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Thinking About Hiatal Hernia Recurrence After Laparoscopic Repair: When Should It Be Considered a True Recurrence? A Different Point of View

Italo Braghetto, Enrique Lanzarini, Maher Musleh, Owen Korn, Juan Pablo Lasnibat

Department of Surgery, Faculty of Medicine, Hospital Clínico Universidad de Chile "Dr José J. Aguirre," University of Chile, Santiago, Chile

Background: High rates of recurrence after laparoscopic hiatal hernia repair have been published. Most of these recurrences are asymptomatic and only diagnosed by endoscopic or radiologic studies. The definition of hiatal hernia recurrence is still under discussion.

Objective: This study aimed to define a true hiatal hernia recurrence using a score and classification criteria considering the presence of symptoms and size of the recurrence.

Patients and Methods: A total of 153 patients with giant hiatal hernia larger than 10 cm in diameter underwent an operation using a laparoscopic approach. Of these patients, 129 had a complete follow-up (3–5 years) after surgery, and they were the only ones included in this study. The IT system of our hospital was our database for data registration. A score and classification were designed for definition of a "true" hiatal hernia recurrence, based on postoperative symptoms and the presence or not of a hiatal hernia in both radiologic and endoscopic evaluations.

Results: Hiatal hernia recurrence based on endoscopic and/or radiologic hiatal hernia was found in 55 patients (42.6%), and only 28 of them (50.9%) had recurrent symptoms. Applying the score and proposed classification, no recurrence was considered in 18 patients (13.9%). Symptomatic and true recurrence were considered in 22.9% of patients (29 patients). Reoperation was needed for 7 patients (5.4%) because of symptomatic and radiologic recurrence.

Conclusions: Postoperative symptoms, endoscopic findings, or radiologic findings are important for the definition of the type of recurrence and for the indication of appropriate

Corresponding author: Italo Braghetto, Department of Surgery, Faculty of Medicine, Hospital Clínico Universidad de Chile "Dr José J. Aguirre," University of Chile, Santos Dumont 999, Santiago 8320000, Chile.
Tel.: +56229788334; Email: ibraghet@hcuch.cl

treatment. The proposed score and classification are useful in order to specify the hiatal hernia recurrence and treatment.

Key words: Hiatal hernia – Laparoscopic repair – Recurrence

There is an ongoing worldwide discussion regarding the high rate of recurrence after laparoscopic hiatal hernia repair, which can reach up to 66%, ranging from 1.2% to 66%, according to the vast available data.[1–6] A critical analysis of the reported results at 1 year has shown less recurrence after a mesh repair, but this issue is still controversial because of the great variability in technique, type of mesh, and size and shape of the hernia.[4–9] A higher rate of recurrence has been reported after laparoscopic repair, especially in giant hiatal hernias. The use of mesh can reduce the recurrence rate, and other authors have suggested performing the Collis Nissen procedure in patients with a hiatal hernia and short esophagus, reporting lower recurrence rates after this procedure.[8–11]

Most of these recurrences are asymptomatic and are only identified by endoscopic or radiological evaluations. When a recurrence is detected after surgery, they are frequently very small Type I sliding hernias, smaller than 3cm in size, in contrast with the giant preoperative hernias, which are usually 10 cm or larger and sometimes complicated with volvulus. In this situation, the recurrence appears insignificant.[11]

Therefore, concerns reside in whether this finding must be considered a "real" or "true" recurrence. Although there is no consensus, some authors have suggested criteria pertaining to issues of size, presence of symptoms, or impact on quality of life.[12,13]

The purpose of this study was to identify clinical, endoscopic, or radiologic characteristics in order to define when a true recurrence should be diagnosed.

Patients and Methods

A total of 153 patients with a large or giant hiatal hernia (more than 10 cm in size), independent of its type, were submitted for laparoscopic hiatal hernia repair, with a mean age of 69.5 years (range, 34–84 years). Of these patients, 129 (82.3%) completed a 3- to 5-year follow-up (range, 3–12 years) and they are the subject of this study. The patients' data were obtained from the digital clinical registry and the radiologic images from the digital imaging system of the radiologic department.

Table 1 shows the clinical characteristics as well as the size (major diameter) and type of hernia, according to the international classification. The size of the hernia was determined based on the radiologic visualization with barium sulphate swallow, measuring the axial and transverse diameters, and confirmation through laparoscopic exploration. During endoscopy, the length of the saccular formation with gastric folds in the distal esophagus, between the esophagogastric junction and hiatal constriction, was also measured.

Regarding the surgical technique, all patients underwent a laparoscopic approach, and no conversion to open surgery occurred.

The main steps of the technique are:

1. Hernia sac dissection: The sac is dissected starting 2 cm above the left crus in the mediastinal reflection. It is then possible to retract it down progressively to the abdominal cavity, dividing all the fibrotic attachments and vessels. The dissection continues towards the right crus, exposing the anterior face of the esophagus. The anterior trunk of the vagus nerve must be identified and preserved. The lateral and posterior face of the esophagogastric junction and distal esophagus is also dissected in order to mobilize the posterior portion of the sac, which is completely retracted to the abdominal cavity, exposing both the left and right diaphragmatic crus.

Table 1 Demographic characteristics of patients included (n = 129)

	Value
Male, n (%)	37 (28.7)
Female, n (%)	92 (71.3)
Mean age, y (range)	69.5 (34–88)
Type of hernia, n (%)	
I	52 (40.3)
II	9 (6.9)
III	49 (37.9)
IV	19 (14.7)
Size of hernia, n (%)	
10–14 cm	88 (62.2)
>15 cm	41 (31.8)

Table 2 Endoscopic and/or radiologic recurrence and presence of symptoms after surgery according to the type of preoperative hiatal hernia (n = 129)

Preoperative hiatal hernia	Endoscopic/radiologic recurrence, n (%)	Symptoms of recurrence, n (%)	Asymptomatic, n (%)
Type I (n = 52)	19 (36.5)	12 (63.1)	7 (36.9)
Type II (n = 9)	4 (44.4)	0	4 (100)
Type III (n = 49)	20 (40.8)	11 (55.)	9 (45)
Type IV (n = 19)	12 (63.2)	8 (66.6)	4 (33.3)
Total (n = 129)	55 (42.6)	31 (56.4)	24 (43.6)
Reoperation patients	7 (12.7)	7 (22.5)	0

2. Closure of the hiatus: closure is performed behind the esophagus using 3 to 4 nonabsorbable sutures. Frequently, an anterior closure of the pillars is also required in order to avoid angulation of the distal esophagus at the hiatus. In large hiatal hernias, a mesh is placed in an onlay fashion using Parietex or Ultrapro mesh.
3. Fundoplication: a calibrated fundoplication over a 36F bougie is performed with nonabsorbable sutures, wrapping the distal esophagus. Posterior gastropexy is added to attach the wrap to the sutured crus. An anterior fundophrenopexy is also performed almost routinely in order to prevent anterior migration of the wrap.
4. With the remnant of the hernia sac, the mesh is covered, in order to prevent late migration or erosion of the mesh into the esophagus.

Follow-up

To evaluate clinical recurrence, patients were evaluated at 6, 12, and 36 months after surgery. For objective imagenologic recurrence, patients underwent an upper endoscopy and barium sulphate swallow at 12 months after surgery, which was repeated if symptoms appeared afterwards. All patients were followed up annually with a clinical interview.

If patients presented any type of typical reflux symptoms (heartburn or regurgitation), respiratory symptoms (cough, dysphony), chest pain, or other symptoms suggesting the presence of reflux, endoscopy and barium swallow were repeated annually. Dysphagia, gas bloat syndrome, and belching were not considered recurrent symptoms because these symptoms are considered to be secondary to fundoplication itself.

For endoscopic recurrence, the presence of a saccular formation with gastric folds emerging from the distal end, associated with a dilated type III or IV cardia (Jobe-Hill classification) observed during the U-turn visualization, was considered as a recurrence.

Radiologic examination with barium swallow was performed in order to measure the length of the gastric segment above the diaphragmatic pillars

A score was determined taking into account the presence of symptoms (yes or no), the presence of a hiatal hernia, and the size at endoscopic and radiologic evaluation, assigning points according to the following score:

- Clinical evaluation: presence of symptoms. No = 0 points. Yes = 1 point.

Table 3 Type of postoperative endoscopic or radiologic recurrent hiatal hernia, depending on the preoperative hiatal hernia

		Type of recurrence, n (%)			
Preoperative hiatal hernia	Recurrence, n (%)	I	II	III	IV
Type I (n = 52)	19	16 (84.2)	3 (15.8)	—	—
Type II (n = 9)	4	4 (100)	—	—	—
Type III (n = 49)	20	18 (90)	2 (10)	—	—
Type IV (n = 19)	12	10 (83.3)	—	2 (16.7)	—
Total (n = 129)	55 (42.6)	48 (87.3)	5 (9.1)	2 (3.6)	—
Postoperative symptoms	31 (56.4)	27 (56.3)	2 (40)	2 (100)	—
Reoperation patients	7/31 (22.5) 7/55 (12.5) 7/129 (5.4)	3 (11.1)	2 (100)	2 (100)	

Table 4 Size of postoperative recurrent hiatal hernia depending on the size of the preoperative hiatal hernia

	n	Preoperative size, cm^2 (range)	Recurrence, n (%)	Size of recurrence, n (%)		
				<2 cm	3–5 cm	>5 cm
Preoperative size (diameter)						
10–14 cm	92	16.3 (15–18)	25	2	21	2
>15 cm	37	23.8 (20–28)	30	17	10	3
Total	129		55 (42.6)	19 (34.5)	31 (56.4)	5 (9.1)
Symptoms			1 (56.4)	1 (5.3)	25 (80.6)	5 (100)

- Endoscopy or radiology (presence of hiatal hernia). <2 cm = 0 points. 3–5 cm = 1 point. >5 cm = 2 points.

Classification of the recurrence was determined and defined as:

- No recurrences = 0 points.
- Relative asymptomatic recurrence = 1 point.
- Symptomatic absolute or "true" recurrence = 2–3 points.

Patients with "true" recurrence are candidates for resurgical repair.

Results

In Table 2, symptomatic recurrence according to the preoperative type of hiatal hernia can be seen. Hiatal hernia recurrence was observed in 55 patients (42.6%), but only 31 (56.4%) presented postoperative symptoms. In 19 patients (36.5%) with a type I hiatal hernia, 63.1% of them were symptomatic. In type II patients, 44.4% presented asymptomatic recurrence, and in patients with a type III hernia, 20 presented recurrence and 55% had symptoms. A total of 12 patients with a type IV hernia presented hiatal hernia recurrence, and 66.6% of them presented symptoms.

Table 3 shows the type of hiatal hernia recurrence for each type of preoperative hernia. In type I hiatal hernias, recurrence was observed in 19 patients, most of them presenting type I recurrence. In type II patients, recurrence type I occurred in 4 patients, all asymptomatic. In type III hernias, recurrence was detected in 20 patients, 90% of them with a type I recurrence. In type IV hernias, recurrence was detected in 12 patients, most of them also with type I recurrence. In total, the most frequent recurrence was type I hiatal hernia (87.3%). Reoperation was required in 7 of 55 patients (12.7%) because of symptomatic and radiologic recurrence (7 of 129 patients, corresponding to 5.4% of the total group)

The amount of recurrence after surgery is shown in Table 4. Of 92 patients with a preoperative hiatal hernia 10 to 14 cm in size, recurrence was observed in 25 patients. In this group, only 2 hernias were larger than 5 cm. In the group of preoperative hernias larger than 15 cm, 30 of them presented with recurrence, most of them smaller. Among patients with a recurrence smaller than 2 cm, 1 patient (5.3%) was symptomatic, whereas in the group of patients with a large hiatal hernia 80.6% presented recurrence and 100% of them presented symptoms.

The summary of results is presented in Table 5, which shows the endoscopic or radiologic recurrence according to type, size, and presence of symptoms. These results are also shown applying the score proposed in this paper.

Most of the patients with recurrence smaller than 2 cm did not present symptoms and were not considered as a true recurrence (score = 0). In patients with a recurrence between 3 and 5 cm (n =

Table 5 Summary of size, type, symptoms, and classification according to the score proposed (n = 55)

		Type, n				Symptoms, n		Score, n			Classification, n		
Size	n	I	II	III	IV	No	Yes	0	1	2	NR	RR	TR
<2 cm	19	16	3			18	1	18	1		18	1	
3–5 cm	31	27[a]	2	2		6	25		6	25		6	25
>5 cm	5	5				0	5						5
	55	48	5	2	0	24	31				18	7	30

NR, no recurrence; RR, relative recurrence; TR, "true" recurrence.

[a]27 = 2 without symptoms and 25 with symptoms.

Table 6 Endoscopic/radiologic recurrence of hiatal hernia versus symptomatic recurrence: literature review according to decade of the report

Years and authors	Recurrence, %	Symptomatic patients, %	Reoperation, %
1990s–2000s			
Wu[22]	23	21	2.8
Gantert[23]	5.4	NR	4
Hashemi[24]	42	24	0
Basso[25]	13.8	9	9
Frantzides[26]	22.2	NR	NR
2000s–2010s			
Diaz[27]	32	28	3
Wiechmann[28]	7	5	3
Khaitan[29]	40	8	NR
Mattar[31]	33	7	2.2
Targarona[30]	20	21	0
Granderath[16]	26	NR	NR
Luketic[3]	16	10	3
2011–2016			
Dallemagne[1]	66	25	3
Oeschlager[2]	57	44	3
Lidor[21]	28	3.6	3.6
Braghetto[17,a]	10.8	100	1
Priego[33]	9	6	5.4
Jones[4]	39	25	0.6
Koetje[20]	23	31	NR
2017			
Braghetto (current series)			
True symptomatic	23.3	56.4	5.4
Relative asymptomatic	5.4		

NR, not reported.

[a]Only symptomatic patients.

31), 6 of them did not present symptoms, and therefore they can be categorized as a relative asymptomatic recurrence (score = 1), and 25 symptomatic patients were classified as "true recurrence" (score = 2). All patients who presented symptoms, with recurrences larger than 5 cm, must also be considered as true symptomatic recurrence.

In summary, 55 patients (42.6%) were initially estimated as having a recurrence, but after applying the proposed score, there was no recurrence in 18 patients (13.9%), relative recurrence in 7 patients (5.4%), and true recurrence in 30 patients (23.3%).

Discussion

A great discussion has occurred during the last decade concerning the high recurrence rate after laparoscopic hiatal hernia repair. DeMeester[9] published a review on hernia repair and its technical details, with the advantages and disadvantages of each one. Soper and Teitelbaum[10] discussed very well the controversy regarding the results observed and concluded that hiatal hernia repair is a complex procedure that must be performed in specialized centers with a very careful technique. Regardless of this discussion, real recurrence continues to be high, but most of the recurrent patients are asymptomatic. Table 6 shows some of the published recurrence rates in the literature. This high recurrence could be multifactorial, due to patients' basal conditions, surgical technique, mesh placement and type, and follow-up, and also due to its variation in the endoscopic, radiologic, and symptomatic definitions. Recurrence has been observed in patients with or without mesh placement and has had an important variation on the reported rates. The controversy remains today, with the main points in discussion being:

1. In which type of hernia is recurrence more frequent?
2. Is the hernia size a risk factor for recurrence? Are large, giant, or complicated hiatal hernias associated with a higher rate of recurrence?
3. If a recurrence is confirmed, how often is the recurrence symptomatic?
4. Is the type of recurrent hernia similar to the preoperative hernia?
5. When should it be considered a true recurrence?

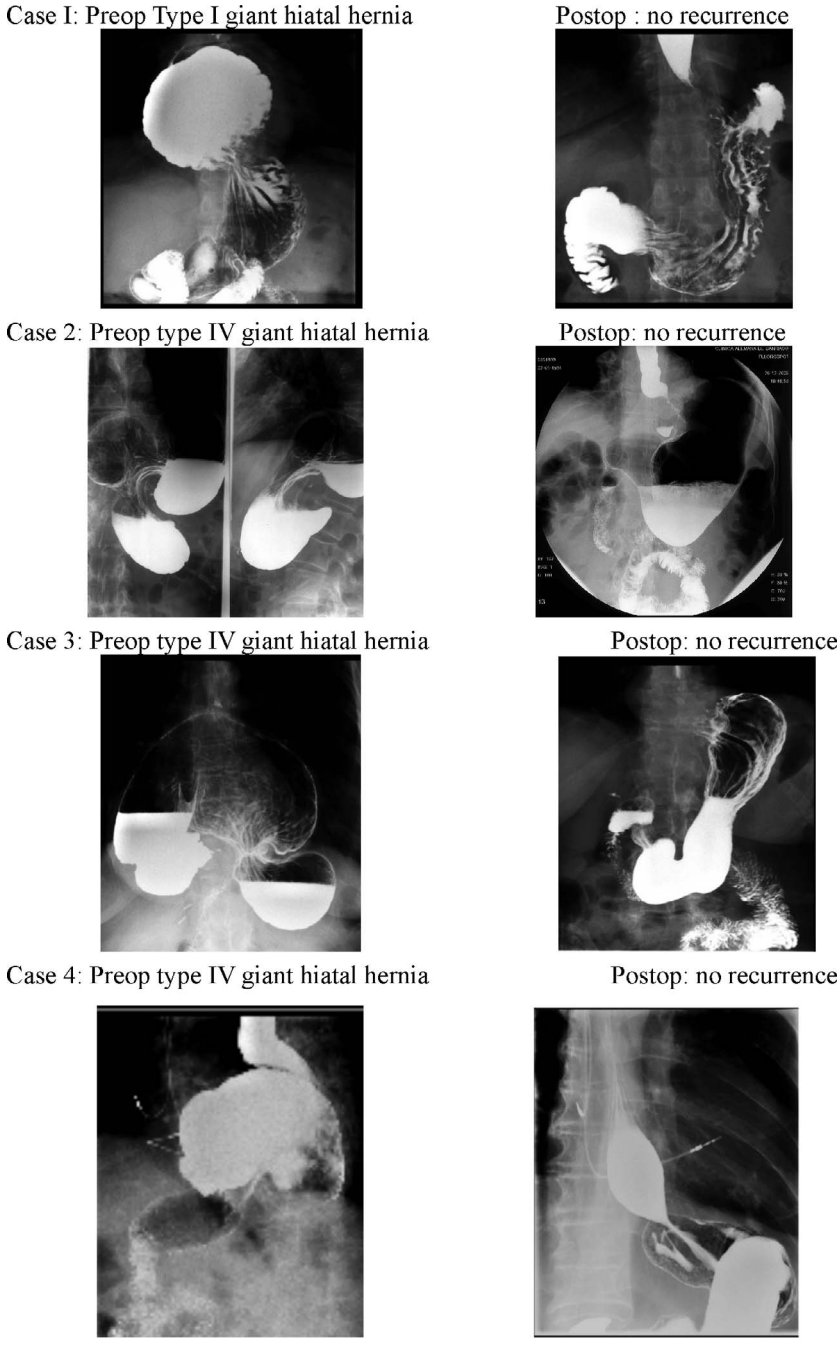


Fig. 1 Radiologic preoperative and postoperative evaluation without hiatal hernia recurrence: presentation of 4 examples (cases).

As previously reported, it has been clearly established that the size and type of hernia before surgery are the main factors for recurrence.[13] It is very important to consider the size of the herniated stomach and the hernia surface area, because as suggested by Koch *et al*,[14] Granderath *et al*,[15,16] and Braghetto *et al*,[17] hiatal hernias larger than 10 cm in diameter have a higher rate of recurrence. The Nebraska group presented a follow-up of 209 patients in which they demonstrated high recurrence rates that increased over time from 16% at 1 year up to 40% after 5 years.[4] The recurrence rate was higher for hernias larger than 5 cm (23% versus 16%), reaching 40% in patients with a new fundoplication for reherniation after surgery. These results are similar to the results published by Oeschlager *et al*[2,12] in their multicenter trial. This report concluded that for patients in whom the initial hiatal hernia

Case1. Preop large Hiatal hernia(15cm)

Postop : asymptomatic image of recurrence:
True recurrence?

Case 2: Preop large Hiatal hernia with Reflux symptoms and anemia

Postop: small asymptomatic hernia: True recurrence?

Fig. 2 Cases with large preoperative hiatal hernias: preoperative and postoperative control demonstrating a small asymptomatic hiatal hernia: true recurrence?

was large, the likelihood of developing a recurrence increased compared with those with smaller initial hernias. In our previously reported study,[17] recurrence occurred more frequently in patients with giant type III or IV hernias. The study reported a 10.8% rate of recurrence and a 0.8% rate of reoperation in patients with a recurrent hernia larger than 10 cm in size who were symptomatic.

A definition regarding the size of a recurrent hernia remains unclear. Dallemagne *et al*[1] chose 3 cm, but for other authors, recurrence is defined as any amount of esophagogastric junction migrating up into the mediastinum.[17,18] Lidor *et al*[13] considered >2 cm for the diagnosis of recurrence, with a 27.6% recurrence at a mean of 14 months of follow-up. The average postoperative hernia size was 3.6 ± 0.9 cm, with no relation between overall quality-of-life scores, symptoms, and presence of recurrent hernia. Only 1 patient required reoperation because of a recurrent hernia larger than 5 cm. Oeschlager *et al*[2] defined recurrence as being if the gastric segment ascends at least 2 cm above the diaphragm (24% measuring 20–39 mm and 33% measuring more than 40 mm), but with no mention of the type and size of the preoperative hernia. In the published literature, the size of a recurrent hernia is very variable, with a mean size of 4 cm (range, 2–7 cm in diameter) and with a recurrence rate ranging from 27% to 57%, without correlation between the size of the recurrent hernia and postoperative symptoms.[1,11–13] The range of asymptomatic recurrent hernia after laparoscopic repairs ranges from 30% to 95% of patients. In the study by Koch *et al*,[14] 95% of patients were asymptomatic, and reherniation was only detected radiologically. In other prospective randomized studies, hernia repair was compared with or without mesh placement, and no difference in symptoms between patients with or without recurrence was reported.[3,15,16,18,19] Dallemagne *et al*[1] published a 66% rate of radiologic recurrence, 38% smaller than 3 cm, and only 25% of patients presented reflux symptoms, with a very satisfactory quality of life. This paper reports 77% of patients used proton pump inhibitors preoperatively, and

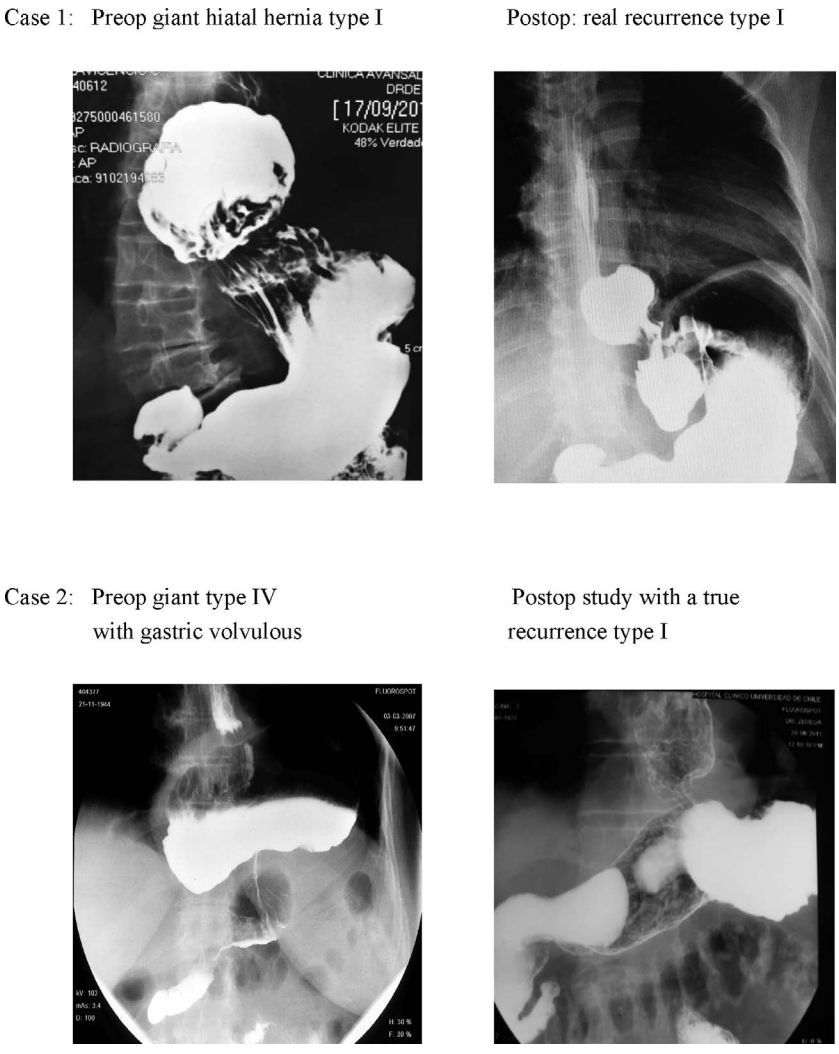


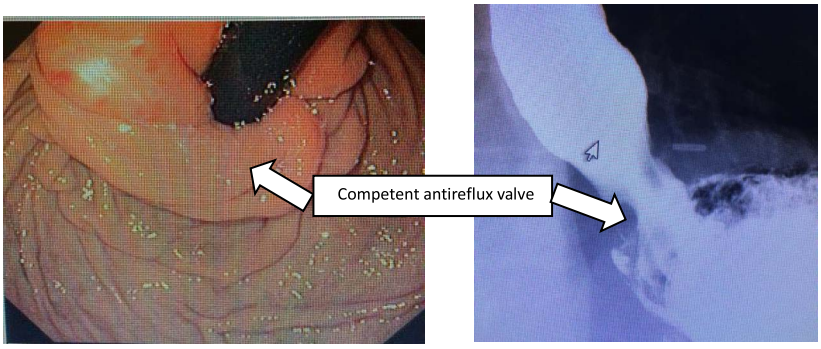
Fig. 3 Cases of true symptomatic hiatal hernia recurrence: preoperative and postoperative radiologic evaluation.

only 17% used them after the operation. Oeschlager *et al*[2,12] published very similar results.

In order to improve the diagnosis of hiatal hernia recurrence, some authors have analyzed objective recurrence and its association with symptoms. Koetje *et al*[20] and Lidor *et al*[21] have shown there was improvement in symptoms and quality of life after laparoscopic hiatal hernia repair. Koetje *et al*,[20] in order to define recurrence, studied patients using endoscopy and barium meal radiology and later classified them as being symptomatic or asymptomatic based on symptoms scores. Symptoms were classified as mental or physical. A recurrent hernia was defined as any evidence of stomach setting above the level of the diaphragm, regardless of the size. A recurrent hernia was defined as objective evidence of recurrent hernia and reflux symptoms (heartburn) with more than 3 points, with a score using a 0 to 10 scale. A total of 29 patients (23%) had recurrence, and only 9 (31%) were symptomatic, and the quality of life was significantly better after surgery. Lidor *et al*[21] showed there was a significant improvement in symptoms score in all patients, even in patients with recurrent hiatal hernia. Also, the quality-of-life index improved similarly. Most of the symptoms observed after surgery are secondary symptoms not associated with the recurrence. Oeschlager *et al*[12] also concludes that despite frequent radiologic recurrence, symptoms are well tolerated, patient satisfaction is very high, and reoperation rates are very low. In the study of the group of Jones *et al*,[4] preoperative symptoms improved in 70% of patients, despite the presence of a recurrent hiatal hernia.

Thus, our current opinion regarding this subject is that in order to define a hernia recurrence, both images and the associated symptoms must be taken into account. Analyzing the current data, if after the

Case 1: Hiatal hernia type I (10cm large) operated 12 months before.



Case 2: Hiatal hernia type I (10 cm large) : endoscopic control 12 monts after surgery

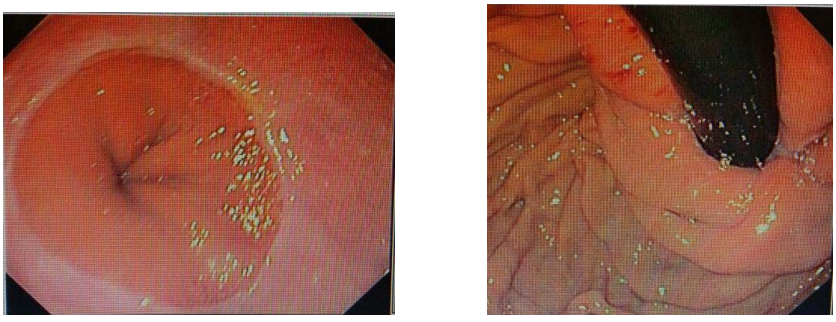


Fig. 4 Endoscopic and radiologic images after hiatal hernia repair: very good fundoplication without hernia recurrence.

repair of a large or giant hernia, a small, asymptomatic recurrent hernia is diagnosed, should it be considered a true recurrence? That is the question.

It should also be considered that both endoscopic and radiologic examinations have limitations. This merits further analysis because there is confusion between endoscopic or radiologic findings and their association with symptoms. In fact, when analyzing the endoscopic or radiologic recurrence applying the proposed score, the recurrence rate was different. There is also an enormous amount of variability among the endoscopic evaluations because the visualization of the gastric folds at the cardias zone is not always precise and does not always correlate with a hiatal hernia. Sometimes they match the invaginated folds secondary to the fundoplication itself performed during the repair. A dilatation of the distal esophagus with cardia type IV of the Jobe-Hill classification should be the only finding in a true recurrence. On the contrary, modifications of the esophagogastric junction should suggest, but not confirm, a true recurrence. Radiologic images with barium swallow also have limitations and are frequently reported as sliding hiatal hernia without

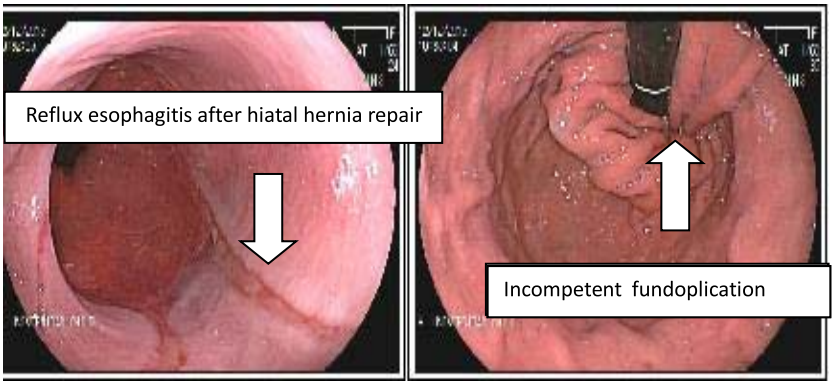


Fig. 5 Endoscopic control after surgery of a patient with recurrent symptoms: type C erosive esophagitis and a true hiatal hernia, failed fundoplication, dilated cardias, and proximal invagination of gastric folds.

considering the preoperative size of the hernia. We have observed asymptomatic small hernias of 5 cm in diameter after surgery; however, the preoperative diameter was more than 15 cm in diameter. In our opinion, this type of case must not be considered as a true recurrence.

The presence of gastric folds at the esophagogastric junction does not necessarily mean recurrence, because it could correspond to gastric folds secondary to the fundoplication. On the contrary, a secular formation with gastric folds above the esophagogastric junction should be considered a sign of recurrence. The following should also be taken into account, that in a radiologic examination it is difficult to determine a hiatal recurrence because sometimes the dilated esophagus phrenic ampulla is misinterpreted as a hiatal hernia. With all this information, it is clear that for a diagnosis of recurrent hernia, a thorough radiologic and endoscopic evaluation is required. Furthermore, hiatal hernia recurrence should be divided into different categories.

Should an asymptomatic hernia smaller than 5 cm in size be considered a recurrence? Figures 1, 2, and 3 present cases with preoperative and postoperative radiologic images of patients without recurrence (Fig. 1), images of a doubtful recurrence (Fig. 2), and cases in which true recurrences are evident (Fig. 3). An example of a very good antireflux valve evaluated with endoscopic and barium sulphate swallow is shown in Fig. 4. On the contrary, in Fig. 5, endoscopic reflux esophagitis associated with noncompetent fundoplication can be seen. With these data, it is possible to think that an asymptomatic small gastric reherniation is frequently observed after operation, without this being considered a true recurrence. This idea is also shared by Lidor *et al*.[21] The lengths of gastric folds observed above the esophagogastric junction should be separated into 3 categories: smaller than 2 cm, 3 to 5 cm, and larger than 5 cm. The following categorization of recurrence is proposed, assigning a score to the presence of symptoms, endoscopic findings and radiologic findings: no recurrence, 0 points; asymptomatic recurrence, 1 point (relative recurrence); and symptomatic recurrence, 2 to 3 points ("true" or absolute recurrence).

Conclusion

It is important to consider all preoperative and postoperative symptoms, endoscopic findings, or radiologic findings, and to apply the proposed score while considering these parameters in order to determine and classify the type of recurrence and be able to indicate the appropriate treatment. We think that "true" or absolute recurrences do not respond well to medical treatment, and therefore this should be an indication for reoperation.

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