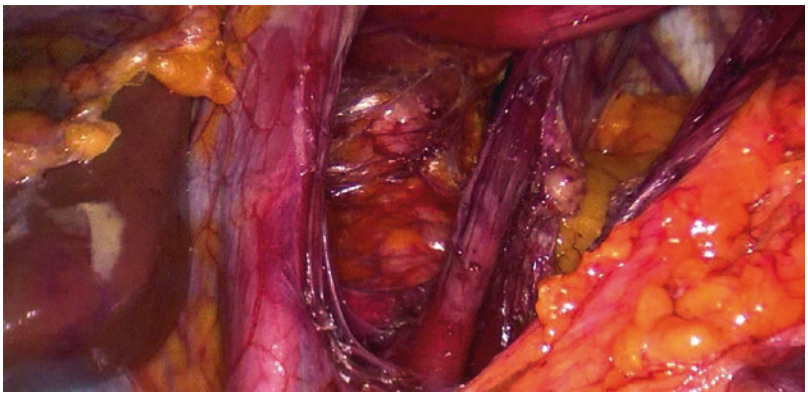

Fig. 39.2 Wide open hiatus after reposition of the stomach into the abdominal cavity

One systematic review, which included meta-analysis [1], identified 5 relevant studies with 295 patients where short-term follow-up revealed a suture repair recurrence rate of 16.6% vs 3.5% for biologic mesh repair (p = 0.003). The limited available information does not permit any conclusions about the long-term efficacy of biologic meshes in this setting [1].

39.4 Risk-Benefit Analysis for Mesh Augmentation

When performing hiatal herniorrhaphy, the increased risk of recurrence without mesh must be weighed against the potential risk of subsequent major resection when using mesh because of erosion and mesh migration [9–12]. Müller-Stich et al. [7] found that recurrences can be bisected by mesh application from 20.5% to 12.1% after a follow-up period of approximately 3 years. Mesh-associated complications are rare at a rate of 1.9% and do not markedly contribute to overall procedure-related complications. The reduction from 20.5% to 12.1% after use of mesh corresponds to an absolute risk reduction of 8.4% and a number needed to treat 12 (95% CI, 10.6–13.5). Reoperation rates after "mesh use" and "no mesh use" are 2.4% and 8.0%, respectively, and correspond with an absolute risk reduction of 5.6% and a number needed to treat 18 (95% CI, 13.3–27.3). The risk-benefit analysis revealed an 11% higher lifelong operation-related mortality rate of 1.6% for laparoscopic mesh-augmented hiatoplasty vs 1.8% for laparoscopic hiatoplasty (thinking of operation-associated mortality of very risky reoperations), corresponding to an absolute risk reduction of 0.3% and a number needed to treat 344 (95% CI, 297.6–406.5). Even more interesting was that the rate of polypropylene-associated complications (0.8%) was lower than that of biological-associated complications (1.3%) [7]. Other authors concluded [1, 16] that the severe complications related to mesh erosion and migration do not appear to occur on using biological meshes (Figs. 39.1, 39.2, and 39.3). On

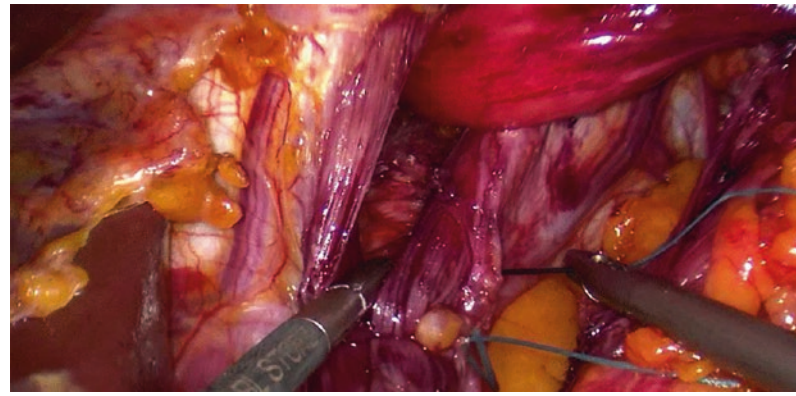

Fig. 39.3 Closing of the hiatus with nonabsorbable sutures

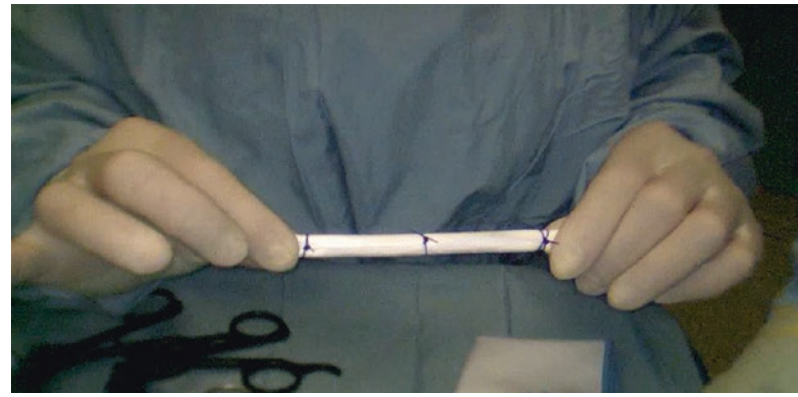

Fig. 39.4 A 12 × 8 cm Tutomesh is formed to a roll

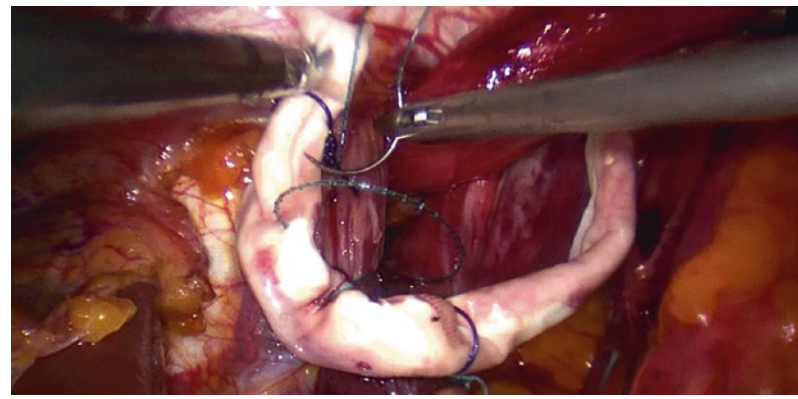

Fig. 39.5 The Tutomesh roll is sutured in a u-form to the hiatal crus for augmentation of the hiatoplasty

short-term follow-up, biological meshes were found to also reduce the recurrence rate [1]. To date, there is no sufficient data available on the longer-term follow-up outcome. On weighing up the risks against the benefits, the short-term data available would seem to support the use of biological meshes for mesh-augmented hiatoplasty in the case of large hiatal hernias. Further RCTs should be carried out in the future with greater sample sizes to conclusively determine which meshes are more suitable for hiatal hernia repair (Figs. 39.4, 39.5, and 39.6).

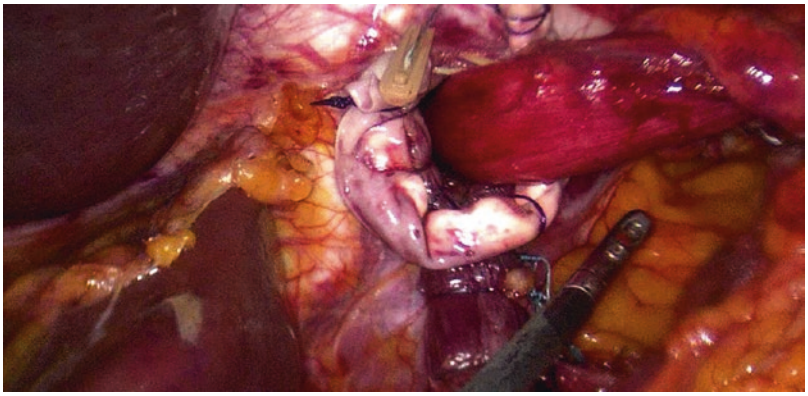

Fig. 39.6 Final view to the Tutomesh augmentation of the hiatoplasty

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