Modern diagnosis and treatment of hiatal hernias

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MODERN DIAGNOSTICS AND TREATMENT OF HIATAL HERNIAS

Graduate thesis

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LIST OF ABBREVIATIONS

HH – Hiatal Hernia

GERD – Gastroesophageal reflux disease

SAGES – Society of American Gastrointestinal and Endoscopic Surgeons

GEJ – Gastroesophageal Junction

PEH – Paraesophageal Hernia

CT- Computed Tomography

EGD – esophagogastroduodenoscopy

LNF – Laparoscopic Nissen Fundoplication

LPF – Laparoscopic Partial Fundoplication

LHG – Laparoscopic Hill Gastropexy

MSA – Magnetic Sphincter Augmentation

TIF – Transoral Incisionless Fundoplication

RNF – Robot assisted Nissen Fundoplication

TF – Toupet Fundoplication

LSG – Laparoscopic Sleeve Gastrectomy

GERD–HRQL – Gastroesophageal reflux disease – Health Related Quality of Life

HH+TIF – Hybrid repair

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ABSTRACT

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Key words: Gastroesophageal reflux disease, Hiatal Hernias,, Nissen Fundoplication

Hiatal hernias are an entity that was first clinically defined in the 20th century and went from an obscure, overlooked disease to a well known clinical entity with several diagnostic and treatment modalities, which are developing to this day.

Hiatal hernias are defined as a condition in which elements of the abdominal cavity, most commonly the stomach, herniate through the esophageal hiatus into the mediastinum. They are closely associated to gastroesophageal reflux disease.

Due to the specific nature of classification of hiatal hernias and their diverse presentation, it has lead to different treatment modalities, which vary from pharmaceutical, through the use of proton pump inhibitors and H_2 blockers, to surgical, through the use of numerous techniques. Whilst the pharmaceutical options remained relatively unaltered since their inception, the surgical treatments developed from an open transthoracic, transabdominal approach to laparoscopic approaches and beyond.

This graduate thesis intends to present the various modern surgical treatment modalities, which were built upon the experiences of pioneers in the field of antireflux surgery throughout the last 80 years. The main focus of this paper is the presentation of the newest surgical techniques, which aim to improve the outcomes of surgical procedures related to hiatal hernias and gastroesophageal reflux.

SAŽETAK

Oliver Marcel Koltay

Ključne riječi: Gastroezofagealna refluksna bolest, Hiatalne kile, fundoplokacija po Nissenu

Hiatalne kile ili ošitne kile su entitet koji je prvi put klinički definirao u 20. stoljeću i prešao je iz opskurne, zanemarene bolesti u poznati klinički entitet s nekoliko dijagnostičkih i terapijskih modaliteta, koji se razvijaju do danas.

Hiatalne kile definiraju se kao stanje u kojem elementi trbušne šupljine, najčešće želudac, hernijiraju kroz hijatus jednjaka u medijastinum. Hiatalne hernije su usko povezane sa gastroezofagealnom refluksnom bolešću.

Zbog specifičnih kriterija za klasifikacije hijatalnih kila i njihove raznolike prezentacije, dolazi do različitih modaliteta liječenja. Modalitet ukljucuju korištenje farmaceutske lijekova poput inhibitora protonske pumpe i blokatora H_2 do korištenjem brojnih kirurskih tehnika. Dok su farmaceutske opcije ostale relativno nepromijenjene od svog osnutka, kirurški tretmani razvili su se kroz niz godina iz otvorenog transtorakalnog, transabdominalnog pristupa do laparoskopskih pristupa ,...

U ovom diplomskom radu namjeravamo prikazati različite suvremene modaliteti kirurškog liječenja, koji su dograđeni na iskustvima pionira u području antirefluksne kirurgije tijekom posljednjih 80 godina. Glavni fokus ovog rada je prezentacija najnovijih kirurških tehnika, čiji je cilj poboljšanje ishoda kirurških zahvata vezanih uz hijatalne kile i gastroezofagealni refluks.

INTRODUCTION

Hiatal hernia (HH) occurs quite frequently in the general population and is characterized by a wide range of non-specific symptoms, most of them related to gastroesophageal reflux disease (GERD).[1] HH refers to conditions in which elements of the abdominal cavity, most commonly the stomach, herniate through the esophageal hiatus into the mediastinum.[2] HH are a clinical entity that has seen a lot of development in diagnostics and treatment throughout the 20th century, culminating in the development of surgical treatment with improvements in outcomes. With the improvement of diagnostic methods such as x-ray imaging, they became a known clinical entity, with a warrying set of symptoms, mostly relating to GERD. The incidence of GERD continues to rise worldwide, with an estimated prevalence of 18–28% in North America and 9–26% in Europe.[3] As pharmacological treatment modalities were improved, with the introduction of proton pump inhibitors (PPIs) and histamine type-2 receptor antagonists (H_2 blockers), so too the surgical interventions were markedly improved. The modern guideliness for diagnostics and management of HH were published by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) in 2013.

This graduate thesis aims to present HHs, their presentation, diagnostic requirements and various modern surgical treatment modalities with their respective outcomes.

HISTORY OF DIAGNOSIS AND TREATMENT OF HIATAL HERNIAS

HH, of the congenital and posttraumatic etiology, were described from the 16th century onwards. Although Galen first described esophagitis almost 2000 years ago, its relation to acid was only recognized in the 19th century (1855) by Rokitansky[4], even though the connection between gastroesophageal reflux and esophagitis in a child was previously described by Billard[5] in 1828. Contemporary clinicians, such as Zenker[6] and Mackenzie[7] saw no clinical relevance in this correlation.

With the advent of x-ray diagnostics in the beginning of the 20th century acquired HH were recognized as an important clinical entity, especially through the use of barium enhanced radiography, even though the relationship between GERD and HH was only definitively established in the 1950s.

The first documented case of a living patient with HH was identified by Eppinger in 1904[8], through the use of auscultation followed up by x–ray to confirm his findings. He followed up his work with an extensive review of available literature on HH, collected from postmortem analysis in 1911. However, the first to connect the typical symptoms of HH (indigestion) to the disease were Friedenwald and Feldman[9] in 1925. They believed that the cause of the hernia was the failure of the muscle surrounding the diaphragm to closely encircle the esophagus.[10] In the following year Akerlund[11] was the first to propose the term hiatal hernia and establish their classification stating: “Diaphragmatic hernia through the esophageal hiatus may properly be termed hiatus hernia. They are most often true nontraumatic hernias and can be classified in 3 groups: a) hiatus hernias with congenitally shortened esophagus (thoracic stomach), b) paraesophageal hernias, c) hernias not included in a and b.”

The first to propose a surgical treatment was Soresi in 1919 stating: “The safe and perfect closure of the opening in the diaphragm is obviously of the utmost importance: the suture has to close in the most perfect manner the opening of the diaphragm especially around the organs that pass through it, esophagus, vena cava, aorta, but without compressing the important organs just mentioned. If the esophagus or the aorta are found in the gap the stitch is somewhat modified: The needle goes through the most superficial layer of the organ that is included in the gap, but the surgeon must be exceedingly careful not to enter the lumen of the organ.”[12]

The modern era of antirefulux surgery began with Allison and his seminal paper published in 1951[13], he aimed to “emphasize the relation between the altered physiology at the cardia, and a common form of indigestion consisting mainly of heartburn, gastric flatulence and postural regurgitation”. He attributed the occurrence of these symptoms to reflux esophagitis due to incompetence of the gastroesophageal junction and he stated that “the cause of the incompetence is a sliding hernia of the stomach through the esophageal hiatus of the diaphragm into the posterior mediastinum.” Allison focused on the crural sling as the key factor in preventing reflux. He believed these crural fibers functioned as a pinchcock to prevent reflux. His transthoracic surgical technique consisted of (1) reduction of the herniated cardia back into the abdomen; (2) retention of the cardia to that position by suturing the phrenoesophageal ligament and peritoneum to the abdominal aspect of the diaphragm; and (3) approximation and *light* suture of the crural fibers behind the esophagus.[10] He followed up his work with a 20 year retrospective analysis, in which he reported a recurrence of the hernia or gastroesophageal reflux in

49% of his sliding HH repairs. [10,14] However it must be stressed that in the majority of cases he reported lesser symptoms in the patients who presented with a recurrence.

As his contemporary Barret took a different approach to the treatment of acid reflux, by focusing on the restoration of the cardioesophageal angle, since he postulated the presence of a fold of mucosa at the gastroesophageal junction that functioned as a flap valve.[15]

The confluence of 2 streams of thought, the anatomic focusing on herniation and the physiologic focusing on acid reflux, were critical to the development of modern hiatal hernia surgery. The identification of the lower esophageal sphincter and use of manometry were reported in 1956. Esophageal pH monitoring would come 2 decades later. These tools linked anatomy and physiology to permit accurate diagnosis of reflux disease and provided an objective standard for evaluation of surgery. In the midst of this physiologic revolution, Nissen and Belsey developed the operations used by most surgeons in the 21st century.[10]

ETIOLOGY OF HIATAL HERNIAS

The etiology of HH is multifactorial but can usually be attributed to a combination of a lax esophageal hiatus and prolonged increased intra-abdominal pressure.

The factors affecting the strength of the esophageal hiatus are as follows:

1. Advanced age - the phrenoesophageal ligament weakens with increasing age
2. Smoking – causes a loss of elastin fibers in the diaphragmatic crura, leading to its weakening
3. Obesity – the deposition of fat in and around the crura widens the hiatus
4. Genetic predisposition – especially genetic variations relating to connective tissue structures and those involved in the regulation of smooth muscle function

The factors that cause prolonged periods of increased intra-abdominal pressure can be summarized as follows:

1. Pregnancy
2. Ascites
3. Chronic cough
4. Chronic constipation

Being overweight and elderly are the key risk factors in its development. Other known risk factors include multiple pregnancies, history of esophageal surgery, partial or full gastrectomy and certain disorders of the skeletal system associated with bone decalcification and degeneration.[1] Approximately 55%-60% of individuals over the age of 50 have a hiatal hernia. However, only about 9% have symptoms.[16]

CLASSIFICATION OF HIATAL HERNIAS

Hiatal hernias are classified according to the increasing severity of protruding intra-abdominal viscera through the esophageal hiatus (types I-IV).[17]

HH are classified into the following 4 types[16]:

1. TYPE I (or sliding HH) – the gastroesophageal junction (GEJ) and gastric cardia slide superiorly into the posterior mediastinum due to the widening of the esophageal hiatus, whilst the gastric fundus remains below the diaphragm forming a so called »hourglass stomach«

2. TYPE II (or paraesophageal HH) – a portion of the gastric fundus herniates into the thorax, whilst the GEJ remains in its anatomical position bellow the diaphragm

3. TYPE III (or mixed HH) – a combination of type I and type II, in which the GEJ and a portion of the gastric fundus prolapse through the hiatus

4. TYPE IV (or complex HH) – in addition to the herniation of the stomach, there is also an additional herniation of another abdominal structure (eg. Spleen, colon, omentum)

The most common type of HH is type I or sliding HH which represents 95% of the recorded cases of HH. The rarest type is type IV, in fact, the combination of types II, III, and IV hiatal hernias account for about 5% of all hiatal hernias. Within that 5%, 2%-5% are solely type IV hiatal hernias.[18]

Types II–IV are referred to as paraesophageal hernias (PEH); their main clinical importance is due to their potential for ischemia, obstruction or volvulus.[1]

SYMPTOMS OF HIATAL HERNIAS

The incidence of symptomatic cases of HH appears to be linked to the diagnosis of GERD, the 2 conditions being closely associated.[1]

GERD occurs when stomach acid flows back into the esophagus, causing irritation. This reflux is most likely to happen when the stomach is pushed up through the diaphragm.

The symptoms of GERD include:

1. Heartburn - a burning sensation in the chest that may spread to the throat creating a sour taste in the mouth, which is exacerbated in the postprandial period, when lying down or bending over.
2. Regurgitation – a sour or bitter tast in the mouth due to the reflux of acid into the throat and/or mouth
3. Dysphagia
4. Chest pain – pain or discomfort in the chest, which can sometimes be mistaken for heart related pain and mimic the pain presented in angina. The pain can be described as sharp, stabbing or a dull ache.

HH also cause a range of respiratory problems, which arise due to the HH interfering with the diaphragms normal functions and due to irritation of the airways by acid reflux.

The respiratory symptoms include:

1. Chronic cough – due to the irritation of the airways caused by acid reflux
2. Wheezing – due to the irritation of the airways caused by acid reflux which can be especially pronounced in patients suffering from asthma
3. Shortness of breath – due to the hernia pressing against the lungs
4. Recurrent pneumonia – due to aspiration of stomach contents into the lungs which lead to repeated bouts of pneumonia

HH can also cause a variety of gastrointestinal symptoms.

The gastrointestinal symptoms include:

1. Bloating and Belching – many patients suffering from HH experience bloating and excessive burping due to swallowed air
2. Nausea and Vomiting – can be especially pronounced in cases in which HH leads to obstruction
3. Early Satiety – due to the pressure excerted on the stomach by the HH
4. Hiccups – persistent of frequent hiccups cant be a sign of irritation from the hernia
5. Iron Defficiency Anemia[19] (can be seen in up to 50% of patients with a paraesophageal hiatal hernia)[20]

As we can clearly determine from the variety of symptoms with which HH presents, a thorough evaluation of the patients medical history, physical status and targeted diagnostic methods are required for proper diagnosis and further treatment.

DIAGNOSTIC METHODS OF HIATAL HERNIAS

The diagnosis of hiatal hernia can be rather challenging at times due to the shift in the anatomy of the esophagogastric junction during deglutition, respiration and movement.[1] There are several different diagnostic methods which can be employed in diagnosing HH. They include imaging techniques endoscopic procedures and functional tests.

Plain chest radiographs may identify soft tissue opacity with or without an air fluid level within the chest. A retrocardiac air-fluid level on chest x-ray is pathognomonic for a PEH. Visceral gas may be seen in cases of intestinal herniation. Also, loops of bowel may be visualized running in an unusual vertical pattern towards the sac, and a characteristic displacement or upward deformity of the transverse colon may be seen in cases of colon herniation.[21] These findings are usually incidentally found on routine chest radiographs and warrant further follow up.

An important imaging method used is the barium swallow radiograph. It provides valuable information about the size of the herniated stomach and the location of the GEJ.[22] Contrast findings may add to suspicion of existing short esophagus[21]. Barium is the contrast agent most frequently reported in the literature as used for this purpose. Given the increased aspiration risk of patients with PEH presenting with acute gastric outlet obstruction, ionic water soluble contrast should be generally avoided due to the risk of aspiration pneumonitis.[21] However this technique has a disadvantage which is that it does not detect HH smaller than 2 cm in axial length, additionally it does not provide detailed information about the esophageal lining or potential complication such as esophagitis or Barrett's esophagus.

Computed tomography (CT) scan may be useful in an urgent situation, eg. for patients with suspected complications from a volvulized paraesophageal hernia. The hernia site and any herniated organs within the chest cavity are clearly visualized in most cases. Multi-slice CT with sagittal, coronal, and 3D reformatted images has increased the sensitivity of CT for the detection of hiatal hernia[16]. If intestinal obstruction and strangulation occur, dilated intestinal segments will be visualized with air-fluid levels within the chest cavity and abdomen. Cephalad migration of the gastroesophageal junction or gastric fundus through the hiatus can be clearly visualized on oral contrast-enhanced CT images.[23]

In the scope of HH diagnostics endoscopy is a mainstay of diagnostics, but the more appropriate diagnostic tool is esophagogastroduodenoscopy (EGD). EGD has the advantage of real-time analysis of the esophageal mucosa, the mucosa of the stomach and duodenum, unlike barrium swallow

radiography, it is able to detect erosive esophagitis, Barrett's esophagus, Cameron's ulcer and even lesions suspicious for malignancy (mandatory to be documented in case of future surgical approach).[20] Duranceau et al.[23] describe the challenges of providing an accurate endoscopic description of massive hernias, thus it is important to also perform a Barium swallow X-ray in order to decribe the hernia in an exact manner. Inability or difficulty reaching the duodenum in the presence of a large hiatal hernia is diagnostic of a volvulized paraesophageal hernia. Evaluation of gastric viability is particularly important among patients undergoing emergency surgery for incarcerated hernias.[21]

The functional test we can perform include esophageal manometry and pH testing.

Esophageal manometry can demonstrate the level of the diaphragmatic crura, the respiratory inversion point and the location of the lower esophageal sphincter. The size of the sliding component of a hiatal hernia can then be calculated, particularly with new high resolution motility technology.[21] It is considered that a separation between the crural diaphragm and lower esophageal sphincter of 2 cm or more is diagnostic for hiatal hernia.[2]

pH testing is not essential in the diagnosis of a hiatal hernia, but it has proven helpful in providing a quantitative analysis of reflux episodes as it correlates pH level with the patient's complaints of reflux.[1]

We can conclude that the diagnostic procedures of HH are closely related to the diagnostics of GERD. It is important to note we must obtain diagnostics for GERD in patients with sliding hernias, since GERD is an indication for surgery in these patients.

If we take into account the available literature, exposure of patients to radiation, physiological differences, experience of the staff performing said procedures and financial burdens of modern healthcare system, we can conclude that the most appropriate way for assessing the HH is a combination of barium swallow radiography, endoscopy or EGD and manometry, since they provide us with the most accurate information on the HH and GERD with minimal side effects for the patient.

INDICATIONS FOR SURGICAL MANAGEMENT OF HIATAL HERNIAS

The guidelines for diagnostics and management of HH were published by SAGES in 2013 and were updated in 2021.

The indications for operative procedures wary based on the type of HH.

According to the SAGES[21,24] guidelines, the indication for repair of a sliding (Type I) HH is GERD. The hernia is not the indication for the procedure but must be repaired. A fundoplication to address the reflux disease is mandatory. Outside of this situation, Type I sliding hiatal hernias have been thought to be almost inconsequential and not warranting of themselves surgical repair.

All symptomatic PEH should be repaired particularly those with acute obstructive symptoms, or which have undergone volvulus. Whilst asymptomatic PEH do exist, they are rare. There is a suggestion that the risk of progression from asymptomatic to symptomatic PEH is approximately 14% per year. This information, together with early reports of near universal mortality resulting from these complications, particularly from gastric necrosis, has in the past led to the dictum that all PEH should be repaired electively in suitable surgical candidates. Age should not be a barrier to repair of symptomatic hernias. However, more recent reports have shown that mortality rates for emergency PEH operations are currently much lower than those reported in the last century. Mortality rates for emergency repair have been reported to be as low as 0 – 5.4%, though average mortality rates for emergency HH surgery are around 17%. Moreover, the risk of developing acute symptoms requiring emergency surgery is probably less than 2% per year.

MODERN SURGICAL TREATMENT TECHNIQUES OF HIATAL HERNIAS

Modern surgical treatments lean towards minimally invasive procedures, which have been developed in many surgical fields since the advent of laparoscopic procedures in 1980. They were further developed with the development of surgical robots, such as the Da Vinci Surgical Robot in 1987. These developments opened new avenues in approaching patients with HH, developing existing techniques and adapting them to the new technological possibilities.

As such we can divide surgical procedures into transabdominal or transthoracic procedures, open or laparoscopic, nowadays robot assisted and even endoscopic procedures.

Even though the original surgical techniques still have merit, the contemporary antireflux procedures are:

1. Laparoscopic Nissen Fundoplication (LNF)
2. Laparoscopic Partial Fundoplication (LPF)
3. Laparoscopic Hill Gastropexy (LHG)
4. Magnetic Sphincter Augmentation (MSA)
5. Transoral incisionless fundoplication (TIF) with or without hiatal hernia repair

The two main surgical procedures in the treatment of HH are LNF and various LPF techniques. Due to the success of LHG, MSA and TIF in the management of GERD there have been applications of said procedures in the treatment of HH.

The 5 basic tenets of antireflux surgery are [25]:

1. The fundoplication must bring fundus over the esophagus and secure to the esophagus
2. The fundoplication must be constructed without constriction
3. The fundoplication is most effective when constructed 2-4 cm in length
4. The fundoplication must remain below the diaphragm
5. The diaphragmatic crura must be approximated to the esophagus

LNF, involving a total 360-degree fundic wrap of the abdominal segment of the esophagus along with closure of the dilated hiatal pillars, has gained wide acceptance among surgeons as the operation of choice for the treatment of GERD. The procedure, subjected to several modifications, provides excellent long-term control of reflux symptoms, although it may be associated with postprandial, mostly temporary, functional problems in some patients.[26]

As one would expect, compared to open surgery, there is a reduction in trauma to the abdominal wall, to the pain in the immediate postoperative period and a practically nonexistent chance of development of postoperative wound herniation.

Comparing LNF to robot assisted Nissen fundoplication (RNF) however showed no significant differences in outcomes, hospital stay and operative complications, according to Albassam et. All[27] and

Markar et. All[28]. Whilst RNF is a safe alternative to LNF, given its high costs and no clear benefits the authors suggest LNF as the treatment of choice.

Another new modification of LNF is the Rosetti-Nissen fundoplication, a common modification to a complete fundoplication, is a 360-degree fundic wrap without the division of the short gastric vessels, Markar et. All[29] report - comparing clinical outcome following laparoscopic NF with or without division of the short gastric vessels has shown no statistically significant difference between the two groups in the primary outcome measures of reoperation, postoperative dysphagia and postoperative reflux. It is, however, not possible conclusively to exclude differences in potentially important clinical outcomes and confounding variables other than those reported in this pooled analysis, and further prospective studies are needed.

According to Dalemagne et. All[30], after performing a 5 year and 10-year retrospective analysis, 93.3% of the patients who underwent LNF, were free of symptoms at the 10 year mark, proving the high efficacy and safety of said procedure.

The chief postoperative complaint is dysphagia and gas-bloating syndrome, which subside in most cases within several weeks.

LPF has several different surgical techniques, mostly differing in the degree of fundoplication and the positioning of it, either anteriorly or posteriorly. They include the Toupet or posterior partial fundoplication (270-degree wrap), Dor or partial anterior fundoplication (200-degree wrap) and Watson or partial anterior fundoplication (180-degree wrap), which is the smallest possible degree of wrapping that still has an effect.

Comparing outcomes between LNF and LPF, Gunter et all[31] reported - While GERD and gastroparesis scores were similar between Toupet Fundoplication (TF) and LNF patients, we did find a significant difference in short-term postoperative dysphagia. LNF patients had higher rates of dysphagia in the early postoperative period, but this improved with time and was not significantly different than their TF counterparts at 3 or 5 years postoperatively. We report a statistically significant increase in PPI use over time in patients who underwent TF, which was not seen in patients who underwent NF, whose PPI use remained low at every follow-up time point. This increase in PPI use along with the trend in worsening GERD in TF patients over time suggests that TF may have limited long-term durability.

LHG is a common accompanying surgery in obese patients who underwent a laparoscopic sleeve gastrectomy (LSG), with the intent of repairing, preventing HH and reducing worsening symptoms of GERD, due to LSG. Given the increasing popularity LSG is gaining, it is necessary to propose new solutions and techniques for GERD treatment in patients who need an LSG as a bariatric procedure or patients who have undergone it in the past and developed new symptoms of GERD.[32] Hill modified technique, as proposed, allows hiatal hernia correction and fixation of the gastroesophageal junction to the arcuate ligament or preaortic fascia, preventing future gastric herniation above the level of the hiatus and reinforcing the LES to prevent GERD symptomatology. Also, this reinforcing at the LES may allow a remodeling of the His angle, promoting natural antireflux mechanisms. Moreover, this procedure can

be performed at the same operative time with LSG or proposed to patients with a history of LSG and symptoms of GERD, because it is not necessary to use the gastric fundus as a fundoplication.[32]

MSA has been a proven and safe way of treatment of GERD, through the implantation of the Linx reflux band, which has been FDA approved since 2012. However, it is a novel approach in the treatment of HH. MSA of the lower esophageal sphincter restores the antireflux barrier in patients with HH greater or equal to 3 cm.[33] MSA in patients with large hiatal hernias demonstrates decreased postoperative PPI requirement and mean GERD-Health Related Quality of Life (GERD-HRQL) scores compared to patients with smaller hernias.[34] Due to the novelty of the procedure, there is a lack of data in relation to long term outcomes and as such there is a distinct need for more prospective studies and meta analysis of the efficacy of MSA in long term therapy of HH.

TIF was developed as an endoscopic procedure for management of GERD. In the scope of treatment of HH, it is a part of a hybrid repair (HH+TIF), which comprises simultaneous laparoscopic fundoplication and TIF. It is also indicated for patients with hiatal hernias less than 2 cm as a standalone procedure. Based on limited available data we can state that short-term functional outcomes and symptom relief with hybrid hiatal hernia repair are no superior to those with conventional repair. Therefore, surgical repair of hiatal hernia with surgical fundoplication remains the standard of care until further data is available on long-term outcomes of the hybrid approach.[35] Neither the 30-day outcomes nor the cost-effectiveness for hybrid repair was superior to those of conventional repair. Therefore, in our experience at the community-level hospital, we conclude that hiatal hernia repair with surgical fundoplication is more cost-effective than surgical repair of hiatal hernia with TIF.[36] However HH + TIF provides significant symptom control for heartburn and regurgitation with no long-term dysphagia or gas bloat normally associated with traditional antireflux procedures.[37] Since there is no consensus on the outcomes amongst various institutions, further data is required to make a definitive statement on the efficacy of said procedures.

CONCLUSION

On a quick glance one might think that HH is a rather simple, linear disease with direct treatment modalities. Once one takes a detailed look at its prevalence, varied symptomatic presentation and varied surgical indications, one can quickly identify a complex disease, which can lead to lethal outcomes if neglected and can at the same time be treated with great success which can lead to a marked increase in the quality of life for patients.

As discussed above the mainstay of diagnostic methods is a combination of barium swallow radiography, endoscopy/EGD and manometry. Whilst these are the safest diagnostic options for the patient, limiting their exposure to radiation and are financially viable for the healthcare system, they are also heavily reliant on the skill of the staff performing said analysis and can therefore lead to varying results, it is also important to note that HH present in a dynamic environment which adds another layer of difficulty in their imaging, especially for smaller HH. The author believes there is a need for improvement or even development of new diagnostic modalities which would simplify the diagnostic procedure, nullify operator bias and provide a better imaging which would assist the surgeon in the preoperative preparation. It also seems intuitive to attempt and develop an imaging modality which would provide all of the information in one examination.

When we look at the development of antireflux surgery and by default surgical therapy of HH we can observe a marked improvement in long term surgical outcomes, especially due to the development of laparoscopic procedures which have excellent outcomes. However, they are heavily reliant on the experience of the surgeon performing the operation and it seems logical to create regional centers which specialize in said operations, which would even further improve their outcomes. We can also determine a lack of long term information about patient outcomes when it comes to the newest surgical treatments such as MSA, TIF,.. With further development and experience these procedures might offer another alternative to the current gold standard, LNF. We can also infer that due to the well-established outcomes of LNF, there is a lack of interest in the development of new surgical procedures.

In conclusion, HH repair and antireflux surgery, is a field of surgery which has well established surgical procedures with excellent outcomes, but also offers opportunity for innovation.

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BIOGRAPHY

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