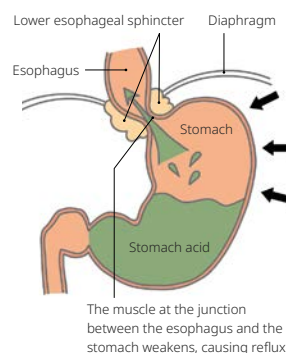


## Esophagus

### > Gastroesophageal Reflux Disease (GERD)

The condition in which stomach contents containing a large volume of gastric acid flow back into the esophagus is called Gastroesophageal Reflux Disease (GERD). This occurs when gastric acid refluxes into the esophagus, irritating its mucosa. GERD is classified into two categories: reflux esophagitis and Non-Erosive Reflux Disease (NERD), based on symptoms and the condition of the esophageal mucosa.

Reflux esophagitis is characterized by symptoms such as heartburn and acid reflux, and endoscopy reveals abnormal lesions, including erosion and ulcers on the esophageal mucosa. In contrast, NERD also presents with symptoms like heartburn and acid reflux; however, endoscopy shows no mucosal lesions such as erosion or ulcers.



Source: "Onaka-Kenکو.com" (Japanese only)  
<https://www.onaka-kenko.com/>

### > Barrett's Esophagus

The esophageal mucosa is lined with squamous epithelium, whereas the stomach and colon are lined with columnar epithelium. Barrett's esophagus is a condition in which the mucosa in the lower esophagus is continuously replaced with columnar epithelium from the mucosa of the stomach. Repeated inflammation of the esophageal mucosa caused by gastric acid reflux can lead to cellular degeneration.

### > Esophageal Cancer

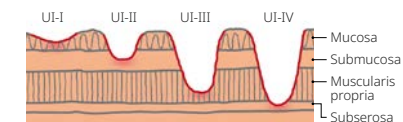
The walls of the esophagus are made from multiple layers of mucosa and muscle. Cancer of the esophagus typically occurs in the innermost mucosa. This is called "squamous cell carcinoma" and over 90% of Japanese people with cancer of the esophagus have this type of cancer. Habitual drinking and smoking are sources of risk. There is another type of esophageal cancer called "adenocarcinoma" which is more common in Europe and the U.S. This type of cancer is found in 60-70% of esophageal cancer cases in Europe and the U.S. Barrett's esophagus, where stomach acid flows up the esophagus and causes inflammation of the esophageal mucosa, is thought to be associated with adenocarcinoma.



## Stomach

### > Stomach Ulcers

An ulcer is a condition in which the gastric mucosa is damaged, extending into the muscular layer beneath the mucosa. It occurs due to the digestive action of gastric acid on the body's own mucosa. Gastric ulcers are classified as acute or chronic. Acute gastric ulcers are shallow, irregular ulcers with several areas of erosion, whereas chronic gastric ulcers are typically round and occur as single ulcers.

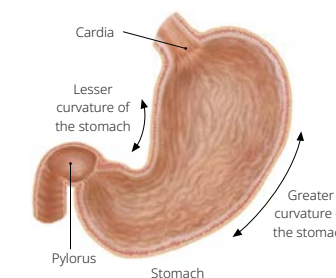


UI-I : Erosion with loss of mucosal surface  
 UI-II : Ulceration tissue with loss as far as the submucosa  
 UI-III : Ulceration tissue with loss as far as the muscularis propria  
 UI-IV : Ulceration tissue with loss extending past the muscularis propria

Source: "Onaka-Kenکو.com" (Japanese only)  
<https://www.onaka-kenko.com/>

### > Stomach Cancer

It is thought to arise in the mucosae of the stomach from gastritis and atrophy. When atrophy occurs in the mucosae of the stomach, it leads to atrophic gastritis, which can lead to "intestinal metaplasia," a condition in which the stomach-type mucosa turns into intestinal-type mucosa. Intestinal metaplasia is known to develop into cancer. Recently it has been shown that this is related to the bacterium *Helicobacter pylori*. *H. pylori* causes inflammation of the mucosa in the stomach and has been observed to lead to atrophic gastritis and intestinal metaplasia.

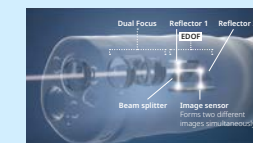


## Gastrointestinal Scope

Gastrointestinal videoscopes are for viewing the stomach and duodenum through the esophagus and usually have an insertion tube length of 1,030mm. Videoscopes have a forward-facing lens on the distal tip which is ideal for observing tissue directly in front of the endoscope. Videoscopes designed to be inserted through the mouth typically have an insertion tube diameter of around 10mm; videoscopes designed for passage through the nose are about half that diameter. There are various types of scopes, and one of them is a videoscope featuring Extended Depth of Field (EDOF)\*1 technology. Even in situations where a large or raised lesion is being diagnosed with an endoscope and keeping the entire lesion in focus is difficult, scopes with EDOF technology\*2 allow physicians to obtain sharp, in-focus images, supporting highly accurate endoscopy.



Gastrointestinal videoscope



Click here to see more details about EDOF. [\[Link\]](#)

\*1 EDOF technology creates an image in total focus by using two prisms to split light entering the endoscope lens into two separate beams with near- and far-focused images. Those beams are then projected simultaneously onto an image sensor, combining them into one image with a wide depth of field.

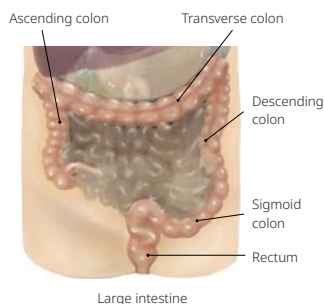
\*2 A colonoscope is also included in the product lineup.

## Colon

### > Colorectal Cancer

Cancer of the large intestine includes both colon cancer and rectal cancer, but colon cancer especially is increasing rapidly. Consuming animal fats causes greater secretion of biliary acid to help with digestion. There are carcinogens among the substances that develop when digesting fats. It is believed that cancer occurs in the mucosa of the large intestine.

The inside of the large intestine consists of four layers. Sometimes, benign polyps called adenomas occur in the mucosa. Many cases of colorectal cancer are believed to be related to these polyps. Furthermore, it has been recently discovered that there are also flat and depressed cancers that develop directly from the mucosa. The most common areas for colorectal cancer are the rectum and sigmoid colon, which cancers account for about 70% of all cases.



### > Benign Polyp

A tissue that protrudes from the mucous membrane of the colon is called a colon polyp. The polyp has a high probability of occurring in the rectum or the sigmoid colon, and its size is between a few millimeters and 3cm. They are largely divided into neoplastic and non-neoplastic polyps. Small polyps are generally asymptomatic, but if they become large, symptoms such as fecal occult blood and fresh blood in the stool can occur.

### > Inflammatory Bowel Disease (IBD)

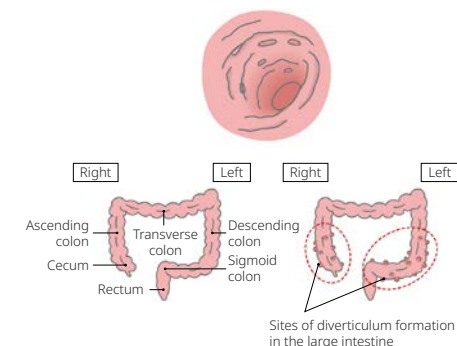
It is a disease characterized by inflammation of the gastrointestinal mucosa, primarily affecting the intestines. Broadly, it is classified into ulcerative colitis (UC) and Crohn's disease (CD). Ulcerative colitis is an inflammatory condition of the colon that mainly involves the mucosa and submucosa, leading to erosions and ulcer formation. Although it primarily affects the colon and is associated with persistent diarrhea and recurrent bloody stools, it may involve the immune system and is considered a systemic disease. Crohn's disease is an inflammatory bowel disease of unknown etiology. Symptoms vary depending on the location of inflammation and ulceration; however, patients often present with abdominal pain, diarrhea, anal pain, anal fistulas, and fever.

\*Williet, N., Tournier, Q., et al. Effect of Endocuff-assisted colonoscopy on adenoma detection rate: meta-analysis of randomized controlled trials. *Endoscopy*, 50 (9), 846-860. Doi:10.1055/a0577-3500. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/29698990>.

### > Diverticulosis

Diverticulosis is a condition in which 5–10mm bulging pouches (diverticula) form in the walls of the colon. Most diverticula are around 1cm in size, but larger ones can have openings exceeding 2cm. Diverticula develop due to increased intestinal pressure from congenital or acquired factors, with insufficient dietary fiber intake being a major acquired cause.

Diverticulosis is usually asymptomatic but can lead to acute complications such as diverticular hemorrhage, where blood vessels within the diverticula rupture and bleed, and diverticulitis, in which bacteria within the diverticula cause infection.



Source: "Onaka-Kenko.com" (Japanese only)  
<https://www.onaka-kenko.com/>

### Colonoscope

Colonoscopes are longer than gastrointestinal videoscopes in order to accommodate the long 1.5m length of the adult colon. Standard-length colonoscopes are 1,330mm long. Extended length models are 1,680mm long. The colonoscope has a forward-facing tip. In order to facilitate insertability into the colon a flexibility adjustment ring allows the operator to adjust the stiffness of the insertion section during the procedure. Colonoscopes typically have an insertion tube diameter of around 13mm.



Colonoscope

### ENDOCUFF VISION, Colonoscope Distal Attachment

This device is attached to the colonoscope's distal end to support visualization in procedures such as colonoscopy screening and polyp removal. ENDOCUFF VISION features a proprietary design comprised of a flexible arm with extensions placed on the device circumference. The arms open the colon's bended section and mucosal folds, providing a clearer view inside the colon and making it easier to detect polyps and adenomas. Research\* shows that compared with standard colonoscopies, those performed using this technology increase the adenoma detection rate (ADR) by up to 11%. According to this research, each 1% improvement in the ADR lowers the risk of colon cancer by 3%.



ENDOCUFF VISION

## Small Bowel

### > Gastrointestinal Bleeding

Gastrointestinal bleeding is suspected when symptoms such as melena or bloody stools indicate bleeding in the digestive tract, but the source cannot be identified through either upper gastrointestinal endoscopy or colonoscopy. Although causes other than small bowel lesions are possible, most cases involve bleeding from the small bowel.

There are many diseases that can cause small bowel bleeding. Conditions such as Crohn's disease, intestinal Behçet's disease, and NSAID-induced enteritis are inflammatory disorders of the small intestine. In addition, small bowel tumors such as malignant lymphoma and gastrointestinal stromal tumors (GIST), as well as arteriovenous malformations and small bowel diverticula, can also be causes of small bowel bleeding.

#### Small Bowel Enteroscope

This involves using an endoscope with a balloon attached on the distal end such that the inflated balloon holds the intestine open and allows the endoscope to be moved forward. Insertion can be via either the mouth or anus. As the instrument channel outlet is also provided, as on a conventional endoscope, it can be used for biopsies or to perform simple procedures. To be long enough to view the small intestine, the endoscope has a length of 2,000mm and a diameter of approximately 9mm.



Small intestinal videoscope



Single balloon enteroscope

## Digestive Tract (Esophagus/Stomach/Colon/Small Bowel)

Main diagnostic method

### Biopsy

A biopsy is a diagnostic procedure that removes pieces of tissue which is suspected of being a lesion, subject to pathological testing under a microscope.



Biopsy

Main endotherapy device used

### Biopsy Forceps

Biopsy forceps include the standard type and also a type with a needle which prevents slipping on the surface of mucosa. Various biopsy forceps are used such as a single-side opening type for the esophagus and the wide-opening type used for stiff mucosa.

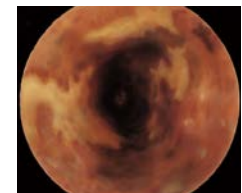


Biopsy forceps with needle

Main diagnostic method

### Dye Spraying

In order to identify tumors or other lesions in the early stages, dye, such as Indigo carmine solution and Lugol's iodine solution, is sprayed on the surface of the mucosa. This procedure enables easier observation of mucosal surface shape change.



Spraying Lugol into the esophagus (image)

Main endotherapy device used

### Spraying Tube

An endotherapy device for spraying dye on an observation site.



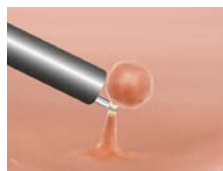
Spraying tube

## Digestive Tract (Esophagus/Stomach/Colon/Small Bowel)

Method of treatment in internal medicine for **benign polyps**

### Polypectomy

A polypectomy is a procedure that removes local elevated lesions called polyps which grow out of the mucous epithelium. A wire snare is looped around the base of the polyp, and a high-frequency electrical current is applied while the snare is tightened. The polyp is then burned off and collected using gripping forceps. There is also a method called "cold polypectomy," in which polyps of less than 10mm are squeezed and removed without applying high-frequency current.



Polypectomy

Main endotherapy device used

### Electrosurgical Snare

An electrosurgical snare is an endotherapy device made of looped metal wire. The device applies a high-frequency current to ligate the lesion site and then burn off the lesion. Among high-frequency snares are ones that can carry out a cold polypectomy that severs the lesion without applying a high-frequency current.



Electrosurgical snare

Method of treatment in internal medicine for **benign polyps**

### Hot Biopsy

For small polyps and relatively flat (sessile) polyps, a procedure called a biopsy can be performed. While pinching the polyp with a biopsy forceps, high-frequency current is used to remove the tissue and cauterize the polyp base, preventing bleeding from the site.



Hot biopsy

Main endotherapy device used

### Hot Biopsy Forceps

Hot biopsy forceps can collect tissue while applying a high-frequency current to a cup unit. The end section is about the same structure as a biopsy forceps. The operating section has a plug for connecting to an electrosurgical generator.



Hot biopsy forceps

Method of treatment in internal medicine for **esophageal cancer, stomach cancer, colorectal cancer, and benign polyps**

### Endoscopic Mucosal Resection (EMR)

EMR enables the removal of small flat lesions such as early-stage cancers. There are several techniques for performing EMR. One of these is so-called "cap EMR" (EMRC). This procedure uses a transparent plastic cap fitted over the tip of the endoscope. The lesion is first raised by injecting normal saline into the submucosa under the lesion. The raised tissue is then sucked into the cap attached to the tip of the endoscope and is cut off using an electrosurgical snare positioned inside the cap. The lesion is then recovered using suction.



EMRC method

Main endotherapy device used

### Transparent Cap

Equipped with a scope end-section, transparent cap is used to remove a lesion by suction.

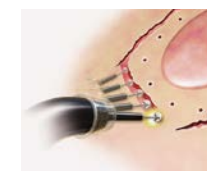


Transparent cap

Method of treatment in internal medicine for **esophageal cancer, stomach cancer, and colorectal cancer**

### Endoscopic Submucosal Dissection (ESD)

EMR is limited to removing lesions smaller than 2cm. ESD was developed as a procedure for removing much larger (and more irregularly shaped) lesions. First, an electrosurgical electrode is used to make small burn marks to outline the area around the lesion. The lesion is then raised by injecting normal saline into the submucosa to separate the lesion from the normal tissue below. Next, the mucosa around the lesion is cut using an electrosurgical knife. The submucosa is then separated, and the lesion is recovered using forceps.

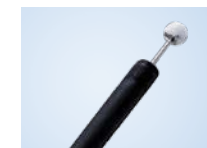


ESD

Main endotherapy device used

### Electrosurgical Knife

A therapeutic device for removing larger early-stage lesions. There are knives with a ceramic insulator attached to the tip of the needle knife. The insulator lowers the risk of perforation in the digestive tract and also enables large-scale mucosa removal.



Electrosurgical knife

**Digestive Tract (Esophagus/Stomach/Colon/Small Bowel)**

Main treatment method in internal medicine

**Hemostasis**

A hemostasis procedure is sometimes required to control the bleeding that results from removing polyps and other lesions. There are several ways to stop bleeding using an endoscope.

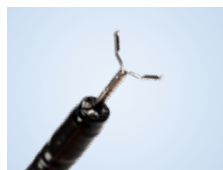
Main endotherapy devices used

**Clip**

The clip acts to pinch the open blood vessel closed, and applies pressure to the tissue to stop the bleeding. In the clip hemostasis method, the clip tip is left in place after compression.



Clip hemostasis



Clip



High-frequency hemostatic forceps

**High-Frequency Hemostatic Forceps**

Hemostatic forceps that use high-frequency securely grip large blood vessels or hard and slippery tissue, enabling coagulation to occur.

**EndoClot, Hemostasis Solution**

EndoClot Polysaccharide Hemostatic System (PHS) is an advanced powder hemostat that is applied during a procedure using consistent air pressure intended to provide more control of delivery. It is indicated for use in combination with other conventional techniques, such as clips, for large and diffuse bleeds, including those occurring in peptic ulcers, post-biopsy, polypectomy, tumor bleeding, post EMR and ESD.



EndoClot PHS

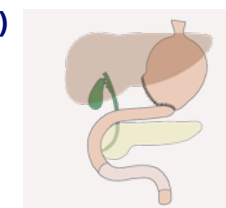
Method of surgical treatment for **stomach cancer**

**Laparoscopy-Assisted Distal Gastrectomy (LADG)**

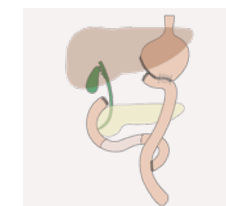
This surgery is limited in application to early-stage cancers from the lower part of the stomach (pyloric antrum) to the middle of the stomach (body of the stomach). The standard procedure is to remove at least two-thirds of the stomach and the lymph nodes around the stomach. The reason this is called a "laparoscopy-assisted" procedure is that the surgery requires a laparotomy, albeit with a smaller incision.

The two basic methods for reconstructing the stomach are the Billroth I method and the Roux-en-Y method. In the Billroth I method, the remaining stomach and the duodenum are joined. In the Roux-en-Y method, the remaining stomach and the jejunum are joined, and the remaining duodenum is connected to the bottom of the jejunum. Food flows from the stomach to the jejunum, where it mixes with digestive fluids that flow in from the duodenum.

If these surgeries are not appropriate for the patient due to tumor location or disease extent, another kind of stomach cancer surgery called Laparoscopy-Assisted Total Gastrectomy (LATG) is performed instead.



Billroth I method



Roux-en-Y method

Method of surgical treatment for **colorectal cancer**

**Laparoscopy-Assisted Colectomy**

Colorectal cancer surgery involves resection of the affected segment of the colon or rectum, along with removal of the associated regional lymph nodes. Compared with gastric surgery, the vascular and lymphatic anatomy of the colon is relatively consistent and well defined, which makes lymph node dissection well suited to laparoscopic techniques. As a result, laparoscopy-assisted colectomy has become an established standard surgical approach for many patients with colon cancer, offering comparable oncologic outcomes with the benefits of minimally invasive surgery.



Laparoscopy-assisted colectomy

Note:  
The above image of the procedure is from the case report by Dr. Arita of Kyoto Prefectural University of Medicine.

Main therapeutic device used

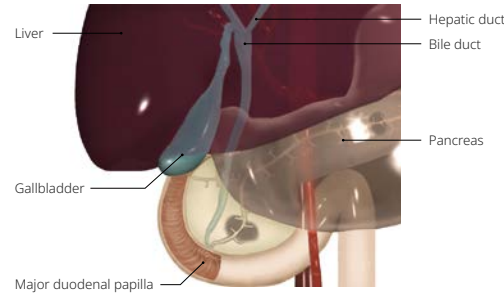
**Surgical Systems**

Systems used in surgery are described on pages 17-18.

## Hepato-Pancreato-Biliary

### > Gallstones

A medical condition in which a stone can appear in the biliary tract (generic term for the bile duct, gallbladder, and major duodenal papilla). Gallstones that form in the gallbladder are particularly common. Biliary tract cancers, which can appear in the gallbladder and bile duct, are understood to be connected to gallstones. If gallstones injure the biliary tract, they can cause inflammation, which can turn into cancer if prolonged.



### > Pancreatic Cancer

It comes from pancreatic cells. Pancreatic cancer is divided into two types: exocrine (digestive enzyme secretion system) and endocrine (hormone secretion system). About 95% of pancreatic cancer is of the exocrine type, and about 85% of these are invasive pancreatic duct cancers that occur on the epithelium of the pancreatic duct. Pancreatic cancer typically occurs in individuals who are 50–70 years old, especially in elderly males.

### Ultrasound Gastrointestinal Videoscope/ Diagnostic Ultrasound System

In addition to standard endoscopy, Endoscopic Ultrasonography (EUS) using medical ultrasound technology is performed to detect lesions that cannot be observed on the surface and are located deep within the organs. These examinations use an ultrasound gastrointestinal videoscope equipped with an ultrasound transducer installed on their tip, together with an ultrasound diagnostic system.

In the digestive tract, this kind of endoscope is used to find tumors and cancers hidden below the surface of the GI tract and to examine varices in the esophagus. They are also used to find cancer, gallstones and pancreatic stones in the pancreas and biliary tract. Biopsy needles inserted under ultrasound guidance help diagnose hidden submucosal tumors and contribute to the diagnosis and management of pancreatic cysts.

We began a collaboration on Endoscopic Ultrasound Systems with Canon Medical Systems Corporation (Canon Medical) in 2024. The Aplio i800 diagnostic ultrasound system for EUS, manufactured by Canon Medical, is designed to support advanced EUS procedures with powerful imaging that enhances penetration and resolution and offers an abundance of advanced, clinically validated tools.

Through our collaboration, we will achieve further qualitative improvements in the quality of images and performance in diagnosis and minimally invasive treatment of EUS, ultimately contributing to facilitate the early detection of diseases.



Ultrasound gastrointestinal videoscope



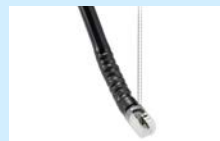
Aplio i800 EUS diagnostic ultrasound system

### Duodenoscope

Unlike gastrointestinal videoscopes and colonoscopes, duodenoscopes have a side-viewing tip design in which the lens and illumination optics are on the side of the scope. This enables the scope to perform procedures such as Endoscopic Retrograde Cholangio Pancreatography (ERCP) that is imaging of the pancreaticobiliary ducts via the duodenum, and for performing Endoscopic Sphincterotomy which allows removal of gallstones via the mouth. This endoscope has a prism at its tip to allow it to look perpendicular to its axis, and a forceps elevator to deflect accessory devices in the same direction. Duodenoscopes typically are 1,240mm long.



Duodenovideoscope



Side-viewing tip design (including forceps elevator system)

Note: A single-use scope is planned for future release.

### Cholangioscope

Cholangioscope is a miniature scope inserted in the instrument channel of a duodenovideoscope. It can be used for direct observation inside the narrow duct of the pancreaticobiliary system or to collect tissue.



Cholangioscope

Note: A single-use scope is planned for future release.

## Hepato-Pancreato-Biliary

Diagnostic method for **gallstones and pancreatic cancer**

### Endoscopic Retrograde Cholangiopancreatography (ERCP)

ERCP is method for examining the biliary tract and pancreatic duct using a combination of endoscopic and radiographic techniques. Using an endoscope, a thin tube (cannula) is inserted through the papilla of Vater into a duct of the pancreaticobiliary system. Radiological contrast dye is then injected into the ducts, and the area is viewed using X-rays.



ERCP

Main endotherapy device used

#### Cannula

A thin tube for injecting radiological contrast dye into the pancreatic or bile duct that can then be viewed by X-rays.



Cannula

Diagnostic method for **pancreatic cancer**

### Endoscopic Ultrasound-Guided Fine Needle Biopsy (EUS-FNB)

EUS-FNB is an examination technique that combines ultrasound and endoscopy technologies, enabling physicians to obtain tissue or cell biopsies of lesions from areas such as the pancreas that cannot be accessed directly by the endoscope. For example, a needle biopsy may be performed through the wall of the gastrointestinal tract with the ultrasound scope being inserted orally and ultrasound imaging used for sub-mucosal visualization. Collected tissue samples are then sent for pathological evaluation to determine whether the lesion is benign or malignant.



EUS-FNB

Main endotherapy device used

#### EUS-FNB Needle

This endotherapy device is designed for use with an ultrasound endoscope to obtain tissue or cell biopsies from lesions in areas such as the pancreas.



EUS needle

Method of treatment in internal medicine for **gallstones**

### Endoscopic Sphincterotomy

It is a procedure that is often used to remove gallstones. A papillotomy knife (papillotome) is inserted into the opening of the duodenal papilla, and the papillary sphincter is cut open. Following this, a stone extraction balloon or stone retrieval basket can be inserted into the biliary ducts to remove any gallstones residing in the biliary system.



EST

Main endotherapy devices used

#### Papillotome

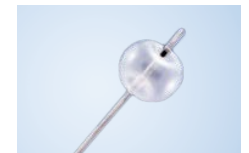
An electrosurgical knife inserted into the papilla at the end of the bile duct for use in incision using high frequencies.



Papillotome

#### Stone Extraction Balloon

A balloon-shaped catheter used to scrape out small stones resembling sand and silt.



Stone extraction balloon

#### Stone Retrieval Basket

An endotherapy device that is used to help retrieve and remove stone fragments from the bile duct.



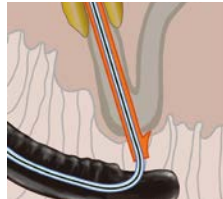
Stone retrieval basket

## Hepato-Pancreato-Biliary

Method of treatment in internal medicine for **gallstones**

### Endoscopic Biliary Drainage (EBD)

If the free flow of bile to the duodenum is hindered due to gallstones or a stricture (narrowing) of the bile duct due to disease, EBD may be performed by inserting a plastic or metal stent into the duct to allow the free flow of bile.



EBD

Main endotherapy devices used

#### Plastic Stent

When a bile duct has a stricture or blockage, this stent is inserted into the duct and releases bile. The device is implanted for a short period of time (around several weeks).



Plastic stent

#### Metal Stent

This stent is made of metal mesh. The post-implantation lumen is larger than for a plastic stent and can be expected to have large drainage. Comparatively long-term (around several months) patency and detainment is possible.

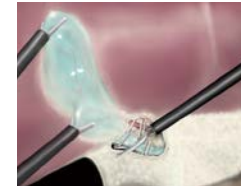


Metal stent

Method of surgical treatment for **gallstones**

### Laparoscopic Cholecystectomy


The gallbladder is located on the undersurface of the liver. During laparoscopic cholecystectomy, the surgeon carefully dissects the structures within Calot's triangle to obtain the critical view of safety and clearly identify the cystic duct and cystic artery. These structures are then secured with surgical clips and divided. The gallbladder is subsequently dissected from the liver bed using an electro-surgical device, with traction provided by grasping forceps. Once completely freed, the gallbladder is placed in a retrieval bag and removed from the abdominal cavity through one of the trocar sites.



Detachment of gallbladder

Main therapeutic device used

#### Surgical Systems

 Systems used in surgery are described on pages 17-18.



Removal through incision