Primary esophageal motility disorders (Concise Review for Clinicians)

A. Simić, Z. Ražnatović, O. Skrobić, P. Peško,
Department for Esophagogastric Surgery, First Surgical
University Hospital, Institute for Digestive Diseases, Clinical
Center of Serbia

Primary esophageal motility disorders comprise various abnormal manometric patterns which usually present with dysphagia or chest pain. Some, such as achalasia, are diseases with a well defined pathology, characteristic manometric features, and good response to treatments directed towards the palliation of symptoms. Other disorders, such as diffuse esophageal spasm and nutcracker esophagus, have no well defined pathology and could represent a range of motility abnormalities associated with subtle neuropathic changes, gastroesophageal reflux and anxiety states. On the other hand, hypocontracting esophagus is generally caused by weak musculature commonly associated with gastroesophageal reflux disease. Although manometric patterns have been defined for these disorders, the relation with symptoms is poorly defined and in some cases the response to medical or surgical therapy unpredictable. The aim of this paper is to present a wide spectrum of the primary esophageal motility disorders, as well as to give a concise review for the clinicians encountering these specific diseases.

Key words: esophagus, motility, manometry.

When liquid is swallowed, a portion goes to the lung and from there is filtered into the pericardial sac, where it lubricates the feverish heart. The rest of the liquid is exhaled as vapour” – Hippocrates1.

Our views on esophageal function have changed somewhat since Hippocrates description of what occurs when liquid is swallowed. Eating requires the propulsion of food from the mouth to the stomach and, as Meltzer noted century ago, is dependent on the “orderly progress of peristaltic movements in the esophagus”2.

Abnormalities of this “orderly progress” are termed esophageal motility disorders and comprise any condition whose symptoms, especially dysphagia and chest pain, are suspected of being esophageal in origin.

These disorders are primarily diagnosed by esophageal manometry studies, which assess lower esophageal sphincter pressure and relaxation, the presence of peristalsis in the esophageal body, and the characteristics of contraction waves including amplitude, duration, repetitive nature, and presence of either non-transmitted or partly transmitted waves.

Although authorities have proposed a number of classification systems for the various abnormalities found by manometry, none of them has been universally accepted. Furthermore, there is much controversy over the clinical importance of many of these abnormal patterns, particularly as to whether they represent real disorders or they are merely unusual findings associated with a patient’s symptoms. Considering all this, esophageal motility disorders can be generally classified as primary and secondary. The latter are due to systemic diseases such as: diabetes, connective tissue disorders, dermatomyositis, scleroderma, amyloidosis, alcoholism, Chagas disease and neoplasms of various sorts (most commonly adenocarcinoma of the cardia), when there is a presence of pseudoachalasia. Primary esophageal motility disorders (PEMP) are currently best explained on the basis of either defective inhibitory or defective excitatory innervation of the LES and the body of the esophagus. Based on such classification all PEMD’s can be divided in five distinctive groups: achalasia, diffuse esophageal spasm, hypercontracting esophagus (i.e. hypertensive “nutcracker” esophagus and hypertensive lower esophageal sphincter), hypercontracting esophagus (i.e. ineffective esophageal motility and hypotensive lower esophageal sphincter) and nonspecific esophageal motility disorders (Table 1).

The aim of this paper is to present a wide spectrum of the PEMD’s, as to refer to their pathophysiology, diagnostics and treatment modalities, and give a concise every day, review for the clinicians dealing with these specific conditions.
The "golden" tool procedure for all PEMDs is stationary esophageal manometry. There is no clear consensus on the ideal technique for performing esophageal manometry. To use the general classification system for esophageal motility abnormalities proposed above, the manometry must at least provide an assessment of the completeness of LES relaxation and an evaluation of peristaltic function of the esophageal body. This can be accomplished as follows: the motility catheter is passed through the nose until the pressure sensors are positioned in the stomach, and gastric baseline pressure is recorded. While the patient breathes quietly, a slow, 1 cm pull through is performed for evaluation of LES pressure. LES pressure is measured as the mid respiratory level in the area of maximal pressure (compared with gastric baseline pressure). Although it is conventional to refer to this measured value as "LES pressure", the value reflects pressure generated by the crural diaphragm as well as the LES muscle. With the pressure sensor positioned in the LES, the patient is asked to perform at least five separate wet swallows (5 ml of water) to assess the completeness of swallow induced LES relaxation. Completeness of relaxation is determined by measuring the residual LES pressure, that is, the difference between the pressure recorded at the nadir of LES relaxation and gastric baseline pressure. Peristalsis is evaluated by positioning four pressure sensors separated by intervals of 5 cm in the body of the esophagus, with the distal sensor positioned 5 cm proximal to the upper LES border, after which a series of 10 wet swallows is performed. The swallows are separated by an interval of at least 20 seconds, and pressure wave amplitude, duration, and velocity are measured. In patients with a dilated and tortuous esophagus, the LES may be difficult to intubate, requiring fluoroscopic or endoscopic guidance for manometry catheter placement. Normal values for esophageal manometry were derived from a study that used the manometry protocol described above in 95 healthy adult volunteers.

ACHALASIA

The first description of achalasia is attributed to Thomas Willis, an English physician who in 1674 described a man who vomited "whatsoever he had eaten". The name achalasia (gr. failure to relax) did not come into use until the XX century when published as "achalasia of the cardia" by Hurst. Achalasia is defined as a primary esophageal motor disorder characterized by manometric findings of

<table>
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<th>Primary esophageal motility disorders</th>
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<td>Achalasia</td>
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<td></td>
<td>Abnormal LES relaxation</td>
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<td></td>
<td>Can have raised LES pressure (&gt;45mmHg)</td>
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<td></td>
<td>Simultaneous contraction &gt;20% of wet swallows</td>
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<td>Intermittent peristalsis</td>
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<tr>
<td>Diffuse esophageal spasm</td>
<td>Can have repetitive or multipeak contractions (&gt;two peaks)</td>
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<td>Can have contraction not associated with swallows</td>
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<td></td>
<td>Contraction amplitude &gt;30 mmHg but usually not high</td>
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<td>Hypercontracting esophagus</td>
<td>Hypertensive esophagus - &quot;nutracker&quot;</td>
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<td>Increased mean distal amplitude (&gt;180mmHg)</td>
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<td>Normal peristalsis</td>
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<td>Hypertensive LES</td>
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<td>Resting LES pressure &gt;45mmHg</td>
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<td>May be incomplete LES relaxation</td>
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<tr>
<td>Hypocontracting esophagus</td>
<td>Ineffective esophageal motility</td>
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<td>≥30% low distal amplitude (&lt;30 mmHg) or failed nontransmitted contractions</td>
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<td>Nontransmitted contractions &gt;20%</td>
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<td>Retrograde contractions</td>
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<td>Low amplitude contractions &lt;35 mmHg</td>
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**TABLE 1**

CLASSIFICATION OF PRIMARY ESOPHAGEAL MOTILITY DISORDERS

1. A. Simic et al. ACI Vol. LIII
incomplete lower esophageal sphincter (LES) relaxation and esophageal aperistalsis. Achalasia is of unknown etiology and the most common of all esophageal motility disorders. It is an uncommon ailment with a reported incidence of 1 per 100,000 in the Western world. Achalasia affects both sexes equally, typically presenting between the ages of 20 and 50, although it can occur in all ages. It is characterized by ineffective relaxation of the LES combined with loss of esophageal peristalsis leading to impaired emptying and gradual esophageal dilatation. The anatomical defect appears to be a decrease or loss of inhibitory nonadrenergic, noncholinergic ganglion cells in the esophageal myenteric plexus. Histological analysis of esophagi resected from patients with end-stage achalasia demonstrates myenteric inflammation and progressive depletion of ganglion cells and subsequent neural fibrosis. There is also a significant reduction in the synthesis of nitric oxide and VIP, the most important mediators of relaxation in the LES. Macroscopically there may often be thickening of the circular layer of the distal esophagus. A long standing achalasia also carries a increased risk of squamous cell carcinoma.

Dysphagia is the cardinal feature of achalasia, accompanied by varying degrees of aspiration, weight loss, and pain. Most patients with achalasia present with progressive dysphagia to solids and liquids, although symptoms may be subtle and nonspecific early in its course. The mean duration of symptoms prior to presentation is 2 years, and the diagnosis often takes much longer as the symptoms are often attributed to GERD or other disorders. Initially the patient may complain of the sensation of a retrosternal "sticking" of foodstuffs. Stress or cold liquids may exacerbate dysphagia. Patients may regurgitate undigested food, especially after meals or when lying supine. If unable to force food into the stomach by the ingestion of liquids or other means, spontaneous or forced regurgitation are often used to evacuate the esophagus. As a result of regurgitation, aspiration of esophageal contents may lead to pulmonary disease. In fact, up to 10% of patients with achalasia experience significant bronchopulmonary complications. Many patients express a sensation of heartburn, explaining why many patients are initially diagnosed with GERD. Although patients with achalasia may experience gastroesophageal reflux, more often heartburn is secondary to fermentation of retained undigested food in the esophagus. Chest pain, clearly distinguishable from heartburn, occurs in 30% of patients. The etiology of this pain is unclear and is unpredictably relieved by esophageal myoto-my. Weight loss is variable and tends to be insidious. The magnitude of weight loss tends to correlate with the severity of the underlying disease. Rapid onset of symptoms (≥6 months), advanced age (≥50 years), or significant weight loss (≥10 kg) should raise suspicion for pseudoachalasia, usually secondary to malignancy or extraluminal obstruction. In these cases a thorough work-up with a CT scan and/or endoscopic ultrasound must be performed before further therapy is considered.

A barium esophagram is typically the first imaging study used in the evaluation of dysphagia and it may demonstrate an air fluid level in the esophagus with a paucity of gastric air. The classical appearance of achalasia on a barium study is the "bird’s beak" tapering of the distal esophagus with a column of contrast in the esophageal lumen. Variable esophageal dilation is seen, ranging from mild in the early stages to the massive sigmoid-shaped esophagus of end-stage achalasia. Fluoroscopic evaluation may also reveal nonpropulsive, tertiary contractions of the esophageal body with failure to clear the barium bolus from the esophagus. The sensitiveness of barium meal for achalasia, although higher than for endoscopy, is only 60%. Endoscopic evaluation is used to rule out other processes that may mimic achalasia. The characteristic appearance is an atonic, dilated esophagus with a tightly closed LES that does not open with insufflation. With gentle pressure the scope is admitted through the LES with a "pop", in contrast with a peptic stricture or a malignancy, which does not yield. The gastresophageal junction, including a retroflexed view of the gastric cardia, should be carefully inspected. Biopsies of any mucosal abnormality should be obtained. Manometry is the "gold standard" for confirming the diagnosis of achalasia. The manometric features proposed for a diagnosis of classic achalasia are: 1) incomplete relaxation of the LES (defined as a mean swallow induced fall in resting LES pressure to a nadir value >8 mm above gastric pressure) and 2) aperistalsis in the body of the esophagus characterised either by simultaneous and nonpropulsive esophageal contractions with amplitudes ≤37 mm Hg or by no apparent esophageal contractions. Complete absence of peristalsis is the sine qua non of achalasia. Manometric features that are characteristic of classic achalasia but not required for the diagnosis include: 1) elevated resting LES pressure (> 45 mmHg) and 2) resting pressure in the esophageal body that exceeds resting pressure in the stomach. A subgroup of patients with otherwise typical features of classic achalasia have simultaneous contractions of their esophageal body which can be of high amplitude (>37 mmHg). This manometric pattern has been termed "vigorous achalasia", and a chest pain episodes are a common finding in these patients. Differentiation of vigorous achalasia from diffuse esophageal spasm can be done only manometrically. In both diseases video-graphic exam can show a corkscrew deformity of the esophagus and diverticulum formation.

The treatment of achalasia is directed at the palliation of symptoms, unable to correct the underlying neuromuscular pathology. The goal of all therapeutic options is to relieve the functional obstruction of the distal esophagus, thus improving esophageal emptying. Drugs that relax smooth muscle and decrease LES pressure such as nitrates and calcium-channel blockers have been used to treat achalasia. Unpredictable and incomplete absorption of oral formulations secondary to poor esophageal emptying is one limitation, thus, sublingual administration is the most efficacious route. Relief from these agents is inconsistent and generally short-lived, with most patients showing...
continued progression of their disease. Their usefulness is limited to temporizing symptoms until more effective the-rapy can be implemented or, in those patients deemed too frail to undergo a more invasive treatment. Botox (Botu-linum toxin type A) is a neurotoxin delivered from Clostridium botulinum, and is capable of binding holinergic ner-ve and therefore irreversibly inhibits acetylcholine secretion. Botox is injected into the LES through the working port of a flexible endoscope, with minimal incidence of immediate complications. Early enthusiasm has waned as results have not proven to be durable. Botox injection is initially effective in 70% of patients but 50% develop recurrent symptoms within 6 months. Repeat administration is possible, but efficacy is diminished with subsequent injections. Another problem with this therapy is that Botox injection can cause an intense inflammatory reaction of the GE junction with subsequent fibrosis. This may impact future surgical therapy, as most patients have continued or progressive symptoms. While not well understood, Botox appears to be more effective in older patients and in those with vigorous achalasia. Botox should be reserved for patients unwilling or deemed unfit to undergo an invasive procedure.

The oldest treatment of achalasia is forceful dilation of the LES, originally accomplished by Willis more than 300 years ago, by the passage of a piece of whalebone with a sponge affixed to the end. This is essentially tearing of the esophageal muscle, resulting in an imprecise, uncon-rolled myotomy. This therapy has become more effective by the development of graded pneumatic polyethylene balloons. Under fluoroscopic or endoscopic guidance, bal-loons (at least 30 mm in diameter) are passed through the LES and inflated, disrupting the fibers of the LES. The balloon is kept inflated from 1 to 3 minutes and then de-flated. The "graded" approach refers to the use of serially larger balloons (up to 40 mm) with subsequent dilations for initial nonresponders and only a single dilation is per-formed per session. Response rates of 60–80% can be achieved, with approximately 70% of patients obtaining substantial relief of dysphagia after one year. Repeat dil-ation is often used, but its efficacy is diminished after two sessions. Patients with a poor result after initial dil-ation or early return of their symptoms are predictably less likely to respond with subsequent dilations. Interestingly, younger patients do not respond as well as older patients. This is thought to be due to their tissues being more compliant and simply stretching during dilation rather than tearing. The presence of a hiatal hernia, significantly di-lated esophagus (>7 cm), or an epiphenric diverticulum increases the risk of perforation and the presence of these factors is a relative contraindication. While the likeli-hood of improving dysphagia increases with increasing balloon diameter, so does the likelihood of perforation. Overall, the incidence of perforation is about 2 – 4 % per dilation attempt.

Surgical therapy was originally described in 1914 by Ernest Heller, who performed the first cardiomyotomy for achalasia. His original description called for the performance of two myotomies along the gastroesophageal junction, one anterior and one posterior. This has subsequently been modified by Zaaier, and since then only an anterior myotomy is performed. Excellent results with cardiomyotomy can be achieved in 90–100 % of patients. Extramucosal cardiomyotomy provides more reliable relief of dysphagia than pneumatic dilation as it allows accurate division of LES muscle fibers rather than blind disrup-tion. Traditionally, this was accomplished by either a transabdominal or a transthoracic approach. Each approach is associated with an obvious incision and postop-erative stays of 7 to 10 days. For this reason, despite superio-r long-term results from surgical myotomy, most pa-tients were treated by less invasive therapies such as pneumatic dilation. Recent developments in minimally invasive techniques now allow performance of cardiomoy-tomy by either a laparoscopic or a thoracoscopic app-proach. The first laparoscopic Heller procedure was performed by Shimi and Cusden in 1991, while the first thoracoscopic myotomy for achalasia was done by Peller-grini in 1992. The first successful laparoscopic operation for achalasia in our country, Serbia, in the form of Hel-ler’s myotomy and Dor’s anterior partial fundoplication was performed by the authors of this review, at the First Surgical University Hospital in Belgrade, in April 2006. Over the time transthoracic or thoracoscopic approach proved to be insufficient due to limited gastric myotomy and therefore higher incidence of postoperative dyspha-gia. For these reasons, today we as well as most esopha-geal surgeons perform a modified Heller’s, or should we say Zaaiers myotomy, via laparotomic or laparoscopic approach. The advantages include excellent visualization of the distal esophagus and the stomach, so that an extended gastric myotomy and an antireflux procedure may be easily performed. There are two main controversies surro-unding Heller’s myotomy. One is the extent of the esophageal myotomy; the other is whether an antireflux pro-cedure should be performed, and if so which one. While there is agreement that the proximal extent of the myoto-my should reach up to 6 cm above the gastroesophageal ju-nction, the distal extent of the myotomy is controversial. There is no length of esophageal myotomy that maximally relieves dysphagia and minimizes the occurrence of ref-lux. A more traditional approach (a 1.5- to 2-cm gastric myotomy) was compared with an extended gastric myoto-my (at least 3 cm). It has been found that the longer myo-tomy resulted in less dysphagia and fewer interventions for recurrent dysphagia. Since advocating an extended gastric myotomy, it is felt that an antireflux procedure is prudent in most cases. Some consider the goal in perform-ing a myotomy is to adequately relieve dysphagia without unnecessarily disrupting the antireflux barrier especially the hiatal attachments. Those who advocate not perform-ing an antireflux procedure cite good clinical results and low incidence of heartburn. On the other hand, most sur-gons find that performing an antireflux procedure in con-junction with laparoscopic myotomy does not add signific-ant time or morbidity to the operation and is not associat-ed with increased postoperative dysphagia. Certainly, a partial fundoplication (Dor or Toupet) is the best option.
A total fundoplication (e.g., Nissen fundoplication) can also be applied but if inefficiently performed it can cause a functional obstruction for a nonpropulsive esophagus, resulting in a high incidence of dysphagia. An anterior (Dor) fundoplication requires less posterior dissection, thus is easier and theoretically preserves more of the natural antireflux barrier. Also, since the wrap is brought anterior to the myotomy, it potentially covers any undetected mucosal injuries. A posterior (Toupet) fundoplication is the preferred partial fundoplication when indicated for GERD. Since it holds the edges of the myotomy open, a Toupet may provide a better protection against recurrent dysphagia. However, its superiority in preventing reflux after myotomy has not been demonstrated. While each of these antireflux techniques has its own theoretical benefits and champions, there is still no strong evidence supporting one over the other. In conclusion, at the beginning of the XXI century, all the questions considering operative treatment of achalasia remain still open.

2. DIFFUSE ESOPHAGEAL SPASM

Diffuse esophageal spasm (DES) was originally described by Osgood in 1889. Diffuse esophageal spasm is PEMD of unknown aetiology which appears to be due to a disturbance of the normal pharmacological timing of propulsive contractions occurring in the esophageal body after swallowing. It is found in 3–5% of patients evaluated for esophageal motility disorders and is manometrically distinguished by relatively normal motility punctuated by simultaneous contractions. DES is defined by the presence of simultaneous contractions in greater than 20% of wet swallow trials during manometry testing. Manometry may also demonstrate long-duration contractions, high-amplitude waves, spontaneous contractions not associated with swallows, and elevated lower esophageal sphincter (LES) pressures. The etiology of DES is unknown. Patients are hypersensitive to provocative agents such as cholinergic agonists and pentagastrin. Recent evidence suggests that there may be a defect in neural inhibition that is normally mediated by nitric oxide (NO) within the esophageal body.

Diffuse esophageal spasm is characterized clinically by intermittent chest pain and dysphagia. Chest pain can vary from mild to crushing, extend to the back and jaw, and last from seconds to minutes. The pain with DES does not always occur with swallowing. Dysphagia in patients with DES can be due to solids or liquids and often occurs more commonly with ingestion of either very cold or very hot foods. The symptoms of DES can range from mild to severe but are classically intermittent, may or may not occur with eating, and are typically not progressive. This lack of symptomatic and manometric progression separates DES from other esophageal causes of chest pain and angina, such as achalasia and esophageal cancer. The classic finding of DES, most commonly seen during a barium swallow study, is the "corkscrew" or "rosary-bead" appearance of the esophageal body during a simultaneous contraction. Primary (normal) peristalsis is often seen in the upper third of the esophagus, and so-called tertiary (abnormal) activity is seen in the region of the spasm. Tertiary activity can occasionally be seen in normal subjects. Episodes of pain do not always correlate with spastic esophageal contractions, and patients can feel intense pain even when swallows appear radiographically normal. Upper endoscopy is typically unremarkable. The esophagus is usually normal in appearance in patients with DES but a thorough search for signs of GERD (esophagitis, ulcerations, stricture, etc.) should be performed at the time of upper endoscopy. The classic abnormality seen during esophageal manometry in patients with DES is a pattern of abnormal simultaneous contractions of the esophageal body. These must be present in greater than 20% of wet swallows during formal testing to make a confident diagnosis. Minor manometric diagnostic criteria for DES include frequent, repetitive esophageal contractions (>3 peaks) of a high amplitude (>180 mm Hg) that are prolonged (>6 seconds). The LES can occasionally have high baseline pressure in DES but is usually normal, as is the upper esophageal sphincter. A subgroup of DES is a segmental distal esophageal spasm that is defined by manometric presentation of simultaneous contractions but only in the distal two channels. The importance of such manometric finding is the length of the myotomy that is required for the treatment of these patients.

Treatment should be aimed at symptomatic relief once cardiac disease has been definitively excluded through formal testing. Medical therapy is first in line and effective to some extent in up to 70% of patients. Patients should be reassured that they have no underlying cardiac disease or malignancy to reduce their anxiety, to reduce their utilization of health care, and to produce some improvement in chest pain. Various pharmacological agents (nitroglycerin, isosorbide-dinitrate, and calcium channel blockers) acting on smooth muscle are used, with none demonstrating superior efficacy. As previously mentio-ned, a psychological component may be an important contributor in patients with "esophageal angina". Several psychoactive agents (benzodiazepines, tricyclics, and trazodone) demonstrate some efficacy, possibly to a greater extent than smooth muscle agents. Endoscopic application of botulinum toxin A (Botox) for DES has not been studied adequately to make definite conclusions about its efficacy. However, with DES where there is diffuse abnormality, the question arises as to where in the esophagus to focus the therapy. Esophageal pneumatic dilation has shown promising results in patients with DES in retrospective, uncontrolled studies and thus can be considered; however, the decision of where to dilate the balloon in the esophagus is difficult. Duration of symptomatic improvement is highly variable.

The traditional surgical approach to spastic disorders of the esophagus has been esophageal myotomy. Myotomy performed either via thoracotomy or thorascoscopically is primarily reserved for patients with DES in whom medical therapy has failed. Several important points should be remembered when surgical myotomy is being considered in patients with DES. First, myotomy will decrease only the intensity of esophageal contractions, not the frequen-
cy; thus, symptoms may still occur after surgery. Second, myotomy can lead to a hypocontractile esophagus, which can result in dysphagia (a symptom the operation is meant to improve). Third, the chest pain that occurs with DES responds better to myotomy than does the dysphagia associated with these illnesses. To date, only small studies of myotomy for spastic disorders of the esophagus have been reported, and none of the studies were controlled trials. Given these limitations, the data on surgical myotomy suggest a trend toward symptomatic relief in the subgroup of patients with severe, refractory symptoms. Patients, whose main problem is dysphagia and whose esophagus empties poorly, will benefit from transhiatal longitudinal myotomy. The extent of myotomy is determined from the preoperative manometry, and in average it extends from the aortic arch toward the sling fibers of the LES at the esophagogastric junction. As a matter of necessity, when there is a presence of LES high basal pressure, the myotomy is extended distally across the LES to reduce outflow resistance. Consequently, some form of antireflux protection is needed to avoid gastroesophageal reflux, Dor’s procedure being the most frequently used. Most authors prefer a partial fundoplication so as not to add resistance that will interfere further with the ability of the myotomized esophagus to empty. The recent advent of minimally invasive approaches has dramatically decreased the morbidity of esophageal myotomy, perhaps allowing an expansion of its indications to these entities.

3. HYPERCONTRACTING ESOPHAGUS

A. NUTCRACKER ESOPHAGUS

Nutcracker esophagus (NE) was first described by Pope and his associates in 1978. The term was coined by Benjamin and Castell in which patients with non-cardiac chest pain and/or dysphagia exhibit peristaltic waves in the distal esophagus with mean amplitudes exceeding normal values by more than 2 standard deviations (SD). The manometric feature proposed for a diagnosis of nutcracker esophagus is a mean distal esophageal peristaltic wave amplitude larger than 180 mmHg (measured as the average amplitude of 10 swallows at two recording sites positioned 5 and 10 cm above the LES) that may be prolonged in nature (>6 seconds). These two manometric findings often coexist, suggesting that they might represent a syndrome of a hypercontractile oesophagus. Apart from these contractions of increased pressure, all other contractions are peristaltic. Resting pressure in the LES is usually normal but may be elevated, in which case patients are categorized as having nutcracker esophagus with a hypertensive LES. Since no pathological equivalent has been found, the cause of hypercontracting esophagus is uncertain; however, some high-pressure contractions could be secondary to exogenous factors such as gastroesophageal reflux or stress.

The main complaint in patients with a hypercontracting esophagus is chest pain; dysphagia is relatively uncommon. In fact, NE is the most common motility disorder reported in patients with chest pain who undergo manometry, being seen in 27–48%. Nevertheless, the precise relation between chest pain and hypercontracting esophagus is still uncertain. Patients are usually symptom-free when the diagnosis is established by esophageal manometry. Additionally, relief from chest pain does not predictably correlate with amplitude reduction by either pharmacotherapy or surgical myotomy.

By definition, all patients with hypercontracting esophagus have normal peristalsis, so barium radiographs are usually normal. As with DES, patients with NE may have a hypersensitive esophagus. Intraesophageal balloon distention reproduces the chest pain experienced by these patients. LES pressures may be normal but are often elevated, with relaxation being normal. As the pattern of peristalsis is not altered, barium esophagram is usually unremarkable. Upper endoscopy is normal but endoscopic ultrasonography may demonstrate thickening of the muscularis propria. Interestingly, psychiatric disorders such as anxiety, depression, and somatoform disorders appear to be found in higher than predicted frequencies in this population, as first described by Clouse. The association with high stress and irritants to the esophagus (eg, acid reflux) suggests that these hypercontracting motility abnormalities might represent an epiphenomenon rather than a primary motility disorder. Treatment of these syndromes is similar to treatment of diffuse esophageal spasm, and results are just as unpredictable.

B. HYPERTENSIVE LOWER ESOPHAGEAL SPHINCTER

Hypertensive lower esophageal sphincter (HLES) is an abnormality diagnosed when there is an elevated LES pressure (>45 mmHg) with normal relaxation in the absence of a concomitant disorder of esophageal body peristalsis. Although the hypertensive LES was described more than 40 years ago by Code et al. in patients with chest pain and dysphagia, it remains unclear whether this condition per se has any clinical or physiological consequences. A hypertensive LES can be defined as one with a resting pressure value more than 2 SD above the normal mean value with an exaggerated contraction of the LES after relaxation. Even by this definition however the lower limit will vary depending on the technique used to measure resting LES pressure (rapid pull through versus station pull through; end expiratory, mid respiratory, end inspiratory). If mid respiratory LES pressure is measured using the stati-on pull through technique, a hypertensive LES can be defined as one with a resting pressure of >45 mmHg. The manometric feature proposed for a diagnosis of isolated hypertensive LES is a mean resting LES pressure of >45 mmHg measured in mid respiration using the station pull through technique. Patients who also have a mean distal esophageal peristaltic wave amplitude >180 mmHg are categorized as nutcracker esophagus with a hypertensive LES. Patients with incomplete LES relaxation are categorized as having an atypical disorder of LES relaxation, not as having an isolated hypertensive LES. The optimum way of treatment are pneumatic dilatation and
esophagocardiomiotomy with or without subsequent fud-}
doplication regarding the hiatal dissection.

4. HYPOCONTRACTING ESOPHAGUS

Most patients who are diagnosed as having non-specific esophageal motility disorders have motility tracings characterised by either low-amplitude peristaltic or simultaneous contractions in the distal esophagus, or failed peristalsis in which the wave does not traverse the entire length of the distal esophagus. These abnormalities have been renamed ineffective esophageal motility (IEM) and are defined by the manometric presence of non-transmitted contractions or distal esophageal amplitudes less than 30 mm Hg seen in more than 30% of contractions in the distal esophagus. The impact of this disorder on esophageal Hg seen in more than 30% of contractions in the distal esophagus is secondary to chronic acid damage to the distal esophagus. The LES hypotension might not be severe, however, and studies suggest that the abnormal acid exposure in these patients correlates better with the weak esophageal pump than with the resting LES pressure. For these reasons, LES hypotension is not required as a diagnostic criterion for ineffective esophageal motility. Dysphagia is usually mild in patients with IEM and heartburn and acid regurgitation are more common. Severe dysphagia suggests the presence of an anatomical problem such as esophagitis or a peptic stricture. Treatment is directed at controlling the acid reflux. Unfortunately, no drug can reliably increase peristaltic amplitude.

5. NONSPECIFIC ESOPHAGEAL MOTILITY DISORDERS

The conditions discussed above are those that have been recognized and named by investigators, and for which there are published series. Many patients previously categorized as having non-specific esophageal motility disorders (NSMD) would be included in the category of ineffective esophageal motility. The diagnosis of NSMD is often used in the evaluation of a patient with dysphagia and/or chest pain who has abnormal findings on esophageal motility tracing but does not fulfill the fixed criteria for other discrete diagnoses. The only required finding for NSMD is “peristaltic abnormalities of insufficient severity to establish any (other) diagnosis, yet not felt to be normal”. The list of associated findings for NSMD includes contractions that are variously nontransmitted, retrograde, repetitive, high amplitude, low amplitude, prolonged, or spontaneous. Incomplete LES relaxation can also be seen in patients with NSMD. These findings can be found in any combination. Treatment of NSMD is nonstandardized at present, and treatment decisions are often aimed at symptomatic relief and guided by the dominant pattern (spastic, hypopcontractile, etc) seen during esophageal manometry. Pending further advances in our understanding of the pathophysiology of motility abnormalities, non-specific esophageal motility abnormalities should be reported descriptively. On the other hand, as we have noticed in our everyday clinical practice, many NSMD represent just the beginning or an early stage of yet completely undifferentiated PEMD, so continuous regular manometric check-ups are strongly advised.

SAŽETAK

Primarni poremećaji motiliteta jednjaka predstavljaju mnogobrojne patološke manometrijske nalaze koji se uglavnom manifestuju u vidu disfagije ili retrosternalog bosta. Pojedina oboljenja, kao što je ahalazija, predstavljaju stanja koja imaju dobro definisanu patologiju, karakteristične manometrijske nalaze kao i dobar odgovor na lečenje u vidu palijacije sahajima. Druga oboljenja, kao što su difuzni spazam jednjaka i jednjaka u vidu krcikalice za orah, nemaju jasno definisanu patologiju i mogu predstavljati spektar poremećaja motiliteta koji su povezani sa subtilnim neuropatološkim promenama, gastroesofagealnim refluxom ili stresnim stanjima. Sa druge strane, hipokontraktilni jednjak je uglavnom uzrokovan postojanjem slabe mukusulature najčešće uzrokovane gastroesofagealnim refluxom. Iako su manometrijske vrednosti za sva ova stanja jasno definisane, povezanost sa simptomima je nespecifična, dok je u pojedinim slučajevima odgovor bolesnika na medicinsko lečenje nepredvidiv. Cilj ovog rada je da prikaže široki spektar primarnih poremećaja motiliteta jednjaka kao i da ponudi sažet pregled za kliničare koji se susreću sa ovim specifičnim oboljenjima. Ključne reči: jednjak, motilitet, manometrija

BIBLIOGRAPHY


