

## Special article

## Complex hiatus hernias. Diagnostic and therapeutic management recommendations



### *Hernias de hiato complejas. Recomendaciones de manejo diagnóstico y terapéutico*

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## ABSTRACT

Hiatus hernia (HH) is a relatively prevalent condition in our setting, yet there is little clinical evidence or guidelines establishing precise recommendations for its diagnostic and therapeutic management.

In order to establish clinical recommendations for the diagnostic and therapeutic management of patients with complex hiatal hernia, defined as a primary type III or IV mixed hernia, a large one with > 30% of the gastric contents in the thoracic cavity, or a recurrence. This document was prepared based on current scientific evidence and the experience of a group of 28 expert surgeons, using GRADE methodology in order to establish recommendations on 13 controversial aspects related to this pathology.

Although the quality of evidence and the degree of recommendation are high in some areas, high-quality prospective clinical studies are needed to clarify certain unresolved points of controversy.

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RESUMEN

**Palabras clave:**  
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La hernia de hiato (HH) es una patología relativamente prevalente en nuestro medio, pero a pesar de ello existe escasa evidencia clínica y guías que establezcan recomendaciones precisas sobre su manejo diagnóstico y terapéutico.

Con el fin de establecer recomendaciones clínicas para el manejo diagnóstico y terapéutico de pacientes con hernia de hiato compleja, definida como aquella hernia primaria tipo III mixta y IV, aquella de gran tamaño con >30% del contenido gástrico en la cavidad torácica o recidivada, se ha elaborado este documento basado en la evidencia científica actual y la experiencia de un grupo de 28 cirujanos expertos. Para ello se revisó la bibliografía publicada y se empleó la metodología GRADE para establecer recomendaciones sobre 13 aspectos controvertidos en relación a esta patología.

A pesar de que en algunos puntos la calidad de evidencia y el grado de recomendación es elevado, es necesario la realización de estudios clínicos prospectivos y de calidad para aclarar ciertos puntos de controversia aún no resueltos.

**Introduction**

Hiatus hernia (HH) is a relatively prevalent condition in our setting (20%–30% of the population),<sup>1</sup> and 5.8% of cases are large.<sup>2</sup>

Despite the prevalence of this disease, there is little clinical evidence and few guidelines providing precise recommendations for its management, as there are many factors that can influence decision-making and the surgical techniques used, which can vary greatly between centres.

This document was prepared to establish clinical recommendations for the diagnostic and therapeutic management of patients with complex hiatus hernias (CHH), based on current scientific evidence and the experience of a group of expert surgeons.

**Methodology**

A group of 28 renowned expert surgeons, who are members of oesophagogastric surgery units and active participants in oesophagogastric surgery conferences, or are current or former members of the Board of the Oesophagogastric Surgery Section of the Spanish Association of Surgeons, drafted the document. They established recommendations on various key points in the diagnostic and therapeutic management of complex hiatus hernias. All participating experts evaluated and agreed upon the document as a whole.

Following an exhaustive literature review published in the PubMed, Web of Science, and Cochrane databases from 1995 to the present day, using keywords related to each point, the GRADE methodology (Table 1) was employed to determine the quality of the evidence and the strength of the recommendation for each of the points analysed:

These are the key points on which the recommendations will be based:

- 1 Definition of complex hiatus hernia

- 2 Clinical evaluation and diagnostic tests
- 3 Surgical indications
- 4 Contraindications and ‘borderline’ patients
- 5 Surgical approaches
- 6 Dissection and pillar closure techniques
- 7 Use of mesh in the surgical repair of complex hiatus hernias
- 8 Indication and types of fundoplication
- 9 Usefulness of gastropexy
- 10 Other surgical techniques in specific situations
- 11 Use of intraoperative endoscopy
- 12 Intraoperative and postoperative complications
- 13 Follow-up recommendations

**Definitions and recommendations from experts**

*Definition of complex hiatus hernia*

The definition of complex hiatal hernia is not straightforward. There is no single definition or international consensus on the matter. In general, it is recommended that complex hiatus hernias be considered to be mixed type III and IV primary hernias (with thoracic migration of other organs alongside the stomach),<sup>3,4</sup> large hernias with >30% of gastric content in the thoracic cavity, and recurrent hernias.<sup>5</sup>

However, there are parameters not included in this definition that are considered important in establishing the complexity of this pathology, such as measuring the diaphragmatic defect and the thickness and tension of the hiatus closure.

Although this type of hernia is not the most common, it can lead to complications such as bleeding, incarceration, and volvulus with or without necrosis and/or secondary perforation, which can result in increased morbidity and mortality and the need for emergency surgery.<sup>6,7</sup>

**Table 1**  
 GRADE quality of evidence levels and grades of recommendation.

Quality of evidence	Definition
High	Very high confidence: the true effect is close to the estimate
Moderate	Moderate confidence: the true effect is likely close but could be substantially different
Low	Limited confidence: the true effect could be substantially different
Very low	Very little confidence: the true effect is likely substantially different
Grades of recommendation	Definition
Strong	High-quality evidence Benefits clearly outweigh harms
Weak	Moderate or high-quality evidence The balance between benefits/harms and other factors suggest a weak recommendation (if based on consensus) Low, very low or absent quality of evidence, but with firm criteria that benefits >> harms

**Table 2**  
Diagnostic tests for complex hiatus hernias.

Diagnostic test	Level of evidence	Grade of recommendation
Plain X-ray	High	Strong
Barium contrast	High	Strong
Computed tomography	High	Strong
Upper gastrointestinal endoscopy	Moderate	Weak
High-resolution manometry	Moderate	Weak
pH monitoring	Low	Weak

### Clinical evaluation and diagnostic tests

The main objective of clinical evaluation is to obtain information about the clinical symptoms experienced.<sup>8,9</sup> While Borchardt's triad<sup>10,11</sup> (chest pain, nausea without vomiting, and inability to insert a nasogastric tube) is characteristic of an acute presentation, the clinical picture of the chronic process is more non-specific, presenting with early postprandial satiety and retrosternal and epigastric discomfort or pain. Symptoms such as nausea, dysphagia, regurgitation, coughing, and dyspnoea, as well as signs such as anaemia and electrocardiographic abnormalities are also common.<sup>12–16</sup>

The diagnostic study of these patients must be individualised. Although the diagnosis of complex hiatus hernia can be made by chest X-ray,<sup>17</sup> barium contrast studies enable the size of the hernia to be measured and the relationship of the oesophagogastric junction to the hiatus and the morphology of the oesophagus to be identified, and concomitant oesophageal pathology to be assessed.<sup>18,19</sup>

Computed tomography (CT) is useful in urgent situations for patients with suspected complications of hiatus hernia.<sup>20</sup>

Upper gastrointestinal endoscopy can be difficult to perform in cases of complex hernias, as the anatomy is altered and the passage is closed, as in gastric volvulus cases.<sup>21</sup> This technique can be useful for measuring the distance between the gastroesophageal junction and the diaphragmatic impression, as well as for visualising the gastric mucosa and identifying lesions.<sup>21,22</sup> In this field, artificial intelligence could assist with visualising and classifying the type of hernia from endoscopic images.<sup>23</sup>

Although high-resolution manometry can help to identify motility problems and accurately locate the pressure of the crura diaphragm on the stomach, it is not always physically feasible in cases of large hernias involving rotation of the axis or very large paraoesophageal hernias.<sup>24</sup> The results of pH monitoring and gastric emptying studies are also unreliable in this context.<sup>24,25</sup>

Table 2 outlines the levels of evidence and the degree of recommendation for performing these tests in the diagnostic process for complex hiatal hernias.

### Surgical indications

Before considering surgical repair, the type, size and clinical presentation of the hernia, as well as potential complications and individualised surgical risk, should be assessed.<sup>26</sup> There is no evidence in the literature to support the surgical treatment of asymptomatic hiatal hernias; therefore, it is not recommended. (*Moderate quality of evidence. Strong grade of recommendation*).<sup>27</sup> In the case of a symptomatic hernia, the patient's risk factors and the risk of complications must be assessed individually in order to determine the need for surgery (*Moderate quality of evidence. Strong grade of recommendation*).<sup>26</sup> Based on this, surgical repair of symptomatic type III and IV hiatus hernias is recommended,<sup>18,28</sup> especially those that cause obstructive symptoms or if the patient has a history of gastric volvulus or risk of incarceration.<sup>29–31</sup> (*High quality of evidence. Strong grade of recommendation*).

Emergency surgical repair is associated with poorer postoperative outcomes and higher morbidity and mortality. Therefore, optimisa-

tion prior to surgery is recommended if there are no clinical data or signs of perforation, necrosis, or volvulus<sup>32,33</sup> that require urgent repair (*Low quality of evidence. Strong grade of recommendation*).

### Contraindications and 'borderline' patients

To indicate elective repair of complex hiatus hernias and assess the patients' operability, it is recommended that a pre-anaesthetic study be performed and serious medical conditions optimised (*Low quality of evidence. Strong grade of recommendation*).

Two clinical scenarios are frequently associated with these hernias: advanced age<sup>34–36</sup> and obesity. The quality of studies evaluating surgical treatment in elderly patients is low, but many authors conclude that there is no difference in morbidity and mortality between elderly and younger patients.<sup>37,38</sup> Conversely, others observe a higher risk,<sup>39</sup> and therefore consider observation to be advisable in paucisymptomatic individuals over 65 years of age.<sup>40</sup> Therefore, although age does not seem to preclude elective surgical treatment, prospective randomised studies are necessary to reach firm conclusions. Obesity is an independent risk factor for hiatus hernia<sup>41</sup> and is associated with recurrence after surgical repair.<sup>42,43</sup> Therefore, in these patients (with a BMI greater than 30 kg/m<sup>2</sup>) Roux-en-Y gastric bypass may be recommended during the same surgical procedure.<sup>44,45</sup> Obesity is not a contraindication for surgery, but weight reduction in these patients would be advisable before the procedure (*Low quality of evidence. Strong grade of recommendation*).

### Surgical approach

#### Thoracotomy vs laparotomy

Traditionally, this type of hernia has been repaired using either a transthoracic or an open transabdominal approach.<sup>46</sup> Although the transthoracic approach offers excellent visualisation of the hiatus and oesophagus, allowing maximum oesophageal mobilization,<sup>47–49</sup> transabdominal access is not inferior to thoracic access for hernia repair<sup>18</sup> and is associated with less morbidity and a shorter postoperative recovery time. This makes it the preferred option, except in exceptional circumstances.<sup>50</sup> (*Moderate quality of evidence. Strong grade of recommendation*).

#### Laparotomy vs laparoscopy

The laparoscopic approach has been shown to be equally effective, with a significantly lower rate of perioperative complications, mortality, and hospital stays than the open approach.<sup>51–54</sup> It is therefore recommended as the standard approach for this type of surgery<sup>18</sup> (*High quality of evidence. Strong grade of recommendation*). When performed by expert surgeons, the laparoscopic approach is viable and safe, with low morbidity and mortality rates and optimal results.<sup>52</sup>

#### Robotic vs laparoscopic approach

Three large meta-analyses have been conducted in recent years to compare laparoscopic and robotic approaches. Although one study revealed a slight decrease in postoperative complications and hospital stays in the robotic group, none of the studies showed significant differences in intraoperative complications, operating times, or 30-day readmission rates.<sup>55–57</sup> Therefore, based on the current evidence, the robotic approach cannot be recommended over the laparoscopic approach (*Low quality of evidence. Weak grade of recommendation*).

#### Dissection and closure techniques for hiatal pillars

Although the level of evidence in the available literature is low, certain recommendations can be made regarding pillar closure based on expert opinion, case series, and retrospective studies.

During hiatal dissection, the peritoneum covering the pillars should be preserved wherever possible, and the hernial sac should be completely excised.<sup>58,59</sup> Adequate mediastinal dissection of the oesophagus should also be performed to achieve at least 2.5–3 cm of abdominal oesophagus.<sup>60,61</sup> (*Moderate quality of evidence. Strong grade of recommendation*). In addition, tension-free closure of the pillars should be achieved using techniques such as creating a capnothorax via unilateral or bilateral pleurotomies<sup>62</sup> or performing relaxation incisions<sup>63–65</sup> (*Low quality of evidence. Weak grade of recommendation*).

Traditionally, the pillars are closed using non-absorbable loose sutures spaced 1 cm apart, although the use of non-absorbable continuous barbed sutures has also been described.<sup>27,66,67</sup> If adequate closure cannot be achieved with three posterior single sutures, the procedure should continue anteriorly to prevent bending of the oesophagus.<sup>48,51,68–70</sup> To reinforce the pillars adequately, sutures supported by PTFE patches,<sup>71</sup> pedicled flaps from the round ligament,<sup>72,73</sup> or the posterior rectus sheath,<sup>74</sup> and mesh, may be used (*Low quality of evidence. Weak grade of evidence*).

#### *The use of mesh in the surgical repair of complex hiatus hernias*

The use of mesh in hiatal hernia surgery remains controversial. Based on the current scientific evidence,<sup>26</sup> no clear recommendation can be made regarding the use of mesh to repair hiatus hernias (*Low quality of evidence. Weak grade of recommendation*).

The most recently published meta-analyses,<sup>74–81</sup> provide arguments both for and against the use of mesh in the hiatus. However, there is significant heterogeneity in terms of the type of mesh, its material properties, size, shape, and positioning within the hiatus, as well as fixation and whether or not it is associated with closure. There are also differences in the indications for surgery, the definition of recurrences and the follow-up period.

According to expert recommendations,<sup>82–84</sup> mesh placement is recommended in hiatal hernia surgery for large paraoesophageal hernias (>50% of the intrathoracic stomach), when the distance between the right and left branches of the right diaphragmatic pillar is >4 cm, and/or in cases of crural atrophy with a thickness of one or both pillars of <.5 cm, as well as in cases of reoperation on the hiatus due to recurrence (*Low quality of evidence. Weak grade of recommendation*).

Regarding the use of absorbable, non-absorbable, or partially absorbable meshes in the hiatus, there is also no robust scientific evidence to suggest that one is superior to another,<sup>85,86</sup> and the results of studies are inconclusive (*Low quality of evidence. Weak grade of recommendation*). The only point on which there seems to be consensus is that non-absorbable mesh carries a greater risk of visceral wall erosion.

#### *Indication and types of fundoplication*

Whether fundoplication should be routinely performed alongside hiatal hernia repair remains a controversial issue. There is no high-level evidence to support this practice, and case series studies constitute the majority of the empirical basis, except for a few randomised trials with few cases.<sup>87</sup> Some authors therefore argue that restoring the anatomy and adequately repairing the oesophageal hiatus can resolve pre-existing gastro-oesophageal reflux.<sup>88</sup>

Arguments in favour of fundoplication include the high prevalence of gastro-oesophageal reflux (80% of patients with hiatal hernias),<sup>48</sup> the presence of an incompetent lower oesophageal sphincter in many cases,<sup>89</sup> and the risk of postoperative gastro-oesophageal reflux following hiatus hernia repair, which is close to 30%.<sup>90</sup> Furthermore, some authors suggest that fundoplication promotes intra-abdominal anchoring of the oesophagogastric junction, thereby reducing the risk of hernia recurrence.<sup>91</sup>

Based on this, the routine addition of fundoplication in hiatus hernia repair is recommended in the following circumstances<sup>18</sup> (*Low quality of evidence. Strong grade of recommendation*):

- 1 Patients with gastroesophageal reflux disease (GORD) refractory to medical treatment.
- 2 Patients with hiatus hernia and severe oesophagitis and/or symptomatic Barrett's oesophagus (Los Angeles grades C and D).
- 3 Complications arising from GORD such as peptic ulcers, severe stenosis, chronic anaemia, aspiration pneumonia, or asthma attacks.
- 4 Hiatus hernias >5 cm with GORD demonstrated in functional studies and poorly controlled with medication.
- 5 Undesirable adverse effects or intolerance to medication.

Regarding the type of fundoplication to be performed, the personalised approach to fundoplication based on the presence of oesophageal motor disorders remains under debate. In this regard, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) concluded that, in the absence of achalasia or scleroderma, such an approach is not justified (*Low quality of evidence. Weak grade of recommendation*).<sup>92</sup> Based on recently published studies, it appears that partial fundoplications (Toupet) result in less postoperative dysphagia and better quality of life outcomes compared to total fundoplication (Nissen).<sup>93</sup>

#### *Usefulness of gastropexy*

Gastropexy can complement the repair of complex hiatus hernias to reduce the risk of recurrence in the medium term<sup>94–99</sup> (*High quality of evidence. Weak grade of recommendation*). It can also be used on its own in patients with intraoperative instability and/or in emergency surgery situations, even by surgeons without oesophagogastric experience. While this is a safe option, it has a higher recurrence rate than when accompanied by hiatal repair<sup>34,100</sup> (*Moderate quality of evidence. Weak grade of recommendation*).

In terms of surgical technique, fixation of the anterior surface of the gastric body or antrum to the abdominal wall using non-absorbable sutures,<sup>34</sup> such as T-anchors,<sup>101</sup> are both valid options. Endoscopic<sup>102</sup> or surgical gastrostomy, should be reserved for very select cases of gastric fixation, for decompression or feeding due to malnutrition or severe limitation of intake.<sup>103</sup> (*Moderate quality of evidence. Weak grade of recommendation*).

#### *Other surgical techniques in specific situations*

The existence of a short oesophagus is still controversial, but it may play an important role in disease recurrence due to increased axial tension. A short oesophagus should be diagnosed intraoperatively if, after adequate mobilisation of the oesophagus in the mediastinum, it is not possible to achieve 2 cm of tension-free abdominal oesophagus.<sup>104</sup>

The most popular technique for oesophageal lengthening is currently laparoscopic Collis-type gastroplasty, which was introduced by Terry in 2004.<sup>105</sup> In specialised units, this technique has low morbidity and a degree of long-term satisfaction similar to that of conventional fundoplication.<sup>106</sup>

For obese patients, laparoscopic Roux-en-Y gastric bypass combined with hiatus hernia repair is recommended (*Moderate quality of evidence. Strong grade of recommendation*).<sup>107,108</sup> This technique enables significant weight loss and controls reflux symptoms, reducing intra-abdominal pressure<sup>109</sup> and the risk of recurrence compared to an isolated repair.<sup>110</sup>

The management of recurrent hiatus hernias should be based on the patient's symptoms. Asymptomatic recurrences can be managed conservatively with surveillance (*Moderate quality of evidence. Strong grade of recommendation*).<sup>111,112</sup> For symptomatic recurrences, revi-

sion surgery to close the hiatal defect and redo the fundoplication is the best option (*Moderate quality of evidence. Strong grade of recommendation*).<sup>108</sup> This sometimes requires the use of techniques such as Collis-type gastroplasty<sup>113</sup> or hiatal reinforcement with mesh.<sup>114</sup>

#### Use of intraoperative endoscopy

The use of intraoperative endoscopy could be considered in complex hiatus hernia repair surgery, as it can aid decision-making and reduce the complication rate (*Low quality of evidence. Weak grade of recommendation*). Although there are no randomised controlled trials or established recommendations on its use,<sup>18,115</sup> some experts advocate its use in complex hiatus hernia surgery, as it allows identification of the oesophagus and oesophago-gastric junction during dissection,<sup>116</sup> ensures adequate intra-abdominal oesophageal length,<sup>117,118</sup> and evaluates the symmetry and fit of anti-reflux procedures,<sup>119,120</sup> helping to identify possible complications.<sup>121</sup>

#### Intraoperative and postoperative complications

The incidence of complications following this surgery varies greatly between published series (between 3% and 45%),<sup>122</sup> their onset being related to factors such as the presence of comorbidities,<sup>123–127</sup> hernia size, revision surgery, anticoagulation,<sup>128</sup> less experienced surgeons,<sup>129</sup> emergency surgery,<sup>130</sup> and open surgery.<sup>131</sup>

Intraoperative perforation is one of the most severe complications, but excellent results are produced by its diagnosis and repair with suturing and coverage with fundoplication.<sup>132</sup>

The development of intraoperative pneumothorax does not usually cause clinical symptoms or require treatment; however, when ventilation is hindered, it is recommended that the pressure of the pneumoperitoneum be reduced and the ventilation frequency increased.<sup>132</sup>

Late dysphagia may have multiple causes (very tight fundoplication or hiatal closure, angulation of the oesophagus, reherniation, or hiatal fibrosis, among other factors) and can be managed with endoscopic dilation and/or revision surgery.<sup>130,132</sup> Other complications such as excessive bloating or diarrhoea are usually treated medically.<sup>132</sup>

#### Follow-up recommendations

Although there is a higher risk of recurrence in the first two years, there is no evidence regarding the frequency of visits and postoperative follow-up.<sup>26,83,133</sup> Therefore, follow-up during this period is recommended in order to accurately assess the results,<sup>134,135</sup> (*Low quality of evidence. Strong grade of recommendation*).

Clinical experience and published literature do not demonstrate a clear correlation between anatomical recurrence and patient symptoms,<sup>18,84,136</sup> so the following recommendations can be made:

- In asymptomatic patients, additional tests are unnecessary<sup>135,136</sup> (*Moderate quality of evidence. Strong grade of recommendation*).
- In symptomatic patients, oesophago-gastric transit testing is recommended (*Moderate quality of evidence. Strong grade of recommendation*). Other useful tests with a weak grade of recommendation are endoscopy, thoracoabdominal CT scanning, and functional pH monitoring and manometry.<sup>135</sup>
- There is controversy regarding the correlation between recurrence and quality of life, as most small radiological recurrences are not clinically significant. Based on this, it is recommended that quality of life questionnaires be used in the follow-up of these patients.<sup>136</sup> (*Low quality of evidence. Weak grade of recommendation*)

#### Final comments

This manuscript sets out recommendations for the diagnosis and treatment of patients with complex hiatus hernias. While many issues remain controversial, from definition and diagnosis to postoperative follow-up, this article brings together the currently available evidence and the clinical experience of expert surgeons in this field. It defines strategies and recommendations that will help to standardise management in routine clinical practice. However, there is a clear need for high-quality, prospective clinical studies to address the points of controversy raised in this article.

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