The management of Gastro-Oesophageal Reflux

Introduction

Gastro-oesophageal reflux occurs when gastric contents pass into the oesophagus resulting in symptoms and or mucosal damage(1). It is one of the most common health and its treatment accounts for the biggest single pharmaceutical expenditure to the NHS. It is also probably responsible for the increasing incidence of oesophageal adenocarcinoma, as this cancer arises in a columnar lined oesophagus consequent to severe reflux disease(2).

Derangements in the normal anatomy of gastro-oesophageal junction and oesophageal hiatus result in herniation of the stomach into the thoracic cavity. Hiatal hernias occur in approximately 10% of the population and typically present later in life with 2:1 female preponderance.

Pathophysiology

Everybody has daily gastro-oesophageal reflux manifested by physiological burping which is short lived and postprandial especially after a heavy meal.

Pathological GOR is defined as chronic acid and or bile reflux causing unacceptable symptoms or demonstrable pathology on investigations. It occurs when the natural barriers of GORD are ineffective or disrupted and they are as below:

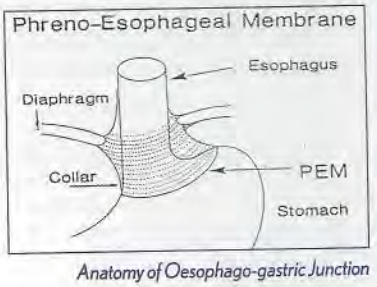
Natural barriers of gastro-oesophageal reflux

Lower oesophageal sphincter tone

- Basal tone
- Adaptive pressure changes
- Transient lower oesophageal sphincter relaxation

External mechanical factors

- Cardio-oesophageal angle
- Diaphragmatic pinchcock
- Mucosal rosette
- Phreno-oesophageal ligament
- Transmitted abdominal pressure



Anatomy of Oesophago-gastric Junction

Determining the true incidence of GORD is difficult as many people regard heartburn and indigestion as normal and are content to treat themselves with antacids without seeking medical advice. It contributes to the late stage diagnosis of esophageal cancers in UK, as three quarters of patients are metastatic or inoperable at diagnosis. Furthermore not all patients with typical reflux symptoms of heartburn and acid regurgitation have oesophagitis. At least two studies have shown normal oesophagus in 32-38% of subjects with reflux symptoms(3, 4). On the other hand 20% of patients with oesophagitis and or Barrett's on endoscopy have never experienced heartburn. Symptoms of GORD can be Typical or Atypical as described below.

Symptoms:

Typical: Heartburn, Regurgitation and Dysphasia

Atypical: Chronic coughing, Asthma, Voice changes, Globus sensation and throat clearing, Dental decay, Sinusitis

Types and symptoms of Hiatus Hernia:

The intra-abdominal oesophagus is anchored to the diaphragm by the phreno-oesophageal ligament which maintains the squamocolumnar junction within or slightly distal to the diaphragmatic hiatus and prevents displacement of the stomach through the diaphragm. Derangement of this leads to hiatus hernia.

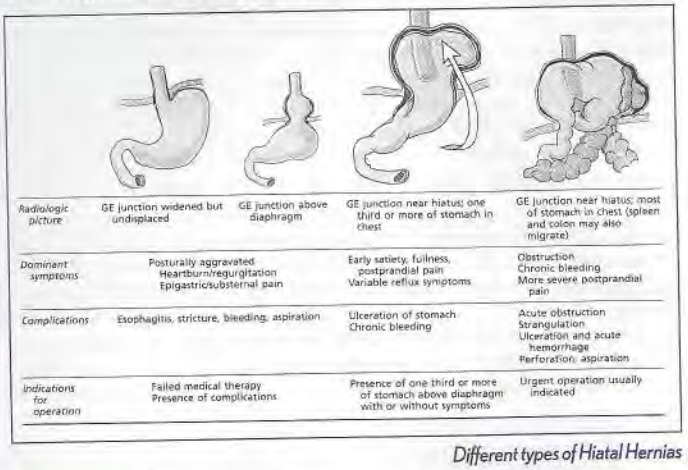
In essence there are four type of hiatus hernia and they are as follows:

Type I or sliding is the most common hiatal hernia (90%), in which the gastric cardia herniates upwards with proximal migration of lower oesophageal sphincter into the thorax. Here the phreno-oesophageal ligament is attenuated but remains intact.

Type II or true Para oesophageal hernias are less common constituting about 3% of all hiatal hernias. In this type of hernia the gastro-oesophageal junction remains anchored in its normal position and the gastric fundus herniates through an enlarged hiatus.

Type III or combined hiatal hernias involve elements of both type I and Type II hernias and represent majority of the Para oesophageal hernias. Usually Type I hiatal hernias evolve to Type III hiatal hernias over a period of time.

Type IV hiatal hernia refer to a large hernia defect with other viscera or abdominal organs contained within the hernial sac. The transverse colon is the most common even though other viscera may be there.



Radiologic picture	GE junction widened but undisplaced	GE junction above diaphragm	GE junction near hiatus; one third or more of stomach in chest	GE junction near hiatus; most of stomach in chest (spleen and colon may also migrate)
Dominant symptoms	Posturally aggravated Heartburn/regurgitation Epigastric/substernal pain		Early satiety, fullness, postprandial pain Variable reflux symptoms	Obstruction Chronic bleeding More severe postprandial pain
Complications	Esophagitis, stricture, bleeding, aspiration		Ulceration of stomach Chronic bleeding	Acute obstruction Strangulation Ulceration and acute hemorrhage Perforation; aspiration
Indications for operation	Failed medical therapy Presence of complications		Presence of one third or more of stomach above diaphragm with or without symptoms	Urgent operation usually indicated

Different types of Hiatal Hernias

Presentation of Hiatal Hernia

Approximately half of all Para oesophageal hernias are clinically silent and become apparent on imaging studies obtained for another reason. Symptomatic hernias may present with Epigastric or chest pain, Heartburn, Post-prandial fullness, Regurgitation or Dysphasia.

Many of the signs and symptoms are non-specific and may mimic those of acute myocardial infarction, gastric ulcer or pneumonia. Type I hiatal hernias may present with typical symptoms of GORD. Type II hernias typically present without reflux symptoms whereas Type III henias most typically present with post-prandial chest pain with or without reflux symptoms. Others present with iron deficiency anaemia secondary to chronic blood loss from erosions of the gastric mucosa caused by repeated movement across the hiatus known as Cameron ulcer as described by Cameron from Mayo clinic.

In view of the varied of symptoms, diagnosing GORD and Hiatus hernia is difficult especially in patients with atypical symptoms. Hence investigations are useful. They usually include Endoscopy, Chest X-ray, Barium swallow, 24hour pH manometry, Wireless pH monitoring (Bravo pH system), High Resolution manometry, Oesophageal Impedence and Bilitec probe.

Endoscopic view of hiatus hernia

Endoscopy

Flexible endoscopy is often the first line of investigation for GORD or hiatus hernia symptoms. In addition to the visual

Disease and Hiatus Hernia

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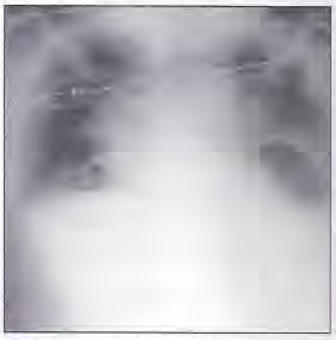
examination of the mucosal lining and its damage, derangements of normal anatomical landmarks can be assessed. Also histological and cytological specimen can be taken.

Radiology

A simple chest x-ray may show lung changes that would support a history of aspiration or reveal the presence of a large hiatus hernia but it is the contrast radiology which plays an important part in the investigation of oesophageal problems detecting anatomical, mucosal and functional abnormalities. A double contrast barium study can reveal mucosal abnormalities and strictures. It will also demonstrate the presence of web, rings, diverticula and hiatus hernias along with the presence or absence of normal propagating contractions. It may reveal the classical motility abnormalities of achalasia or diffuse oesophageal spasm.

While endoscopy has overtaken radiology in the investigation of reflux disease, radiology still remains plays an important role in the investigation of motility abnormalities especially video fluoroscopy.



Plain chest x-ray showing hiatus hernia

Barium swallow showing large Hiatus hernia

pH Studies

The development of miniatured pH catheters, digital recording devices and computer analysis software has allowed prolonged pH monitoring widely available in clinical practice. Not only does this record acid reflux episodes as they occur it also allows correlation between patient symptoms as they occur. Computerised software then analyses the recording to produce tables of standard variables that can be compared with known control values.

An oesophageal pH of <4, recorded 5cm above a manometrically defined Lower Oesophageal Sphincter should be present for less than 5% of a 24-hour period in normal individuals. If this recording is further divided to daytime, night-time and post-prandial periods a large number of values are possible as there is a wide spectrum of severity of acid reflux disease. DeMeester score is clinically validated system for assessing the severity of reflux disease based on the number of reflux episodes and duration of acid exposure in the upright and supine positions.

Bravo System

One of the limitations to standard pH monitoring is nasal and pharyngeal discomfort with gagging, nausea and vomiting reported by some patients. It may be also socially embarrassing and can result in a modified diet and lifestyle that may not be representative of normal daily life. The Bravo system is an innovative endoscopically placed catheter-free pH monitoring system, which transmits pH data for even longer periods of time up to 96 hours.

The cause of swallowing and other oesophageal symptoms remains uncertain in some patients despite conventional investigations. High Resolution Manometry can detect focal oesophageal dysmotility and measure the oesphago-gastric pressure gradient that drives bolus transport, factors that have been linked to improved diagnostic accuracy.

Oesophageal Impedence

This is a fairly new technique and is especially used when other tests are not very helpful in making the diagnosis of GORD which occurs in up to 20% of GORD patients. Where as pH manometry picks up acid reflux episodes, oesophageal impedence can diagnose non-acid or alkaline refluxes and also determines the proximal extent of the refluxate into the oesophagus.

Diagnosis

Diagnosis of GORD is made either by the typical symptoms such as heartburn, regurgitation or dysphasia or with or without extra-oesophageal manifestations such as chronic cough, asthma, lumpiness in throat, sinusitis or dental decay. Majority of the patients respond to simple measures and to medications initially which however as the disease progresses may become refractory or inadequately controlled.

The result of a pH study should be taken into consideration with the clinical history, endoscopy and radiology findings and response acid suppression with proton pump inhibitor when making a diagnosis of GORD.

Management

Simple measures include avoiding spicy food and alcohol, weight loss, stop cigarette smoking, timing and quantity of meals before going to bed and raising the head end of the bed. However these measures are rarely effective for patients with moderate to severe GORD and who will need medications before considering surgery

Medications include antacids, H2 receptor antagonists, Proton pump inhibitors and Prokinetic agents. Proton pump inhibitors are the main form of treatment and other medications may be added to obtain maximum benefit. However patients with significant oesophagitis have a higher failure rate and many patients who initially had good symptom control go on to develop breakthrough symptoms and will need incremental dose of PPI's. Patients with regurgitation do not respond well to PPI's.

Principles of surgical treatment

This is based on the principle of creation of a mechanical antireflux barrier between the oesophagus and stomach which works independent of the composition of the refluxate. While medical therapy may be effective in relieving many symptoms of acid reflux, only surgery achieves effective control of duodeno-gastro-oesophagel reflux.

Selection criteria for surgery

This is based on the objective evidence of reflux, failure to respond or partial response to medical treatment, symptoms are fully controlled but patient does not want to take medications for life especially younger patients, intolerance or side effects to medications, volume regurgitation, complicated reflux disease, reflux with oesophageal stricture, reflux with respiratory complications such as pneumonia, asthma and bronchiectasis, columnar lined oesophagus or Barrett's oesophagus which are sequelae of long-term refluxate of both acid and bile

Medical versus surgical therapy

The issue of the most appropriate therapy for GORD has been the subject of dis-agreement between surgeons and gastroenterologists. While most would agree that a single strategy is unlikely to be appropriate for all patients, there is need for better comparative data for medical versus surgical therapy. Seven randomised trials have been reported that have investigated this issue, although five of them were before laparoscopic antirelfux surgery and PPI's. Rhodes et al reported the first randomised trial to compare PPI medication with Laparoscopic Nissen fundoplication in 217 patients. Surgery was followed by less oesophageal acid exposure and better symptom control at one year. Similarly Anvari et al in 104 patients followed for a year have shown better symptom control.

Pros and cons of antireflux surgery

Advantages of surgery are clear. Surgery is the only treatment that actually cures the problem, which is stopping the gastric contents refluxing to the oesophagus. Hence

The management of Gastro-Oesophageal Reflux Disease and Hiatus Hernia (continued...)

patients treated by surgery can usually eat whatever foods they choose, they can lie down flat and bend over without reflux occurring and importantly they do not need to take any medications in the majority.

The morbidity following laparoscopic fundoplication is minimal as most patients stay in hospital for a day or two. There is some difficulty in swallowing immediately following surgery and this is transient. Some patients feel full after eating and may loose some weight initially which is an advantage for the obese which is in the majority.

Because fundoplication produces a one-way valve, swallowed air that has passed to the stomach usually cannot pass back through the valve. Patients need to be forewarned that they will not be able to belch effectively after the operation and so should be cautious about drinking gassy drinks. Similarly they may not be able to vomit and may pass more wind from below. However these symptoms will be less in patients who have undergone partial fundoplication. Despite these possible disadvantages the overwhelming majority of patients claim that the disadvantages are far outweighed by the advantages of the operation.

Surgery for GORD

Rudolf Nissen first described fundoplication in 1956. Since then Nissens or its variants are the commonest surgical procedures performed worldwide today. Majority of fundoplications are done laparoscopically.

Mechanisms of action of antireflux surgery

The mechanisms of action of an antireflux operation are not completely clear. However the proposed mechanisms include:

1. Creation of a floppy valve by maintaining close apposition between the abdominal oesophagus and the gastric fundus. As the intragastric pressure rises the intra-abdominal oesophagus is compressed by the adjacent fundus.
2. Exaggeration of the flap valve at the angle of HIS.
3. Increase in the basal pressure generated by the lower oesophageal sphincter.
4. Reduction in the triggering of transient lower oesophageal sphincter relaxations.
5. Reduction in the capacity of gastric fundus thereby speeding proximal and total gastric emptying.
6. prevention of effacement of the lower oesophagus which weakens the lower oesophageal sphincter.

Principles of surgery

- Reduction of hiatal hernia if present
- Mobilisation of lower intra-abdominal oesophagus and maintaining the lower esophagus in the abdomen
- Repair of the hiatal crus
- Wrapping of the lower oesophagus with fundus of the stomach

Types of Fundoplications:

- Total or Nissen fundoplication (360 degree wrap)
- Partial fundoplication (less than 360 degree) which can be anterior or posterior depending on the way the fundus is wrapped around the lower oesophagus
- Posterior: Toupet (270 degree) or Lind (300 degree)
- Anterior: Belsey Mark IV(240 degree) or Dor

Operative finding of hiatus hernia

Hiatus hernia repair with Nissen Fundoplication

Complete or partial fundoplication

Because fundoplication is occasionally associated with an incidence of post-operative dysphasia, gas bloat and other gas-related symptoms such as increased flatulence, the relative merits of the Nissen fundoplication versus partial fundoplication has been debated for years. On the one hand Nissen fundoplication produces an over competent gastro-oesophageal junction, which is the cause of some of the problems with dysphasia and gas bloat. On the other hand it has been suggested that partial fundoplication reduce the risk of over competence but perhaps at the expense of a less durable antireflux repair.

Complications

In the expert hands majority fundoplication is done laparoscopically and mostly patients stay a day or two in hospital. Like any other surgery fundoplication does carry risks of complications such as dysphasia, gas bloat, flatulence, pneumothorax, hiatal stenosis, paraoesophageal hiatal hernia, bilobed stomach, oesophageal perforation, gastric perforation and failure or recurrence of symptoms. Mortality following fundoplication is extremely rare.

Endoscopic therapies for reflux

Over the recent years endoscopic procedures for the treatment of GORD have emerged. These procedures are performed without abdominal wall incisions required for conventional or laparoscopic surgical access. These are likely to appeal to both the patients and the physicians as they open the possibility of less invasive and curative procedure. Since the early 2000s these procedures have been applied with enthusiasm in some centres, especially in the USA. However none of these treatments apply the established principles that underpin the efficacy of antireflux surgery and the clinical outcomes have predictably been disappointing.

Hiatus hernia operations

Symptomatic hiatal hernias need to be repaired if the patient is a good surgical candidate. However in high risk patients an asymptomatic hernia may be left alone as the risk of strangulation and obstruction is usually very small. Principles of Hiatal hernia:

1. Complete excision of the hernia sac.
2. Reduction of the herniated stomach and 2-3cm of distal oesophagus to the abdominal cavity.
3. Repair of the diaphragmatic hiatus.

In the majority the procedure can be preformed laparoscopically. Sometimes if the oesophagus is shortened it may need to be lengthened with Collis gastroplasty and if the hiatal tissue is attenuated it needs to be reinforced with mesh especially biological such as bio-design.

Conclusion

The treatment of gastro-oesophageal reflux is usually incremental, commencing with various levels of medical measures. Surgery is reserved for patients with more severe disease, who either fail to respond adequately to medical treatment or who do not wish to take lifelong medication. It is also apparent that a single strategy is unlikely to be appropriate for all patients. Surgical therapy achieves better control of reflux with moderate to severe reflux. It remains an open question whether Barrett's oesophagus alone is an indication for anti-reflux surgery because of its potential risk for oesophageal adenocarcinoma. However patients with Barrett's and reflux symptoms definitely need surgery.

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