8 Technical Pitfalls and Factors that Promote Recurrence (Small Defects) Following Surgical Treatment of Hiatal Hernia

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Introduction

The successful development of laparoscopic fundoplication has made it a valid alternative to medical therapy in the treatment of gastro-esophageal reflux. As experience has grown, the laparoscopic approach is now used to treat more complex conditions such as type II (paraesophageal hernia, PEH) or type-III (mixed) hiatal hernia [1]. Results from several series have shown that laparoscopic repair is feasible and safe, in spite of the increased technical difficulty, and its immediate and short-term results are excellent (◘ Table 8.1) [2–13]. However, the incidence of recurrences may be high, reaching 42% in one series [3].

The Problem

Experience over the past 15 years suggests that surgical strategy for the laparoscopic treatment of PEH includes viscera reduction, sac excision, retrogastric crural closure and fundoplication [1, 14, 15]. Pexy of the gastric plicature, abdominal wall gastropexy and gastrostomy are the most controversial technical steps in maintaining the stomach in place in the abdomen. Though controlled comparative trials with the open approach are lacking, the immediate clinical outcome of laparoscopic repair of PEH is highly satisfactory. However, the recurrence rate is higher than expected at midterm follow-up – as high as 42%, when compared with the open approach (◘ Table 8.1), and some authors have suggested that the laparoscopic technique is unsuitable in this setting [3]. Recurrence has been related to several factors [16, 17] – none of which is clearly responsible – but the main reason for failure of the hiatal repair is tension. Treatment of all hernia repairs, such as the Lichtenstein repair or incisional hernia repair is currently tension-free. However, performing a tension-free repair in the hiatus is controversial and technically very demanding due to the oblique situation of the pillars and the difficulty in securing the mesh. Furthermore, in inguinal or ventral hernia repair, the mesh provides passive support to the intra-abdominal viscera, while the hiatus is a complex anatomical structure in which the esophagus moves during respiratory excursion of the diaphragm. Any prosthetic mesh will therefore be in contact with the esophagus, so there is a theoretical risk of esophageal erosion and complications.

Recurrences

Surgical treatment of gastro-esophageal reflux disease (GERD) or PEH may fail due to relapsing symptoms or to true anatomical failure, associated or not to clinical symptoms. This anatomical failure may be the result of a problem with the fundoplication (too tight or broken), or a hiatal recurrence. This chapter deals only with anatomical hiatal recurrence. The incidence of recurrence is variable. Initial experience of fundoplication for

Table 8.1. Recurrence after laparoscopic treatment of PEH in series with systematic radiological control

Author	No.[a]		Recurrence [%]	PEH recurrence	Sliding Symptoms	
Wu [2]	35/38	92%	23%	2	5	35%
Hashemi [3]	21/27	78%	42%	ns	ns	40%
Wiechmann [4]	44/60	73%	7%	3	0	100%
Khaitan [5]	15/25	60%	40%	1	5	50%
Jobe [6]	34/52	65%	32%	8	3	64%
Mattar [7]	32/125	26%	33%	ns	ns	43%
Keidar [8]	ns		15%	0	5	40%
Diaz [9]	66/96	69%	32%	7	14	62%
Targarona [10]	30/37	81%	20%	1	5	50%
Andujar [11]	120/166	72%	28%	6	24	33%
Watson [12]	60/100	60%	30%	5	13	30%
Ferri [13]		91%	23%	ns	ns	

[a]No. of patients with esophagogram

GERD was followed by a 10% recurrence rate, mainly related to difficulty in closure of the hiatus [18]. With current experience, recurrence rates of less than 5% are expected in cases of pure G-E reflux or small type-I sliding hernia. However, the incidence is highly variable in the case of type-II–IV hernias, reaching 42% in one series. Analysis of recurrences shows different patterns of time and form of presentation (see Table 8.1). Immediate postoperative recurrent hernias are usually secondary to total disruption of the hiatal closure with a relapsing PEH. Long-term recurrences may adopt several patterns: complete recurrent PEH, fundoplication migration, or a small sliding hernia, without a clear recurrence of the paraesophageal sac. In the latter subgroup, the incidence of symptoms is variable, and most are identified only by esophagogram. Symptom recurrences should be treated surgically, depending on the severity. However, there is tacit agreement that non-symptomatic recurrences, especially in cases of small sliding hernia, do not require repair. Recurrent hernias of any type should be considered technical failures, although the long-term outcome of asymptomatic recurrent hernias is unknown.

Factors Related to Hiatal Hernia Recurrence

Many factors have been related to hiatal hernia recurrence. They include local or anatomical factors, technical-related factors and functional (patient-related) factors (Table 8.2). Few studies have analyzed the individual responsibility of any of these factors as the definitive cause of recurrence.

Local factors are of paramount importance because the anatomical elements of the hiatus are widely distorted, especially in PEH. Nevertheless, these elements will be needed for the surgical repair (pillars). All the anatomic factors are inter-related. Besides, the size of the hernia and the amount of the herniated stomach are related to the type of hernia, and may be type II, III or IV. All correlate with the size or width of the hiatus, and some paraesophageal hernias may be as large as 10 cm. Consequently, surgical repair of type-I or pure GERD diseases without hernia have a recurrence below 9%, but recurrence after type II–IV is up to 40%.

It is not surprising that another factor favouring recurrence is redo surgery. Re-dissection of a previously operated area logically implies the use of fibrous and

Table 8.2. Results of comparative studies of paraesophageal hernia repair. Laparoscopy vs. laparoscopy + mesh

Author/year	Groups	No.	T. Op	Conv	Follow-up	Recurrence	Comment
Basso [27][a]	Lap	65	78	1.5%	48.3	14%	Ten-free (polypr.)
	Lap-mesh	67	70	0	22.5	0	
Hui [28]	Lap-mesh	12	226	8%	37	0	Se+ pcr + fp (ptfe + polipr.)
	Lap	12	202	ns	37	0	Se+ pcr + fp
Kamolz [29][c]	Lap	100	70	0	12	9%	Pcr + fp
	Lap mesh	100	70	0	12	ns	Pcr + fp + mesh polypr.
Frantzides [30][d]	Lap	36	ns	0	40	22%	Se + pcr + fp
	Lap mesh	36	ns	0	40	0	Se + pcr + fp + ptfe
Granderath [32]	Lap	50	58	0	12	26%	Pcr + fp
	Lap mesh	50	58	0	12	8%	Pcr + fp + mesh polypr

[a+c]Non-randomized, include all types of hiatal hernias. [d]Prospective randomized trial. *Se* sac excision, *Pcr* posterior crural repair, *Fp* fundoplication, *ns* not stated.

scar tissue. The incidence of recurrence is higher and it may occur especially when a recurrent hernia is found in the redo procedure [20].

Another factor related to recurrence is the anatomy of the pillars. The hiatal crura are a fleshy structure without tendinous reinforcement. Standard sutures may cut the muscle, and if the hiatus is particularly wide, when the pillars are approached, the lateral portions of the diaphragm near the crura become tense, especially on the right, and there is a potential risk of disruption.

A second important group of factors which play a relevant role in recurrence are technical aspects. In spite of the success of laparoscopic surgery for gastroesophageal reflux, fundoplication and hiatal dissection should be performed by means of a precise technique which requires advanced laparoscopic surgical skills. In the literature, many of the series of patients undergoing surgery for large hiatal hernias were operated on in the early days of laparoscopic fundoplication, and there is inevitably a steep learning curve with this technique, as demonstrated by the reduction in operative time and associated morbidity as experience is gained. The current technique for the laparoscopic approach is well systematized, and includes stomach reduction, sac excision, esophageal mobilization, hiatus closure and funduplicature. Any variation, pitfall or mishap could be followed by a relapse [1, 14, 15].

One of the key factors for technical success is crural closure, inevitably related with tension. Gentle intraoperative manoeuvers and manipulation are needed to avoid the tearing or rupture of the pillars. Crural closure poses some technical challenges, and in function of the size and shape of the hiatus opening, posterior or anterior stitches to the esophagus or the placement of a mesh may be needed. Such technical options may favour a defective closure of the hiatal passage and facilitate recurrence. The routine use of calibration has been also suggested as a measure to minimize hiatal recurrence [17]. Although it is rare, a short esophagus is another controversial factor, especially in PEH which do not have longstanding esophagitis.

Additional factors which are difficult to evaluate regarding their role in recurrence are the type of knot performed (double knot, square knot, pledgets), the type of knotting technique [intracorporeal, extracorporeal, Endo-StitchTM (Tyco)], and the material used.

Some authors suggest the use of non-resorbable sutures, as they consider that silk-braided string may degrade over time and favour recurrence [21, 22]. Using mesh to reinforce the pillars' approximation may logically help to avoid recurrence. The mesh may be placed by one of several methods and as yet there is no consensus regarding the method of choice. However, mesh placement in this setting continues to be controversial. The hidden side is the number of underreported severe complications secondary to the presence of a mesh near the esophagogastric junction [14, 15].

Functional factors associated with the patient's general condition are sources of complications which should also be taken into consideration. A number of situations, mainly chronic disorders, are associated with episodes of increased intra-abdominal pressure and may have a direct effect on the repaired anatomical area [16, 17]. Another factor that may enhance the effect of these functional stressors is the reduction of postoperative adherences, a well-known characteristic of laparoscopic surgery [12, 18, 23–25]. Obesity, chronic pulmonary disease, constipation or gastro-esophageal symptoms (gagging, belching, retching, hiccuping, vomiting) may promote recurrence. It goes without saying that early or chronic weight lifting is also related to recurrence.

Other Manoeuvers

Additional manoeuvers to secure the stomach in the abdomen in an attempt to reduce recurrence include a range of techniques: pexy of the fundoplication to the diaphragm, pexy of the gastric body to the abdominal wall, gastrostomy and ligamentum teres pexia [1, 14, 15]. Fundoplication itself may have some fixation effect. Some authors consider the Toupet technique may help to avoid recurrence because the posterior placement of the fundus covers the crural closure and fixes it to the diaphragm. However, as yet there are no definitive data from randomized trials to support the routine use of any of these measures.

It is not known whether collagen disorders are related to the appearance of hiatal hernia or favour recurrence, as has been observed in incisional hernia [26].

Analysis of the Factors Responsible for Recurrence

There was little interest in this topic during the prelaparosopic era, as is evident if we compare the number of papers published before or after the description of laparoscopic repair. Besides, there are no well-defined prospective trials analyzing the importance of different factors on the appearance of a recurrence. One major drawback is the failure to stratify patients according to a homogeneous model. Some studies include a variety of criteria (more than 30, 50%, intrathoracic stomach, gastric volvulus) that make comparison difficult. Furthermore, patients' associated medical conditions which may also impair the anatomical outcome are not considered.

Factors related to hernia recurrence are shown in ◘ Tables 8.3 and 8.4. Soper [18] and Filipi's group [17, 23, 24] worked on a group of GORD patients and both found hernia size and diaphragmatic stressors were the main factors related to recurrence. However, Watson's group [12] analyzed the same factors in the case of PEH hernia and found that only age and obesity were predictors for recurrence.

Comparative trials addressing hiatal closure with or without the use of a mesh are few and their methodology has some drawbacks. However, based on the observation of minimal recurrence with the use of a mesh, they add further support to the hypothesis that tension is the reason for failure. Four comparative studies have been published (◘ Table 8.3) [27–30], but only two were prospective and randomized trials. In addition, two of the comparative trials included patients with all types of hiatal hernias, and only one focused on PEH hernia repair. Basso et al. [27] compared simple, tension-free closures using an onlay piece of polypropylene, and divided their personal series chronologically into two parts. Kamolz et al. [29] compared simple closure with a reinforcement procedure that places the stitches over a piece of polypropylene covering the hiatal closure. Neither study was randomized; they were merely comparisons of initial experiences without mesh and more recent experiences with mesh. They also counted hiatal repair of all types, including type-I hernias or pure GERD without hernia. Mesh placement was followed by a lower incidence of recurrences, without specific morbidity.

Frantzides et al. [30] reported their results of a prospective randomized trial comparing simple closure with PTFE onlay reinforcement for PEH hernia repair, in cases with hiatus over 8 cm wide. Recurrences were significantly reduced after mesh placement (20% vs. 0, $p < 0.00$), without long-term sequel after a 40-month

Table 8.3. Multivariate analysis of factors related to hernia recurrence

Author	Soper [18]	Karkalapudi [24]	Aly [12]	Iqbal [23]
Year	1999	2002	2005	2006
N	290	37	100	100
Hernia type	I	I	II	I-II
Predictive factor	Learning group ($p < 0.05$) Vomiting ($p < 0.0001$) Other stressors[a] ($p < 0.001$) Hiatal size ($p < 0.005$)	vomiting ($p < 0.03$) weight lift (< 0.02)	age ($p < 0.05$) obesity ($p < 0.05$)	gagging ($p < 0.005$) belching ($p < 0.02$) hernia size ($p < 0.04$)

[a]Diaphragmatic stressors: cough, sneezing, vomiting, motor vehicle accident, weight lifting.

Table 8.4. Factors related to hiatal hernia recurrence

Type of hernia	– I/II–IV – Size – Primary/secondary – Pillars characteristic – Short esophagus
Technical factors	– Approach: laparoscopic vs. open – Surgical experience – Knots (type, intra-/extracorporeal) – Material – Calibration – Type of suture – Mesh – Redo
Patient condition	– Obesity – Pulmonary disease – Constipation – Symptoms of GERD recurrence – Gagging/belching/retching/hiccoughing – Associated diseases – Weight lifting
Other manoeuvers	– Gastric pexia – Gastrostomy – Mesh – Ligamentum teres pexia

follow up period. Granderath et al. [31] recently showed similar results with satisfactory long-term function, but with only reinforcing the hiatus with a portion of polypropylene mesh.

Discussion and Conclusions

Treatment for PEH and type-III mixed hernias has been a challenge to digestive surgery for the past 30 years. Surgical treatment was an option for a subset of elderly patients, some of whom were particularly frail, and in some cases it was associated to emergencies such as gastric volvulus or gastric incarceration. However, the results from centres with extensive experience showed low morbidity and good long-term outcome after standard open transthoracic or transabdominal approaches, though in most series the results were merely assessed on the basis of the presence or absence of symptoms, without any anatomical (X-ray) evaluation. Available experience shows the efficacy of the laparoscopic approach for treatment of PEH [1]. Although the intra-operative technical difficulty is greater, and although there are no randomized trials comparing it with the open approach to conclusively determine its relative merits, the immediate outcome clearly endorses the use of this minimally invasive approach in a population that is generally at a higher risk than conventional patients with GERD or small type-I hiatal hernia. The large number of series published in recent years (20 series related to

open approach in 33 years, compared with 46 series in 12 years for the laparoscopic approach) bears witness to the success of, and the interest in, the application of laparoscopic techniques in PEH repair.

The most common technical approaches for surgery of PEH include stomach reduction, sac excision and closure of the hiatal defect – on occasion over 8 cm wide – with or without the addition of some type of pexy. The controversy arises after the definitive observation of a variable recurrence rate (up to 42%) when a routine radiological control is conducted. Some authors have suggested that alternative approaches (open or thoracic) may be better for this disease. Arguments put forward to account for this unacceptably high recurrence rate include the learning curve due to the technical difficulty of the procedure, poor technical crural closure, or a short esophagus. The learning curve for a difficult laparoscopic procedure undoubtedly plays a role, and it has been observed in several large series that the recurrence rate falls as surgeons gain experience. The significance of a short esophagus continues to be a controversial issue. It has been considered a potential cause of failure, but most PEH patients do not have advanced GERD disease with esophageal scarring. The need to perform a Collis gastroplasty to lengthen the esophagus varied from 0% to 70% in the series analyzed and as yet there is no clear agreement on whether this technical step is needed during PEH repair.

Clearly, as with other abdominal wall defects, the aim is to achieve adequate closure. In contrast with the accepted standard concept for inguinal or ventral hernia, which is tension-free, the most widely supported approach is to close the hiatus under tension, with the obvious risk of disruption. The rationale for this judgment is that, unlike the abdomen or groin, where repair aims to achieve passive contention, the cardial region – including the hiatus and the GE junction – is a highly dynamic area and anatomical repair is thus justified. However, since PEH repair causes wide-ranging anatomic distortion and the risk of disruption is high, reinforcement with a mesh is a logical forward step. Hiatal closure is occasionally difficult. Surgeons who do not generally favour the placement of mesh in the hiatus are sometimes obliged to use the procedure to correct the gap, either because of the size of the hernia or because it is technically impossible to proceed otherwise.

There are no clear explanations for the differences in outcome after open or laparoscopic approach to PEH. The final results of laparoscopic repair are possibly not as good because the approach is more technically demanding [32]. However, performance of a systematic radiological esophagogram in patients operated by the open approach, including asymptomatic patients, has evidenced a high number of recurrences. Haas et al. [33, 34], for example, found an anatomical recurrence rate of 42% after systematic radiological evaluation. This suggests that the recurrence may also have been high in the open era, but has only become relevant since the laparoscopic revolution and the increased interest in this topic.

One of the main arguments against mesh placement is the emergence of complications, due in the main to visceral erosion, a risk that is intrinsically related to the existence of a foreign body [14, 15]. Based on this rationale, many surgeons contra-indicate routine placement. However, there are clear differences between the placement of a mesh and insertion of an Angelchik device or bands for gastric banding in obese patients. The latter devices are placed directly over the cardia, creating sustained tension and favouring potential erosion. On the other hand, a mesh in the hiatus to reinforce diaphragmatic closure is placed outside the esophagus and direct contact is avoided. Though several severe complications have been reported, the morbidity rate associated with mesh placement is low.

Another controversial point is whether the use of mesh for hiatal repair in PEH should be routine or selective. The local conditions of the hiatus after sac excision may cause results to differ and sometimes, even though the hernia sac is large, the pillars may be of good quality and can be approached without difficulty. Regarding recurrence after laparoscopic repair of PEH, few studies to date have investigated the predictive factors [2, 18, 23, 24] possibly involving anatomical features of the hiatus (such as the size of the gap, tension, diaphragmatic weakness), the type of repair (single stitches, pledget, etc.), additional fixation manoeuvers (Toupet, pexy, gastrostomy, etc.) and patient characteristics (heavy work, constipation, chronic cough, etc.). Some authors recommend a tailored approach, placing a mesh in cases of major risk of recurrence, and this practice seems more advisable in the case of redo operations. However, the final decision whether or not to place a mesh will evidently depend on the experience of the surgeon.

The controversy surrounding recurrence after surgical treatment of hiatus hernia will end when the long-term follow-up of patients in whom a mesh has been placed has been analyzed, and when randomized trials have been performed. These should be designed to resolve the controversial technical aspects regarding the type of mesh to be used, location of the lesion, selective vs. routine use and additional manoeuvers such as pexy and, Collis esophageal lengthening, and the definitive role of diaphragmatic stressors.

References

1. Draaisma WA, Gooszen HG, Tournoij E, Broeders IA. in paraesophageal hernia repair: a review of literature. Surg Endosc 2005, 19: 1300–1308
2. Wu JS, Dunnegan DL, Soper NJ. Clinical and radiologic assessment of laparoscopic paraesophageal hernia repair. Surg Endosc 1999, 13: 497–502
3. Hashemi M, Peters JH, DeMeester TR, et al. Laparoscopic repair of large type III hiatal hernia: objective follow up reveals high recurrence rate. J Am Coll Surg 2000, 190: 553–561
4. Wiechman RJ, Ferguson MK, Naunheim KS, McKesey P, Hazelrigg SJ, Sanntucci TS, Macherey RS, Landrenau RJ. Laparoscopic management of giant paraesophageal herniation. Ann Thorac Surg 2001, 71: 1080–1087
5. Khaitan L, Houston H, Sharp K, Holzman M, Richards W. Laparoscopic paraesophageal hernia repair has an acceptable recurrence rate. Am Surg 2002, 68: 546–551
6. 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: 181–188
7. Mattar SG, Bowers SP, Galloway KD, Hunter CD, Smith CD. Long-term outcome of laparoscopic fepair of paraesophageal hernia. Surg Endosc 2002, 16: 745–749
8. Keidar A, Szold A. Laparoscopic repair of paraesophageal hernia with selective use of mesh. Surg Laparosc Endosc 2003, 13: 149–154
9. Diaz S, Brunt M, Klingensmith ME, Frisella PM, Soper NJ. Laparoscopic paraesophageal hernia repair, a challenging operation: medium-term outcome of 116patients. J Gastroint Surg 2003, 7: 59–67
10. Targarona EM, Novell J, Vela S, et al. Mid term analysis of safety and quality of life after the laparoscopic repair of paraesophageal hiatal hernia. Surg Endosc 2004, 18: 1045–1050
11. Andujar JJ, Papasavas PK, Birdas T, et al. Laparoscopic repair of large paraesophageal hernia is associated with a low incidence of recurrence and reoperation. Surg Endosc 2004, 18: 444–447
12. Aly A, Munt J, Jamieson GG, Ludemann R, Devitt PG, Watson DI. Repair of large hiatal hernias. Br J Surg 2005, 92: 648–653
13. Ferri LE, Feldman LS, Stanbridge D, Mayrand S, Stein L, Fried GM. Should laparoscopic paraesophageal hernia repair be abandoned in favor of the open approach? Surg Endosc 2005, 19: 4–8
14. Targarona EM, Bendahan G, Balague C, Garriga J, Trias M. in the hiatus: a controversial issue. Arch Surg 2004, 139: 1286–1296
15. Targarona EM, Balague C, Martinez C, Garriga J, Trias M. The massive hiatal hernia: dealing with the defect. Semin Laparosc Surg 2004, 11: 161–169
16. Rice TW. Why antireflux surgery fails. Dig Dis 2000, 18: 43–47
17. Puri V, Kakarlapudi GV, Awad ZT, Filipi CJ. Hiatal hernia recurrence: 2004. Hernia 2004, 8: 311–317
18. Soper NJ, Dunnegan D. fundoplication failure after laparoscopic antireflux surgery. Ann Surg 1999, 229: 669–676
19. Catarci, M, Gentilkeschi, P, Papi, C, Carrara, A, Marrese, R, Gaspari, AL, Grassi, GB. Evidence-Based apparisal of antireflux fundoplication. Ann Surg 2004, 239: 325–337
20. Smith CD, McClusky DA, Rajad MA, Lederman AB, Hunter JG. When fundoplication fails: redo? Ann Surg. 2005, 241: 861–869
21. Greenwald D, Shumway S, Albear P, Gottlieb L. Mechanical comparison of 10 suture materials before and after in vivo incubation. J Surg Res 1994, 56: 372–377
22. Neo EL, Patkin M, Watson DI. Suturing efficiency during hiatal repair for laparoscopic fundoplication. ANZ J Surg 2004, 74: 13–17
23. Iqbal A, Kakarlapudi GV, Awad ZT, et al. Assessment of diaphragmatic stressors as risk factors for symptomatic failure of laparoscopic Nissen fundoplication. J Gastroint Surg 2006, 10: 12–21
24. Kakarlapudi GV, Awad ZT, Haynatzki G, Sampson T, Stroup G, Filipi CJ. The effect of diaphragmatic stressors on recurrent hiatal hernia. Hernia 2002, 6: 163–166
25. Stein HJ, Feussner H, Siewert JR. Failure of antireflux surgery: causes and management strategies. Am J Surg 1996, 171: 36–40
26. Roisch R, Junge K, Knops M, Lynen P, Klinge U, Schumpelick V. Analysis of collagen-interacting proteins in patients with incisional hernias. Langenbecks Arch Surg 2003, 387: 427–432
27. Basso N, DeLeo A, Genco A, Rpsato P, Rea S, Spaziani E, Primavera A. 360º laparoscopic fundoplication with tension free hiatoplasty in the treatment of symptomatic gastroesophageal reflux disease. Surg Endosc 2000, 14: 164–169
28. Hui, TT, David, T, Spyrou, M, Phillips, EH. Mesh crural repair of large paraesophageal hiatal hernias. Am Surg, 2001, 67:1170–4.
29. Kamolz, 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, 2002,16:572–7.
30. Frantzides CT, Madan AK, Carlson MA, Stavropoulos GP.. A prospective, randomised trial of laparoscopic polytetrafluoroethylene (PTFE) patch repair vs simple cruroplasty for large hiatal hernia. Arch Surg. 2002, 137:649–52.
31. Granderath FA, Schweiger UM, Kamolz T, Asche KU, Pointner R. Laparoscopic Nissen fundoplication with prosthetic hiatal closure reduces postoperative intrathoracic wrap herniation: preliminary results of a prospective randomized functional and clinical study. Arch Surg 2005, 140: 40–48
32. Oelschlager BK, Pellegrini CA. Paraesophageal hernias: open, laparoscopic, or thoracic repair?. Chest Surg Clin N Am 2001, 11: 589–603
33. Haas O, Rat P, Christophe M, Friedman S, Favre JP. Surgical results of intrathoracic gastric volvulus complicating hiatal hernia. Br J Surg 1990, 77: 1379 1381
34. Low DE, Unger T. Open repair of paraesophageal hernia: reassessment of subjective and objective outcomes. Ann Thorac Surg 2005, 80: 287–294

Discussion

Franzidis: *Prof. Fuchs, you mentioned that, at the end of the procedure or the hiatal hernia repair, the surgeon is always happy with the repair. I would disagree with that. I am often not happy with the primary repair. And I have some parameters where I would say that these patients, if I leave it the way it is, need one blow and then it will fall apart.*

Fuchs: *There is a randomized trial showing that it is helpful for the patient if you use a bougie, especially if you are not very experienced to prevent a long persisting dysphagia. I always advise in courses, that a bogie should be used in order to prevent a persisting dysphagia. I always tend to be happy at the end of the operation, and I am not happy when I try to change what I have done. As a matter of fact, I am pretty often happy. If the condition is bad, then I use a mesh. I shall be happy, when you have finished the study so that we have some data on it.*

Schumpelick: *If you do a normal hernia, stitching together, it doesn't work in an inguinal hernia or an incisional hernia. Should it work here? Why? It is a permanently moving muscle, you stitch it together and rely on that and say that this is hernia repair, and don't talk about reflux disease. I am talking about hernia repair. I will not be certain that this suture repair of the hiatus in the long run is sufficient. Have you any data? In my opinion, we are not treating the hernia.*

Fuchs: *Of course we are not sure. Later in the summary I will show some data on the number of patients that have a migration. You can ask a lot of people doing reflux surgery that having a migration is one of the problems. First of all again, fixing the oesophagus at the diaphragm with all its moving doesn't help. People who have done this, and I did this for a certain period, too, will experience that it becomes loose, because of all the movement and tension that there is. That is not enough. On the other hand, we have to narrow it in order to have at least some kind of resistance there. So the door is not wide open, but we cannot close it, this is our problem. What we at least can do is make sure that the narrowing that we can create during the operation will stay like this. We know from the randomized trials that the recurrence rate was 15%. That was reflux recurrence. We don't know the number of hiatal recurrences from the very few references where this is always documented. I agree with your opinion, that we don't treat the hernia.*

Köckerling: *I agree with Prof. Schumpelick's comment. The recurrences we have seen have always the same appearance. The Nissen fundoplication was intact, but the complete fundoplication slipped back into the thorax and again we have a widening of the hiatus, which is the problem. In my opinion we need a prospective randomized study comparing simple suture reconstruction and a reconstruction using additional mesh material.*

You have mentioned the close anatomical relation between the hiatus and the aorta. One very important step is to really dissect the aorta so that you can grasp enough of the muscle.

Fuchs: *I agree with the second, maybe also with the first comment. I have done two or three stitches in the aorta, and with compression there was never a problem. This can be really a problem for somebody who has no experience. Regarding the first comment, again I must say that I am sure that the meshes do have a role in narrowing the hiatus and making it stable. But, on the other hand, you cannot close this hernia as you can close an incisional or an inguinal hernia because you have a food passage here. If you close it more you will have side effects that the patient will not like. Even if you do a mesh on every patient you will still have a gap that you will need for the oesophageus, and through this gap you will have some kind of recurrence.*

Köckerling: *I tend now to say that the dysphagia we sometimes see in patients is induced more by the Nissen fundoplication and not by the very close suturing of the hiatus. This is our experience. What we do now is make a Toupet fundoplication and close the hiatus very densely with four to five stitches using additional latches. Since we have been doing this, we have never seen a patient with postoperative dysphagia. In my opinion it is more the fundoplication and not the closing of the hiatus.*

Fuchs: *I would disagree to that, because we have done a thousand Nissens. And others who have done more than a thousand Nissen fundoplications have not had this dysphagia as others have.*

Franzidis: *If you review the surgical literature it is not an American problem and not a European problem, it is a world-wide problem. The main reason for recurrence of symptoms in patients with hiatal hernia reflux is disruption of the hiatal hernia. When you claim that you can leave the hiatal defect unrepaired, I think it is a disservice to the patient. What must be done is prevent recurrence of hiatal hernia.*

Fuchs: *I agree completely with you. But you will not be able to do this even if you use a mesh. I have done redos where I found meshes all over the place. It also can create other problems.*

Read: *Dr. Targarona, some of these recurrences occur through the diaphragm itself to do the lateral cross, and they do not herniate through the esophageal hiatus.*

Targarona: *It is clear that hernia is mainly a disease of the elderly. I don't know if that favours the recurrence or*

if the older patients have more comorbidities, or difficult tissues that make solution different. Also it is important to remark that this special group of patients is sometimes frail, which is also to be considered. In order to know that you need a perfect anatomical hernia repair or we can have some tolerance with this. This is also a matter of discussion from the clinical point of view. If the hernia is through the oesphagus or through the lateral pillow I can not answer it really.

Ferzli: *A quick comment on what you have said. I saw your video and your standardization. Do you take a short gas track, because there is a recent paper from Kleiber, who uses the mesh routinely here in Switzerland? And they also don't take a short gas track.*

Targarona: *We take out the short vessels to avoid this for every dysphagia. In these patients it is probably much easier to dissect the sac. My practice now is to pull the stomach to go through the short vessels till the beginning of the sac in the inferior part of the left pillar and then you begin to dissect the sac and you can take it out.*

Fuchs: *There is an interesting discussion based on some randomized trials regarding the division of the short gastrics. If you summarize the four randomized trials that are available you are tempted to say it is not necessary, but it depends also on to what extent you dissect on the right side. If you minimize your dissection on the right side you need something on the left in order to dissect the hiatus. I also mobilize the fundus very posteriorly to make a symmetric wrap, but looking at the evidence from some randomized trials we must confess that the evidence is not clear, or rather controversial.*

Schippers: *I have a comment on technique and a question. You are in favour of placing a tube order to calibrate your fundoplication. I was afraid about this technique, because I had some better experience with our anaesthologists. From that time I switched to doing an intra-operative endoscopy after my procedure. If it is able to pass the hiatus without pushing, I am quite lucky with my operation.*

You mentioned cases of big defects in the diaphragm. With respect to the comment before, that we treat the defect and not the disease, do we really have any evidence-based literature which proves that we have to add a fundoplication after our repair of the defect?

Targarona: *I don't use calibration. I think it is finally not necessary. I am also afraid, because sometimes it can hurt the hiatal oesophagus and it is much more difficult to handle this disruption. With the cutting of the short vessels we can assure a really floppy Nissen.*

The disease is at the hiatus. But we destroy all the paraoesophageal attachment to the oesophagus. And at this moment the most accepted technique is to add a fundoplication.

Schippers: *I was not talking about the defect in the hiatus. I was talking about lateral defects in the diaphragm. Do we have to add a fundoplication in these patients?*

Targarona: *Then you need to put a mesh on the defect.*

Ferzli: *It is very controversial, because we are here as experts. But we are in the area of GIA on the one hand, and we have the experience that we are witnessing in these patients that when we do a band on them, they all get reflux; within a year when the laparoscopic lap bands all have oesophagitis and reflux. Yet when we scope a gastrectomy, they do not have a reflux. When we do the vertical banded gastroplasty with the resection of the upper part of the stomach, which is now the new vertical gastric, these patients have no reflux. My question is, shouldn't we move into a new area of technique where there is no wrap? There is now fear of migration of wrap, maybe there is no need to reconstruct a hiatus which is constantly under motion.*