Achalasia

Achalasein, greek: inability to swallow; achalasia is a swallowing disorder, affects 1/100 000.
Cause: loss of the function of the nerve, which mediate transport and relaxation of the lower esophageal sphincter. Consequence: the lower esophageal sphincter does not relax (open).
Symptoms: inability to swallow. Diagnosis: gastroscopy (exclude a tumor), esophageal manometry: classical pressure tracings. Manometry lists 3 types of achalasia: type I, II and III.
Treatment: botox injections; balloon dilatation; surgery (laparoscopic Heller myotomy and partial anterior fundoplication; Dor).
Reflux monitoring assesses the time of esophageal acid exposure during 24 h measurement. The test uses gastric acid as a marker for reflux. For the assessment of acid exposure patient has to discontinue anti acid medication (proton pump inhibitor) for 10 days. Acid exposure is given in % time pH 4.2% is abnormal and indicates reflux. Reflux monitoring assesses acid exposure and the number of reflux episodes.

Acid pocket

After a meal acid concentrates within the cardia (dilated distal esophagus), this is the acid pocket. The acid pocket causes heartburn after a meal.

Acid reflux

Reflux of gastric acid, causes heartburn and acid regurgitation. Esophageal reflux monitoring assesses acid reflux.

Anti reflux mechanism

Valve mechanism in the lower portion of the esophagus, length: 6.0 cm. This is the lower esophageal sphincter. The valve is closed and opens for the passage of food. In patients with heartburn and reflux the function of the valve is impaired (short and low pressure, as assessed by manometry).

Anti reflux surgery

Laparoscopic surgery, it restores the function of the anti reflux mechanism (lower esophageal sphincter; LES). Works by placement of a magnetic ring or a fundic wrap (fundoplication) around the lower end of the esophagus.
Bile reflux

Reflex of bile into the esophagus. Causes the bitter taste of reflux.

Biopsy

Tissue sample for histological examination under the endoscope. The pathologist examines the sample for the presence or absence of inflammation, Barrett’s esophagus, dysplasia or cancer. The result of the examination is cataloged in the histopathology report.

Biopsy forceps

Device for collecting tissue samples during the endoscopy (gastroscopy). The biopsy forceps is introduced via the working channel of the endoscope.

Cardia

Frequently mistaken as proximal stomach in fact represents the dilated distal esophagus. The cardia is the reflux damaged, dilated, sack-like, folds forming lower portion of the esophagus. Since it is covered by a gastric type innermost-layer (mucosa) it is misclassified as proximal stomach. The histopathology of biopsies obtained from this region proof the esophageal origin. The cardia develops at the cost of the anti reflux mechanism (the lower esophageal sphincter): the longer the cardia, the shorter the sphincter. Within the cardia cancer reflux may cause the development Barrett’s esophagus and cancer (adenocarcinoma of the cardia).

Cardiac mucosa (CM)
Columnar type mucosa (innermost layer of the esophagus); may progress to Barrett’s esophagus and cancer. Consists of mucus cells only.

Chandrasoma classification

Describes the types of mucosa (innermost layer of the esophagus), which develops as a consequence of reflux, i.e. the columnar lined esophagus. The histopathology classification is named after the US American pathologist Prof. Dr. Para Chandrasoma and lists the types of columnar lined esophagus without dysplasia. The Chandrasoma classification catalogs histopathology and lists: cardiac mucosa (mucus cells only), oxyntocardiac mucosa (mixture of mucus cells and parietal cells) and intestinal metaplasia (IM; goblet cells; IM is also termed Barrett’s esophagus). Multilayered epithelium is cause by reflux and is a mixture of squamous and columnar cells. Via dysplasia Barrett’s esophagus may progress to esophageal cancer (0.5% annual risk, this equals the risk of a colon polyp to progress to colon cancer).

CLEV

Columnar lined esophagus (CLEV) visible at the magnification of the endoscope (5-10 times). Under the endoscope the normal mucosa of the esophagus has a white color. The CLEV has a salmon color. Inflammation of the esophagus (esophagitis) shows red stripes and areas. Our endoscopy report always catalogs the length of the CLEV. The length equals the distance form the most upper limit of the CLEV (salmon color) to the level of the rise to the gastric type folds. The normal lining of the esophagus shows a white color during endoscopy.

Columnar lined esophagus (CLE)

Abnormal type of innermost layer of the esophagus; develops as a consequence of the reflux; lists 3 types: cardiac mucosa, oxyntocardiac mucosa and intestinal metaplasia (Barrett’s esophagus). Cardiac mucosa progresses to intestinal metaplasia (Barrett’s esophagus). Barrett’s esophagus has a 0.5% annual cancer risk. Oxyntocardiac mucosa has no cancer risk. The diagnosis is established under microscope, where the pathologists examined biopsies obtained from the esophagus (gullet). CLE develops between the normal squamous lined esophagus and the oxyntic mucosa of the proximal stomach. Therefore CLE lines the squamo oxyntic gap (SOG).

Connective tissue disease
Dilated distal esophagus (DDE; cardia)

The morphological and functional manifestation of reflux. Due to gastric distention the lower portion of the esophagus gets over-stretched, dilated and exposed to the reflux. As a consequence the innermost layer is covered by a gastric-type mucosa (columnar lined esophagus). Therefore it looks like stomach during endoscopy. The histopathology of biopsies obtained from this region proof the esophageal origin. The dilated distal esophagus develops at the cost of the anti reflux mechanism (the lower esophageal sphincter): the longer the cardia, the shorter the sphincter. The dilated distal esophagus may harbor Barrett’s esophagus and become the playground for the development of the adenocarcinoma of the cardia.

Dor fundoplication

Anti reflux surgery, the anterior aspect of the esophagus is covered by the fundus of the stomach. Is only used for anti reflux therapy after Heller myotomy for achalasia.
Duodenum

Portion of the gut after the stomach, it collects sections from its mucosa, the liver and the pancreas for the digestion of food. The duodenum is the upper portion of the small intestine.

Dysphagia

Swallowing difficulty. Cause: disorder of the esophagus (tumor, inflammation, scar tissue; reflux). Diagnosis: gastroscopy. Reflux impairs the transport function of the esophagus (gullet). As a consequence dysphagia occurs in reflux patients.

Dysplasia

Cellular mis-formation with increased cancer risk. Dysplasia is diagnosed under the microscope: histopathology of biopsies obtained during a gastroscopy. Low- and high grade dysplasia describe lower and higher grades of mis-formation. High grade dysplasia is the direct precursor of cancer.

End stage achalasia

Amotility of the esophagus, absence of any transport function. In this end stage situation the surgeon has to remove the esophagus (gastric pull up, Ivor Lewis esophagectomy operation).

Endoscopy

Device for endoscopic examination of the gut (esophagus, stomach, duodenum, colon, rectum, anus), urine bladder, ears, nose throat, trachea (tube between throat and lungs). Modern high
Definition (HD) endoscopy uses a flexible white light endoscope connected to the video tower and video screen. Digital staining (narrow band imaging) improves the accuracy and detection rate of abnormalities.

Eosinophilic esophagitis (EoE)

Rare form of esophagitis. Named after white blood cells, which are increased in the tissue (eosinophil granulocytes). Causes: unknown, food allergy, reflux. Symptoms: difficulties at swallowing (dysphagia), heartburn and chest pain. Diagnosis: gastroscopy and histopathology of biopsies obtained from the esophagus (gullet). Therapy: administration of cortisone spray and proton pump inhibitor. Outflow obstruction due to rings and scars is treated by balloon dilatation.

Epithelial restitution

This process serves to reseal leaks and defects within the innermost cell layer of the mucosa. Following damage and detachment of epithelial cells neighboring epithelial cells flatten and migrate to reseal the defect. Epithelial restitution serves to reseal wounds during inflammation (gastritis, esophagitis, colitis). Epithelial restitution also heals wounds within columnar lined esophagus (CLE) and Barrett’s esophagus. The process is driven by compounds within the mucosa and involves mediators (hormones, growth factors) released from nerve-, connective tissue-, blood-, immune-, muscle cells and other epithelial cells.

Epithelium

This is the innermost cell layer of the gut. The epithelium lines the mucosa (=the innermost layer of the gut). The epithelium serves for secretion, digestion, protection against luminal bacteria etc. The epithelium is a highly dynamic structure. Injuries are immediately repaired by epithelial restitution.

Esophageal adenocarcinoma

Caused by reflux; arises from Barrett’s esophagus via low- and high- grade dysplasia. Risk factors: male gender, reflux, obesity and alcohol. Symptoms: heartburn, dysphagia. Diagnosis: gastroscopy. Therapy: early stage is treated by endoscopic mucosa resection and radiofrequency ablation; invasive cancer is treated by surgery (Ivor Lewis operation). Advanced stage with involvement of neighboring and distant organs (metastasis) is treated by chemo-radiation.
Dysphagia is managed by stent placement. Survival is related to the tumor stage and differentiation type of the tumor.

**Esophageal manometry**

The ambulatory test lasts 15 min and assesses the pressure profile of the anti reflux mechanism (lower esophageal sphincter, LES). Combined with impedance it assesses esophageal transport (complete, incomplete). For manometry we introduce a spaghetti thick catheter via the anesthetized nostrils into the stomach. The catheter includes probes for pressure assessment and impedance probes for the examination of esophageal transport.

**Esophageal squamous cell cancer**

Arises from the squamous epithelium of the esophagus. Risk factors: males, alcohol, smoking; human papilloma virus. Usually develops in the upper to mid third of the esophagus. Frequently assessed in advanced stage with dysphagia (inability to swallow). Therefore operation is not possible. Instead chemo-radiation aims to reduce the size of the tumor and to prolog survival. Dysphagia is treated by the placement of a stent. Diagnosis: gastroscopy. Prevention: avoid the above risk factors. Survival depends on the tumor stage and differentiation type of the tumor.

**Esophagitis**

Inflammation of the esophagus. Causes: reflux, acid reflux, allergy. Symptoms: dysphagia, heartburn, coughing, asthma. Reflux causes a complex neurohumoral flush released by the cells of the innermost layer (mucosa) of the esophagus. The flush generates heartburn, coughing and asthma. Over time the flush generates genetic changes within the cells. Thus esophagitis drives the development of Barrett’s esophagus, dysplasia and cancer.

**Fundoplication**
Laparoscopic anti reflux operation. The surgeon wraps the fundus of the stomach around the lower end of the esophagus. This creates a new anti reflux mechanism.

Fundus

Sack-like distensible part of the upper portion of the stomach; runs to the left and upwards, lies adjacent to the left part of the diaphragm and to the spleen. In case of gastric over-distention (large meals) the fundus pushes towards the diaphragm and causes hiccups. During fundoplication the surgeon wraps the fundus around the lower end of the esophagus and thus creates a new effective anti reflux mechanism.

Gastroesophageal reflux disease

Due to the impaired function of the anti reflux mechanism in the lower end of the esophagus, reflux inflames the esophagus: heartburn, acid regurgitation, coughing and asthma occur. If the symptoms impair the life quality of an individual the condition is termed GERD. GERD affects 20% to 30% of the population in Europe, North America, Japan and some areas in China, Taiwan, India and South America. GERD is a life style disease and originates from unhealthy eating behavior. Treatment includes medical or surgical therapy (magnetic ring, fundoplication).

Gastroscopy

Endoscopic examination of the esophagus (gullet), stomach and duodenum. We perform gastroscopy under sedation (painless endoscopy). Via the mouth we introduce the endoscope into the esophagus, pass it along via the stomach into the duodenum. Then we slowly remove the endoscope and examine the innermost layer (mucosa) of the duodenum, stomach and the esophagus (gullet). Biopsies are obtained from duodenum, stomach and esophagus for histological examination. Any abnormal area is biopsy sampled (area of inflammation, tumor). Polyps are removed, using the biopsy forceps or the sling. The devices are introduced via the working channel of the endoscope.
Gastroesophageal Reflux Disease (=Reflux) indicates the back flow of gastric content (lat. refluare = flow back). Acid reflux is the major cause for heartburn. Symptomatic Acid reflux with heartburn, coughing and vomiting affects 20% to 30% of the population (male and females with similar frequency).

GERD complications

Complications of GERD include esophagitis (+bleeding, ulcer, perforation), Barrett’s esophagus, dysplasia and cancer development. Cancer prevention includes gastroscopy (+biopsy sampling) for the exclusion of cancer risk and elimination of Barrett’s esophagus with radiofrequency ablation.

GERD diagnosis

The diagnosis of GERD includes patient history, symptom assessment, gastroscopy, esophageal manometry and esophageal reflux monitoring.

GERD emergency

GERD related emergency includes acute heartburn, swallowing disorders, abdominal pain, nausea, and vomiting. You should immediately consult the emergency unit of your neighboring hospital. Antacids, proton pump inhibitor may provide partial pain relief.

GERD therapy

The therapy of GERD includes medical treatment (antacids, histamine type 2 blocker, proton pump inhibitor) and anti reflux surgery (magnetic ring operation, fundoplication).
Are tube-like invaginations of the innermost layer of the gut (mucosa). At the base the gland tube lobulates like the fingers of a hand. This is the so called subfoveolar portion of the gland. Different cell types line the gland. The gland produces secretion for digestion and lubrication of the surface. The cell composition defines the gland type.

Guide wire

The wire is delivered into the lumen of the gut via the working channel of the endoscope. Leaving the guide wire in place the endoscope is removed and replaced by a catheter. Thus the guide wire serves for safe introduction of catheters into the gut, i.e. HALO 360, sizing balloon, stents.

HALO 360

Used for circumferential ablation of Barrett’s esophagus. It is a catheter mounted balloon electrode for circumferential delivery of radiofrequency energy. Before HALO 360 treatment we assess the diameter of the esophagus, using the sizing balloon.

HALO 60

Used for focal ablation of Barrett’s esophagus. It is small endoscope mounted plate electrode for the delivery of radiofrequency energy to the Barrett’s mucosa.

HALO 90

Used for focal ablation of Barrett’s esophagus. It is small endoscope mounted plate electrode (larger than HALO 60) for the delivery of radiofrequency energy to the Barrett’s mucosa.

Heartburn
Burning sensation behind the breastbone, in the chest and arising to the neck, throat and ears. 
Cause: acid reflux.

Heartburn surgery

Laparoscopic surgery, it restores the function of the anti reflux mechanism (lower esophageal sphincter; LES). Works by placement of a magnetic ring or a fundic wrap (fundoplication) around the lower end of the esophagus.

Heller myotomy

Laparoscopic operation for achalasia. The lower esophageal sphincter is dissected. Then an anterior fundoplication (Dor) is created as anti reflux procedure.

Hiatal hernia

Dilation of the hole of the diaphragm, which allows the passage of the esophagus from the chest into the abdomen. The hiatus is enlarged in persons with reflux and heartburn. Large hernias harbor the risk for incarceration. The size of the hernia is reduced during anti reflux surgery (fundoplication, magnetic ring operation).

Hill grade

Endoscopic measure for the function of the anti reflux valve in the lower portion of the esophagus. During gastroscopy we assess in as much the anti efflux valve encircles the endoscope. Hill grade I: optimal valve function. Hill grade II: weak valve function, but does not open. Hill grade III: valve stays intermittently open. Hill grade IV: valve stay always open. We always include the Hill grade into your endoscopy report.

Human papilloma virus
Exually transmitted, causes inflammation and cancer in squamous type epithelia (mouth, neck, throat, esophagus; anal canal; females: vagina, portio uteri). In the esophagus the human papilloma virus causes the development of squamous cell cancer. Prevention: vaccination.

Impedance

Measures the resistance changes along a catheter placed in the lumen of the esophagus. The direction of the resistance changes indicates influx vs. reflux. Impedance is combined with manometry (correlation of pressure and esophageal transport) and used for reflux monitoring (amount of reflux).

Incarceration

Strangulation of an organ within the narrowing of hole (hernia); associates with the danger of tissue necrosis, pain, nausea and vomiting. Occurs in going hernia, hiatal hernia (reflux) and internal hernia (side holes within the abdominal cavity).

Ivor Lewis esophagectomy

This is an operation for the removal of the thoracic (chest) and abdominal portion of the esophagus (gullet). Indications: cancer of the esophagus (adenocarcinoma, squamous cell cancer), functional disorders of the esophagus (end stage achalasia, diffuse esophageal spasm), complications after esophageal surgery (failed, slipped fundoplication) esophageal diverticulosis, long stenosis (narrowing), perforation (after vomiting), radiation esophagitis. The resection includes the thoracic (chest) and abdominal portion of the esophagus and the proximal stomach. The continuity is restored by the formation of a gastric tube, which is sutured to the cervical portion of the esophagus. The Ivor Lewis operation is conducted as an open procedure or by laparoscopy (minimal invasive operation).
Laparoscopy

Endoscopy of the abdominal cavity. Via small incisions (0.5 cm – 1 cm) trocars (tubes) are inserted into the abdominal wall. CO2 is insufflated to elevate the wall of the abdomen to create the space for the operation within the abdominal cavity. Laparoscopy is applied for various types of surgeries including anti reflux surgery and the magnetic ring operation.

Lower esophageal sphincter (LES)

Muscular thickening in the lower portion of the esophagus (6 cm length). This is the anti reflux mechanism. Normally the LES is closed and opens for the passage of food. In Patients with reflux the LES shows an impaired function (short and low pressure, as shown by manometry).

Magnetic ring operation

Novel laparoscopic anti reflux operation. A ring consisting of magnetic titanium beads is placed around the lower end of the esophagus (the lower esophageal sphincter). The ring augments the sphincter, prevents reflux and opens during swallowing.

Mucosa

Is the innermost layer of the gut (esophagus, stomach etc.). Normally squamous epithelium lines the innermost layer of the esophagus. Reflux inflames the esophagus and replaces the squamous epithelium by a columnar type mucosa: cardiac mucosa, oxyntocardiac mucosa, Barrett’s esophagus (intestinal metaplasia). Mucosa type is assessed by the microscopic examination of biopsies obtained during endoscopy (gastroscopy).

Multi layered epithelium
Is a type of columnar lined esophagus, it is a mixture of squamous and columnar epithelium. Its presence indicates reflux. The diagnosis is established under the microscope from biopsies obtained from the esophagus.

N

Narrow band imaging

Modern digital staining technology for endoscopy. A complex digital filter system improves the tissue discrimination and the detection of abnormalities of the innermost layer of the gut (mucosa). The pit pattern of the mucosal glands and the vessels (vascular pit pattern) indicates the presence or absence of dysplasia and cancer.

Nissen fundoplication

Anti reflux surgery, the entire circumference of the esophagus is enwrapped by the fundus.

O

Out balanced carb diet

Sugars are the essential currency of the metabolism. With age the organism does not tolerate the entire spectrum of food, especially concentrated carbohydrates (sugars). The outbalanced carb diet eliminates concentrated sugars and improves the metabolism. It is highly effective to relief heartburn, cough, asthma and burning sensations in the throat and tongue. For more information feel free to contact us to make an appointment for a consultation in the reflux medical insitute.
The normal innermost layer of the upper portion of the stomach. It consists of mucus cells, parietal cells (produce the gastric acid) and chief cells (produce the enzyme pepsinogen).

**Oxyntocardiac mucosa (OCM)**

Benign type of mucosa of the esophagus, develops due to reflux, has no cancer risk. Consists of a mixture of mucus and parietal cells in the subfoveolar region of the gland.

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**P**

Painless endoscopy

**Endoscopy (gastroscopy, colonoscopy)**

**Parietal cell**

Cell of the innermost layer (mucosa) of the stomach. Via activation of the proton pump the parietal cell produces the gastric acid. The gastric acid is the major compound of acid reflux. Proton pump inhibitor (PPI) blocks the function of the proton pump of the parietal cell and thus inhibits gastric acid secretion.

**Pepsinogen**

Enzyme produced by the chief cells of the stomach. When exposed to the acidic environment of the lumen of the stomach it turns to pepsin. Pepsin is a protease enzyme for the digestion of the proteins within the food.

**Peroral endoscopic myotomy (POEM)**

Radiofrequency ablation (RFA)

Novel technology for the endoscopic removal of Barrett’s esophagus. RFA destroys the Barrett’s tissue by the delivery of radiofrequency energy (10-12 J/cm2). RFA is effective (70% effect after 1 treatment) and durable (92% after 5 years). RFA uses focal endoscope mounted plate ablators (HALO 60, 90) and the balloon catheter for circumferential ablation. Complications are rare (0.2%).

Reflux

Reflux indicates the back flow of gastric content (lat. refluare = flow back). Acid reflux is the major cause for heartburn. Symptomatic Acid reflux with heartburn, coughing and vomiting affects 20% to 30% of the population (male and females with similar frequency).

Reflux esophagitis

Esophagitis (inflammation) of the esophagus (gullet) caused by reflux (acid and non acid). During endoscopy esophagitis shows red areas, stripes and dots. Endoscopic esophagitis is graded according to the Los Angeles classification. None, grades A, B, C, D. Our endoscopy records always catalog the grade of esophagitis. Histopathology reveals the microscopic esophagitis. Symptoms: heartburn, acid regurgitation, coughing, asthma. Therapy: administration of proton pump inhibitor or anti reflux surgery.

Reflux monitoring
The ambulatory test assesses the number of reflux episodes, the amount of esophageal acid exposure and of the reflux and the acid exposure cause the symptoms. For reflux monitoring we introduce a spaghetti thick catheter via the anesthetized nostrils into the stomach. The catheter includes probes for reflux assessment.

Novel concept coined by the US American pathologist Para Chandrasoma, Los Angeles. It describes the interposition of columnar lined esophagus (CLE) between the normal squamous lined esophagus and the oxyntic mucosa of the stomach. The gap develops as a consequence of the reflux. Over time the reflux increases the length of the gap. The SOG includes the CLEv and the cardia (the dilated distal esophagus). We perform special multi level biopsies for the assessment of the length of the SOG. The SOG is the basis for treatment tailoring (medical, surgery; magnetic ring, fundoplication).

The normal lining of the innermost layer (mucosa) of the esophagus (gullet).

Narrowing within a tubular organ (gut, esophagus, colon, bile duct etc.).

A tube made of plastic for overbridging narrow areas in the esophagus (tumor). Following the introduction of a guide wire the folded stent is pushed across the narrowing. Then the stent is unfolded, extends and creates the lumen. Stents are used for palliation in patients with stenosis.
due to inflammation (reflux esophagitis) or esophageal cancer. In addition stents are used for effective bridging of esophageal iatrogenic perforations (iatros, greek: physician, genein, greek: make). Iatrogenic perforations may happen after endoscopic mucosal resection, fundoplication, operation of achalasia etc.).

Stomach

Sack like organ interposed between the esophagus (gullet) and the duodenum. The stomach serves for the storage and digestion of food. The stomach includes the proximal portion (fundus, corpus = body of the stomach) and the distal portion (antrum). The lower esophageal sphincter separates the esophagus from the stomach. The pylorus separates the stomach from the duodenum and opens for the passage of food. The stomach produces acid and enzymes for the digestion of the food. In addition the stomach produces important gut hormones (gastrin etc.).

Subfoveolar

Gland architecture, glands are are tube-like invaginations of the innermost layer of the gut (mucosa). At the base the gland tube lobulates like the fingers of a hand. This is the so-called subfoveolar portion of the gland. The cell composition defines the gland type.

Toupet fundoplication

Anti reflux surgery, the dorsal 270° of the circumference of the esophagus are included into the fundus wrap.