REVIEW ARTICLE

Review of Literatures on Laparoscopic Prosthetic Repair of Giant Hiatal Hernia than Pure Anatomical Repair of Crura

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Abstract

The recurrence rate after laparoscopic primary repair of giant hiatal hernias with paraesophageal involvement is reported to be high. Mesh reinforcement repair of hiatal defect is proposed for solving this problem which is debated. The indication for mesh use, the type of mesh to use, and the placement technique are controversial. After review of all literatures of our study it has been concluded that the use of prosthetic reinforcement of cruroplasty in laparoscopic giant hiatal hernias has very low recurrence, though certain mesh related complications are worse than recurrance which are up to certain extent are surgically correctable complications, as per different studies no one mesh type is clearly superior in terms of avoiding failure and complication. Only further studies and long-term evaluation will allow judgment of the effectiveness of laparoscopic mesh repair in patients with large hiatal hernias.

Keywords: Giant hiatal hernia, laparoscopic repair, prosthetic/mesh repair, nonabsorbable and reabsorbable/biological mesh, recurrence, complications.

INTRODUCTION

The esophagus passes through an opening in the diaphragm (i.e. esophageal hiatus) as it courses through the chest to the abdomen eventually ending at the stomach. This opening is usually adequate for passage of the esophagus and nothing else (Fig. 1). However, patients that have a hiatal hernia have an enlarged opening. There are four different types of hiatal hernias described. Giant hiatal hernia is defined as greater than one third of the stomach in the thoracic cavity[1] and representing 5 to 10% of all hiatal hernia.[2] The hiatal opening in a patient with a large hernia is wide, with the right and left Crura very thin and often separated by 5 cm or more.[2] Types of hiatal hernia are represented diagrammatically in Figures 1 to 2D.

Traditionally repair of giant paraesophageal hernia has been performed through laparotomy or thoracotomy, with the advent of laparoscopy, nowadays giant hiatal hernia (type III, type IV) are performed with laparoscopy.[3] The recurrence rate after laparoscopic repair of hiatal hernias with paraesophageal involvement (LRHP) is reported to be high.[4]

Several recent reports have shown laparoscopic repair of paraesophageal hiatal hernia.[5-7] Suggesting that it is feasible and effective obtaining comparative result to open surgery.

AIMS AND OBJECTIVES

The aim of this review is to analyze the role of laparoscopic prosthetic cruroplasty in the management of Giant hiatal hernia.

MATERIALS AND METHODS

A systematic Google, Highwire press search looking for all of the studies published in English in relation to treatment

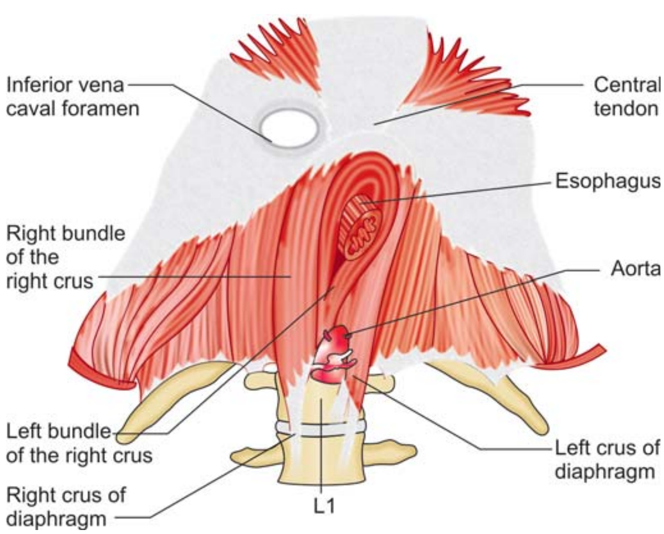
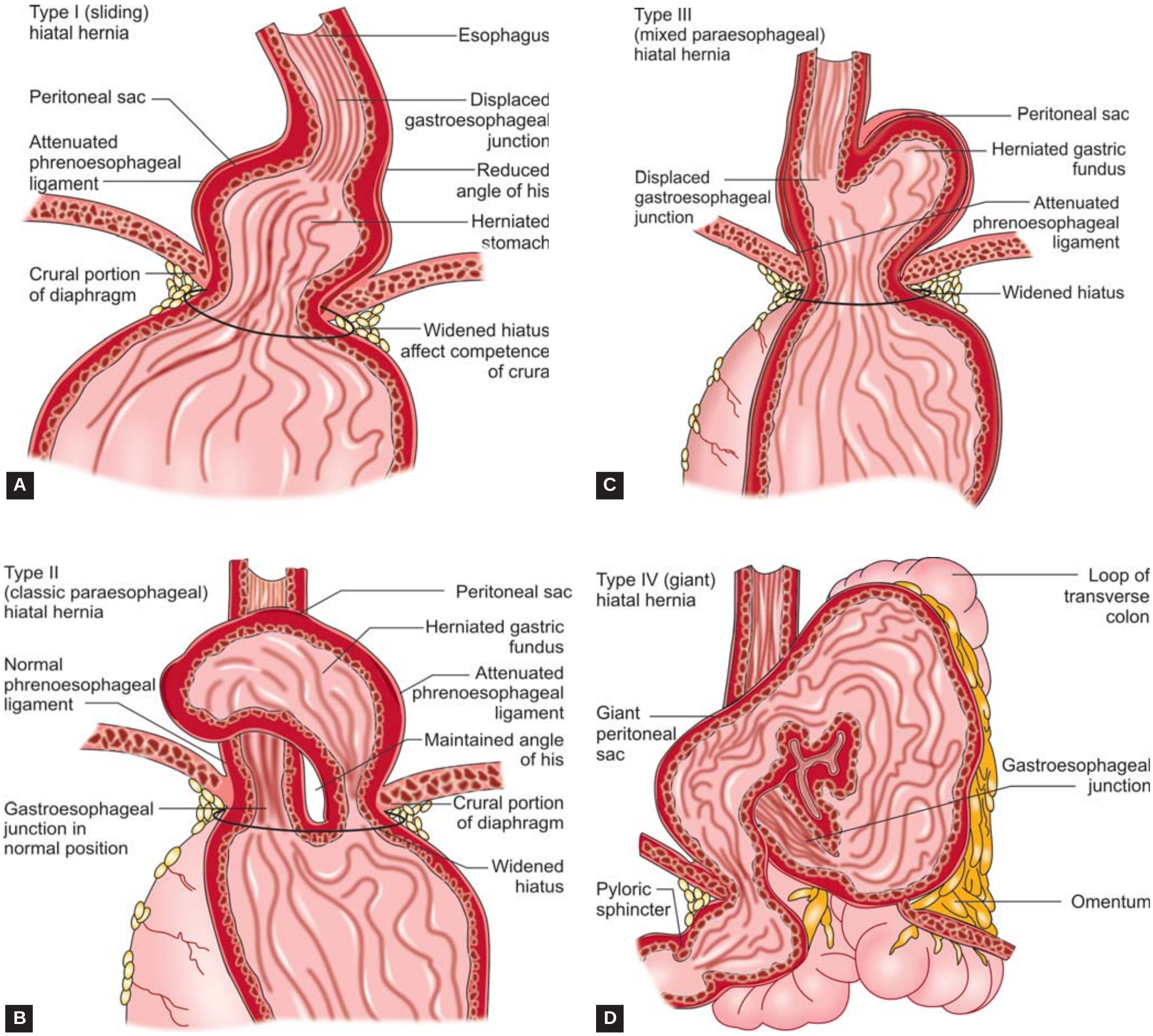


Fig. 1: Anatomy of hiatus



Figs 2A to D: Types of hiatus hernia

of giant paraesophageal and mixed hiatal hernias was performed (Figs 2A to D). Particular attention was paid to the use of meshes for reinforcement of the hiatal repair.

OPERATIVE PROCEDURE

The standard surgical technique include:

- Standerd five cannula technique
- Devide the lesser omentum to expose the right hilar piller within the sac
- Reduction of hernia by means of atraumatic grasper in a hand over hand fashion
- Complete excision of sac
- Primary closure of hiatal hernia defect with either suture approximation of crura or by different type of mesh application (for tension free repair)
- After closing the hiatus a fundoplication (Nissen or toupet) with or without collis gastroplasty will complete the operation depending upon the finding of intraoperative assessment of short esophagus and esophageal manometry.

The most controversial issue in the use of prostheses in the hiatus is the surgical technique. Several models have been proposed,[8] which are discussed below.

Tension-free Techniques

1. One tension-free technique is anterior placement of a triangular piece of mesh, proposed by Paul et al[9] (Fig. 3). A triangular or semilunar polytef patch is placed to occlude the anterior segment of the hiatus and fixed with staples or stitches. The stomach is fixed to the abdomen and a fundoplication is added.
2. For posterior placement of a triangular piece of mesh (Fig. 4), the aim is the same as in the technique for anterior placement. Kuster and Gilroy[11] proposed a posterior segmental occlusion, occluding the base of the pillar overture, and placing the esophagus anteriorly, fixing the mesh with staples or stitches. Fixation to the abdominal wall or a gastrostomy is also performed.[12]
3. A third technique involves onlay of a piece of mesh, with a hole facilitating the passage of the esophagus. The mesh covers the whole of the hiatal defect, and no attempt is made to close the hiatus (Fig. 5).
4. There are several shapes of mesh designed to allow the passage of the esophagus and to facilitate fixation (e.g. U shape,[13,14] A shape[15]) (Fig. 6). Casaccia et al[15] recently proposed a composite polytef-polypropylene A-shaped mesh. This mesh was designed according to the strength lines of the hiatus and produced good results after 8 months of follow-up.
5. A piece of mesh may be placed just covering the defect below the esophagus, overlapping both pillars laterally. This was described by Basso et al[16] (Fig. 7).
6. In another technique, after a standard closure of the hiatus, a relaxing incision lateral to the right crura is placed, and a patch is fixed with stitches or staples

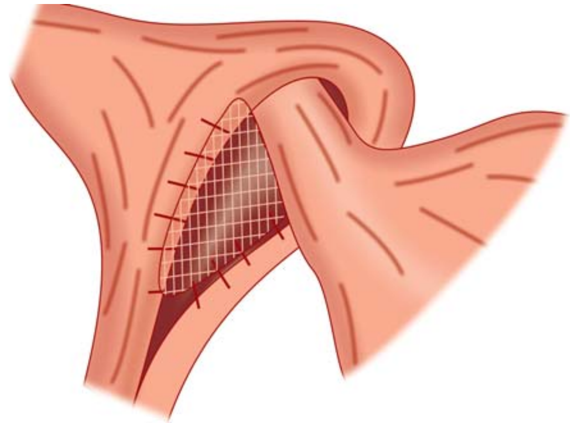


Fig. 4: Tension-free repair: Posterior placement of a triangular piece of mesh[11]

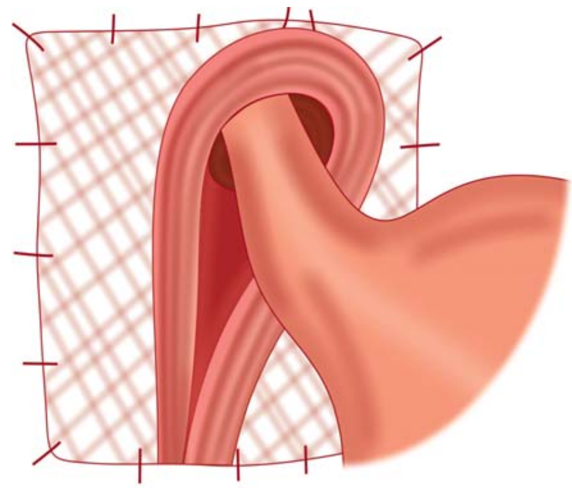


Fig. 5: Tension-free repair: Onlay piece of mesh, with a hole facilitating the passage of the esophagus

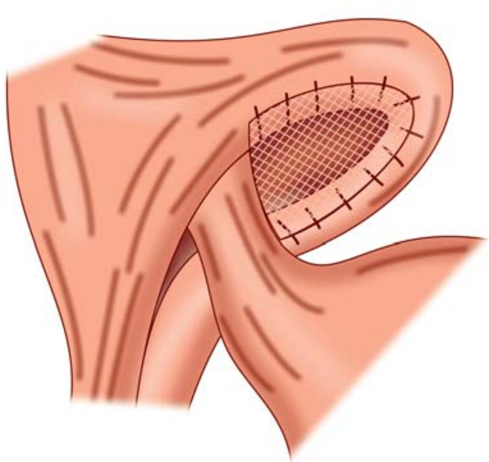


Fig. 3: Tension-free repair: Anterior placement of a triangular piece of mesh[10]

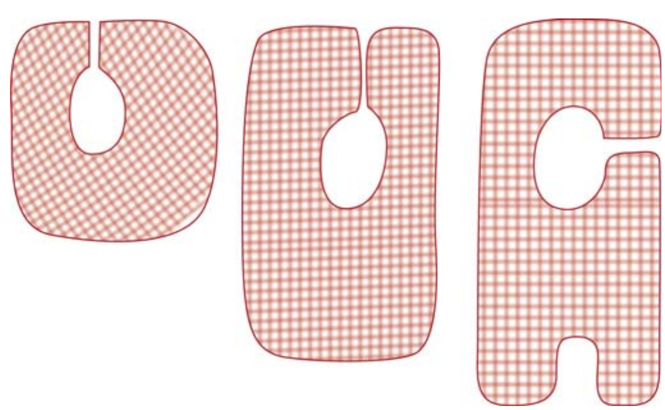


Fig. 6: Shapes of mesh designed to allow passage of the esophagus and to facilitate fixation (U shape,[13,14] A shape[15])

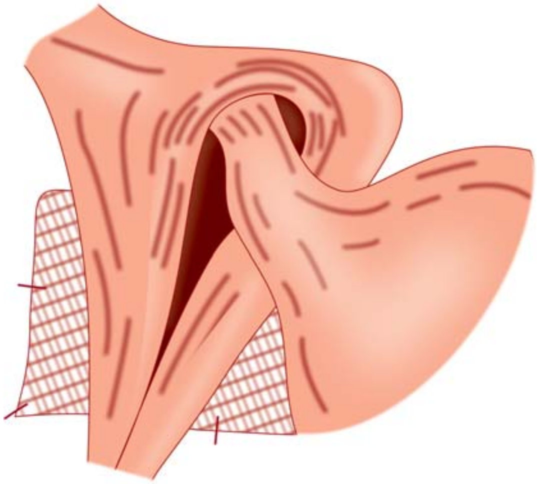


Fig. 7: Tension-free repair: Piece of mesh just covering the defect below the esophagus, overlapping both pillars laterally[16]

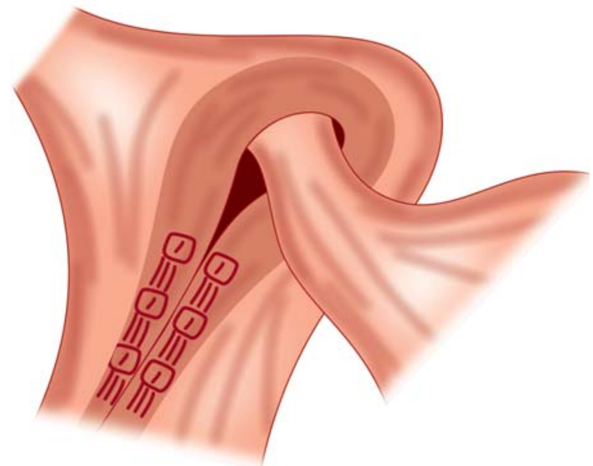


Fig. 9: Nontension-free repair with reinforcement of the crural closure to avoid the cutting effect of the stitches, using simple stitches with Teflon or Dacron pledgets[19,20]

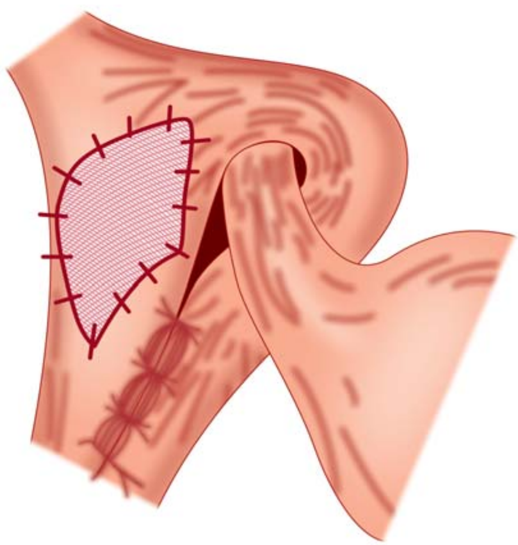


Fig. 8: Tension-free repair. After a standard closure of the hiatus, a relaxing incision lateral to the right crura is performed, and a patch is fixed with stitches or staples covering the diaphragmmatic defect[17,18]

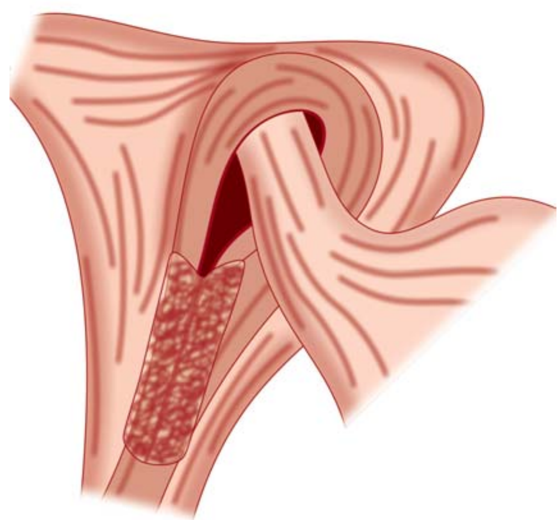


Fig. 10: Nontension-free repair with reinforcement of the crural closure, using a polypropylene strip along the crura to hold the stitches

covering the diaphragmmatic defect (Fig. 8). Described by Huntington in 1997,[17] it has been also proposed by Horgan et al.[18]

Nontension-free Techniques

A buttress mesh technique has also been described (Figs 9 to 11). A long strip of mesh is placed below the esophagus, covering the pillar closure (Fig. 12). The advantage is that it avoids the encircling of the esophagus, reducing the risk of dysphagia or erosion. Champion and Rock[22] reported good results in a series of 52 cases, with a recurrence rate of 2%.

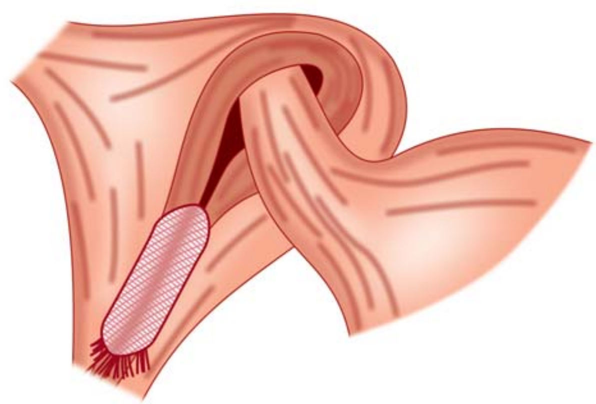


Fig. 11: Nontension-free repair with reinforcement of the crural closure, using a polypropylene piece of mesh covering both edges of the pillars[21]

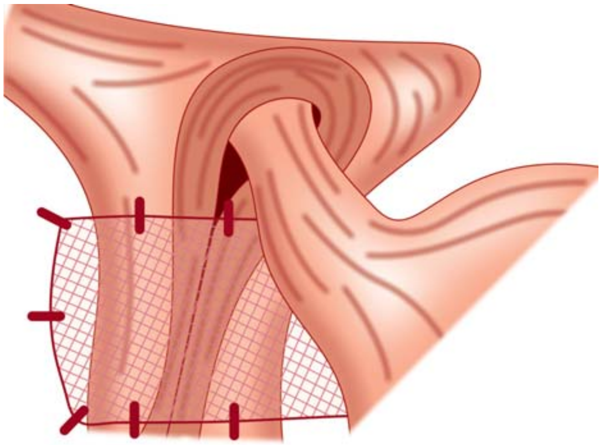


Fig. 12: Nontension-free repair with reinforcement of the crural closure using buttress mesh. A long strip of mesh is placed below the esophagus, covering the pillar closure[22]

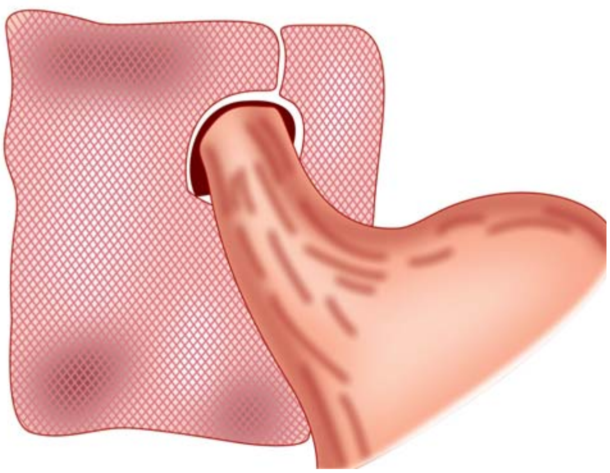


Fig. 13: Nontension-free repair with reinforcement of the crural closure. Onlay mesh is placed around the esophagus once the defect has been closed[23,24]

Placement of onlay mesh around the esophagus with a hole in the middle, once the defect has been closed, has been used (Fig. 13). There are also pre-shaped meshes designed to adapt anatomically to the characteristics of the anatomic area.[23,24]

REPAIR MATERIALS

The prostheses available for hiatal reinforcement are made of a range of materials. Most authors agree that the material used should be nonresorbable, because resorbable material (polyglycolic acid) loses its mechanical properties as it is resorbed. Nonresorbable material may be made of polypropylene, polytef, or composite (polytef plus polypropylene). Recently, surgisis a nonresorbable material of biological origin has been used. [24]

Acellular human dermal matrix may be an effective method to buttress the crural closure in patients with large hiatal hernias. Longer follow-up in larger numbers of patients is needed to assess the validity of this approach. [25]

COMPLICATIONS

Early nonreoperative complications[26]

- Dysphagia
- Heartburn
- Chest pain
- Fever
- Epigastric pain
- Weight loss.

Main reoperative complications[26]

- Intraluminal mesh erosion
- Esophageal stenosis
- Dense fibrosis.

DISCUSSION

The most common mesh types used in different studies were biomaterial then polytetrafluoroethylene and polypropylene. Suture anchorage was the most common fixation technique . The findings in different studies showed on an average failure rate of 3%, a stricture rate of 0.2%, and an erosion rate of 0.3%. Biomaterial tended to be associated with failure, whereas nonabsorbable mesh tended to be associated with stricture and erosion.

On the basis of various studies, it appears that the tension-free repair of large hiatal hernias (type II and III) with polypropylene–PTFE mesh is technically feasible and easy to perform. The novelty represented by the new shape of the mesh and the use of a composite material for this region is encouraging.

Follow-up period is too short in most of the present literatures, but short-term functional results are promising. Only long-term evaluation will allow judgment of the effectiveness of laparoscopic mesh repair in patients with large hiatal hernias.

Further studies are necessary to define which hiatal defects canbe successfully treated with a simple cruroplasty and which ones need a prosthetic reinforcement.

CONCLUSION

Laparoscopic hiatal hernia repair using mesh resulted in a low recurrence rate[3,8,12-15] which appeared to be lower than that obtained historically without mesh. Different mesh placement tecniques has their own merits and demerits.

Thus laparoscopic mesh hiatoplasty for giant hiatal hernia is acceptable though certain mesh related complications are worse than recurrence which are up to certain extent are surgically correctable complications[26] and as per different studies no one mesh type is clearly superior in terms of avoiding failure and complication.

ACKNOWLEDGMENT

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REFERENCES

1. Andrew F Pierre, et al. Result of laparoscopic repair of giant paraesophageal hernia: 2000 consecutive patient, Aug-2007.
2. Morino M, et al. Laparoscopic management of giant hiatal hernia factors influencing outcome, 2006.
3. Prosthetic closure of the esophageal hiatus in large hiatal hernia repair and laparoscopic antireflux surgery. HYPERLINK "http://lib. bioinfo. pl/auth:Granderath, F"F Granderath, M Carlson, J Champion, A Szold, N Basso, R Pointner, C Frantzides Surg Endosc Jan 19, 2006;16424984 Cit:31.
4. Peter S Dahlberg, Claude Deschamps, Daniel L Miller, Mark S Allen, Francis C. Laparoscopic repair of large paraesophageal hiatal hernia. Ann Thorac Surg 2001;72:1125-32.
5. Wiech mann RJ, et al. Laparoscopic management of giant paraesophageal hernitation. Ann of Thoracic Surgery, 2000.
6. Surgio Diaz MD, et al. Laparoscopic paraesophageal hernia repair a changing operation: Medium term outcome of 116 patients, May 2002.
7. Paramswaran R, et al. Laparoscopic repair of large paraesophageal hiatal hernia: quality of life and durability. 2006.
8. Eduardo M Targarona, Gali Bendahan, Carmen Balague, Jordi Garriga, Manuel Trias. Mesh in the Hiatus A Controversial Issue. Arch Surg 2004;139:1286-96.
9. Paul MG, De Rosa RP, Petrucci PE, Palmer ML, Danovitch SH. Laparoscopic tension-free repair of large paraesophageal hernias. Surg Endosc 1997;11:303-07.
10. Luketich JD, Raja S, Fernando HC, et al. Laparoscopic repair of giant paraesophageal hernia: 100 consecutive cases. Ann Surg 2000;232:608-18.
11. Kuster GG, Gilroy S. Laparoscopic technique for repair of paraesophageal hiatal hernias. J Laparoendosc Surg 1993;3:331-38.
12. Frantzides CT, Richards CG, Carlson MA. Laparoscopic repair of a large hiatal hernia with polytetrafluoroethylene. Surg Endosc 1999;13:906-08.
13. Khaitan L, Houston H, Sharp K, Holzman M, Richards W. Laparoscopic paraesophageal hernia repair has an acceptable recurrence rate. Am Surg 2002;68:546-55.
14. Frantzides CT, Carlson MA. Prosthetic reinforcement of posterior cruroplasty during laparoscopic hiatal herniorraphy. Surg Endosc. 1997;11:769-71.
15. Casaccia M, Torelli P, Panaro F, Cavaliere D, Ventura A, Valente U. Laparoscopic physiologic hiatoplasty for hiatal hernia: New composite "A"-shaped mesh. Surg Endosc 2002;16:1441-45.
16. Basso N, DeLeo A, Genco A, et al. 360 Degrees laparoscopic fundoplication with tension free hiatoplasty in the treatment of symptomatic gastroesophageal reflux disease. Surg Endosc 2000;14:164-69.
17. Huntington TR. Laparoscopic mesh repair of the oesophageal hiatus. J Am Coll Surg 1997;184:399-401.
18. Horgan S, Eubanks TR, Jacobsen G, Omelanczuk P, Pellegrini CA. Repair of paraesophageal hernias. Am J Surg 1999;177:354-58.
19. Peet DL, Klinkerberg-Knol EC, Alonso A, Sietses C, Eijsbouts QAJ, Cuesta MA. Laparoscopic treatment of large paraesophageal hernias. Surg Endosc 2000;14:1015-18.
20. Jobe BA, Aye RW, Deveney CW, Domreis JS, Hill LD. Laparoscopic management of giant type III hiatal hernia and short oesophagus: Objective follow-up at three years. J Gastrointest Surg 2002;6:181-88.
21. T Granderath FA, Basmmer T, Pasiut M, Pointner R. Dysphagia and quality of life after laparoscopic Nissen funduplication in patients with and without prosthetic reinforcement of the hiatal crura. Surg Endosc 2002;16:572-77.
22. Champion JK, Rock D. Laparoscopic mesh cruroplasty for large paraesophageal hernias. Surg Endosc 2003;17:551-53.
23. Athanasakis H, Tzortzinis A, Tsiaoussis J, Vassilakis JS, Xynos E. Laparoscopic repair of paraesophagealhernia. Endoscopy 2001;33:590-94.
24. Oelschlager BK, Barreca M, Chang L, Pellegrini CA. The use of small intestine submucosa in the repair of paraesophageal hernias: Initial observation of a new technique. Am J Surg 2003;186:4-8.
25. Evaluation of acellular human dermis reinforcement of the crural closure in patients with difficult hiatal hernias. E Lee, MM Frisella, B Matthews, LM Brunt (Department of Surgery and Institute for Minimally Invasive Surgery, Washington University School of Medicine). St. Louis, MO, USA Surg Endosc 2007;21:641-45.
26. Rudolf J Stadlhuber, Amr El Sherif, Sumeet K Mittal, Robert J Fitzgibbons Jr, L Michael Brunt, John G Hunter, Tom R DeMeester, Lee L Swanstrom C Daniel Smith, Charles J. Mesh complications after prosthetic reinforcement of hiatal closure: A 28-case series. Filipi Surg Endosc 2009;23:1219-26.