THE RENDEZVOUS TECHNIQUE IN THE UPPER GASTROINTESTINAL TRACT

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1.0 Introduction

For more than 20 years now, minimally invasive surgery has been an established part of everyday surgical practice. After a period of initial hesitancy and problems with instrumentation, minimally invasive surgical techniques were widely implemented, in some cases without benefit of corroborative studies. The ability to achieve a good result with minimal surgical access trauma and shorter postoperative convalescence were compelling\(^1\)–\(^4\), although it was still necessary to master the new techniques.

Small abnormalities in the gastrointestinal tract as well as benign and early malignant lesions were formerly a domain of open surgery (assuming the malignancies could be detected at an early stage). The surgical access trauma in these cases was disproportionately large in relation to the small size of the lesion.

The introduction of flexible intraluminal endoscopy provided an effective alternative in many cases and opened up new endoluminal treatment options. Improved diagnostic methods based on flexible endoscopy led to the more frequent diagnosis of benign lesions and early tumor stages in the gastrointestinal tract.

The horizontal relationship between visceral surgeons and gastroenterologists in the treatment of gastrointestinal diseases also suggests an approach for the combination of treatment options. It makes sense that lesions which are not small or accessible enough for an endoluminal procedure can be resected by applying a combination of endoscopic techniques. For the gastroenterologist, these interventional “rendezvous” techniques can expand available therapeutic options; for the surgeon, they allow for the further reduction of access trauma. We are convinced that this problem-oriented approach that transcends interdisciplinary boundaries can be beneficial for the patient.

At present, the percentage of lesions that could be managed by this combined approach is difficult to estimate. It is determined partly by the gastroenterologist, who generally is the first specialist to see these patients. The interdisciplinary concept is the key to making surgeons more willing to undertake a minimally invasive local resection on a broader basis, aided if necessary by a gastroenterologist performing simultaneous interventional endoscopy.

This combination of endoscopic procedures does entail higher logistical costs, but the added costs are justified by the benefit for the patient in the form of minimal access trauma.

In this booklet we present selected examples of how therapeutic rendezvous techniques can be effectively applied in upper gastrointestinal operations.
2.0 Equipment Requirements

Rendezvous techniques impose special requirements in terms of operating room personnel and equipment. To satisfy these requirements while maintaining realistic staff expectations, it is important that optimum working conditions be established. Combined endoscopic-laparoscopic and endoscopic-thoracoscopic procedures are still in the clinical introduction phase. On the whole, these procedures represent an individualized approach that is tailored to the needs of the specific case. The developmental potential of these limited resection techniques is beyond question. Their clinical feasibility, practicality, and efficiency depend upon several local factors. Besides the upgrade in technology, it is necessary to provide adequate space for the operating teams (laparoscopy/thoracoscopy and endoscopy) to prevent mutual interference and breaks in aseptic technique.

This increased interdisciplinary teamwork calls for a new working environment designed to meet interdisciplinary requirements and satisfy the needs of different specialties. The ability to acquire, process, and display user-specific image information and equipment parameters requires a new, previously unattained level of operating room technology. If all necessary image information is to be made available to the surgeon and operating room personnel, means must be found to integrate live videoendoscopic images into application-oriented workflows.

For example, the surgeon must be able to see both the endoscopic and laparoscopic images simultaneously at an optimum viewing angle, while the endoscopic personnel must be able to view the laparoscopic operating site. The picture-in-picture feature (PIP, Fig. 1) is one possible solution. From a practical standpoint, however, it is better to have two full-size, mobile video monitors positioned so that they can be viewed simultaneously. This is accomplished by using a system of video monitors suspended from adjustable arms (Fig. 2). It should be possible to freely select and display the desired digital image signals, according to requirements.

Besides image control, which is an essential function in combined laparoscopic-endoscopic procedures, means must also be available for controlling other endoscopic functions (cold light source, insufflation unit, etc.), units for image documentation and processing, and peripheral equipment (operating table, operating room lights, etc.). Removing complex control functions from the sterile field and having them carried out by nonsterile assistants may lead to breaks in performance and delays. This underscores the importance of direct control by the surgeon, which can be accomplished by using a touch-screen monitor or voice-activated control functions.
Figure 3 shows the functions that can be controlled by the surgeon via touch-screen monitor. With the growing number of videoendoscopic operations and the combination of various minimally invasive video techniques, integrated operating systems are becoming increasingly important.

Another key requirement is a high level of training in laparoscopy, thoracoscopy, and intraluminal endoscopy. This depends to a significant degree on the medical facility itself, and it cannot always be assumed that endoscopic personnel can give proficient assistance in the operating room.

Conversely, the operating room personnel must be familiar with endoscopic equipment and routines. Regular instruction and continuing education are essential, regardless of whether the endoscopic personnel are provided by surgery or gastroenterology. The trend toward a less invasive access trauma is gaining momentum. The authors emphasize that this trend is associated with greater technological costs. The character of our operating rooms will evolve in the direction of increasingly networked, interdisciplinary operational environments.
3.0 Resection of Benign Esophageal Tumors

Videoendoscopic techniques have already been incorporated into the surgery of the intrathoracic organs. As a result of “video-assisted thoracic surgery,” today a variety of surgical procedures are being performed routinely without a thoracotomy. This minimizes surgical trauma while reducing postoperative pain and complications, resulting in a significant overall increase in patient comfort.

Minimally invasive techniques are also being applied with growing frequency in esophageal surgery. Myotomy for the treatment of achalasia, fundoplication for gastroesophageal reflux disease, and the removal of esophageal diverticula and benign submucous tumors have become a domain of minimally invasive surgery.

The absence of tactile feedback from direct palpation is partially offset by the capabilities of video-assisted technology. These include the use of endoscopes with various directions of view combined with video-assisted image magnification and digital image enhancement. Also, the accessibility of the esophagus to endoluminal endoscopy makes it possible for the operating surgeon and endoscopist to cooperate by using a rendezvous technique. The main goal of rendezvous endoscopy in minimally invasive esophageal surgery is to determine the precise location of the target lesion while avoiding the principal complication of esophageal surgery— injury to the mucosa. Even undetected mucosal lesions constitute an esophageal perforation and predispose to the most serious complication, which is the development of an intrathoracic infection (mediastinitis, pleural empyema) and severe sepsis.

“Submucous esophageal tumors” is a collective term applied to a variety of histological tumor entities. A common feature of these entities is their submucous, intramural pattern of growth. Examples are leiomyomas, rhabdomyomas, lipomas, and gastrointestinal stromal tumors. These mostly benign lesions account for approximately 0.12–2% of all esophageal tumors.

The morphological appearance of the tumor by esophagoscopy or contrast pharyngoesophagography (Fig. 4) strongly suggests its benign biological behavior.

Indications for surgical treatment:

1. A symptomatic tumor (cardinal symptom: dysphagia).
2. Malignancy cannot be excluded based on tumor size.
3. Enlargement of the lesion has been observed.

Surgical treatment consists of tumor enucleation. This technique has been adopted from conventional open surgery and applied directly to minimally invasive surgery, changing only the route of approach. The tumor is carefully shelled out of its bed in one piece, relying mainly on blunt dissection. Submucous tumors can usually be dissected out of their fibrous capsule without much difficulty.
For this reason, it has been recommended that the tumor not be biopsied prior to the operation. It has been reported that a preoperative biopsy may provoke the formation of adhesions between the tumor and its fibrous capsule, making it difficult or impossible to enucleate the tumor\(^{15}\). We have been unable to confirm this observation. Even with tumors that had been biopsied prior to referral, enucleation using minimally invasive technique was not significantly more difficult and there were no cases that required conversion to open surgery\(^{11, 15}\).

The preoperative diagnostic workup should include endoscopy of the upper gastrointestinal tract, pharyngoesophagography with oral contrast medium (see Fig. 4), and endosonography (see Fig. 5). These studies can demonstrate the intramural location of the tumor with the overlying intact mucosa (submucous growth).

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**Fig. 4**
Contrast radiographs of an intramural esophageal tumor.

**Fig. 5**
Endosonography shows a sharply circumscribed tumor in the esophageal wall (A). B: Ultrasound probe.
3.1 Operating Technique

The thoracoscopic enucleation of a submucous or intramural esophageal tumor is performed under general endotracheal anesthesia with the patient in left lateral decubitus. The right half of the lung will collapse when a double-lumen endotracheal tube is used, and so one-lung ventilation is essential. The arrangement of the operating team and monitors is shown in Fig. 6. The trocar ports are shown in Fig. 7. The trocar pattern should be adapted to the tumor location.

As a rule, we use two 13-mm thoracic trocars and one 6-mm trocar.

After pleural adhesions and the pulmonary ligament have been divided, the posterior mediastinum can be visualized (Fig. 8). Aided by simultaneous esophagoscopy, the tumor is localized and its extent is determined by transillumination (Figs. 9, 10). The mediastinal pleura is opened with an ultrasonic scalpel, and the esophagus is exposed at the desired level. Further dissection of the tumor is aided by simultaneous intraluminal endoscopy. The thoracoscopic and endoluminal video images are displayed so that they can be viewed simultaneously by the surgeon. The endoscopic light shining through the esophageal wall makes it easy to identify the plane of the dissection (Figs. 11–13). This transillumination significantly increases the safety and accuracy of the dissection. Longitudinal blunt dissection of the esophageal wall is performed in line with the muscle fibers using two dissectors. The endoscopic light allows the surgeon to recognize the exact location of the tumor and the path of the dissection. If the tumor is on the right side, there is no need for extensive dissection of the esophagus. The tumor can be removed under direct vision (Fig. 13). With a posterior or left-sided tumor, the esophagus must be mobilized in its mediastinal bed so that it can be rotated toward the operator and the tumor can be reached by intramural dissection (Figs. 11, 12). After the tumor has been completely enucleated, it is placed into a cellular and waterproof extraction bag and removed through a trocar port, which may be enlarged if necessary.
After the division of pleural adhesions and the pulmonary ligament, the posterior mediastinum is visualized. The esophagus is adjacent to the azygos vein.

The mediastinal pleura is opened with an ultrasonic scalpel, and the esophagus is exposed at the desired level.

The surgeon has been guided by the thoracosopic and endoluminal video images. Transillumination from the endoscopic light shows the location of the tumor and the plane of the dissection (broken line indicates the course of the esophagus).

The tumor is on the left side of the esophagus. Therefore the esophagus is mobilized in its mediastinal bed until it can be rotated toward the surgeon. This is followed by blunt intramural dissection that spares the mucosa.
When the tumor has been removed, the integrity of the esophagus is tested to exclude a perforation of the esophageal mucosa. This is done by placing fluid in the posterior mediastinum and insufflating air through the flexible intraluminal endoscope (Fig. 14). Air bubbles indicate the presence of a perforation, which must be oversewn. The site of repair is then tested for integrity in the same way.

The dissection plane is covered by approximating the longitudinal muscle and pleura over the operative site (Fig. 15). The purpose of this measure is to prevent the formation of a diverticulum. The trocar ports are then closed in two layers. We place a small chest tube through one of the trocar ports and generally remove it on the first postoperative day. If the esophageal mucosa was not perforated during the operation, an oral diet may be resumed on the day of the operation.

A transhiatal resection is preferred for tumors of the distal esophagus. The distal third of the esophagus deviates somewhat toward the left side of the thorax. For anatomical reasons, tumors at this distal location are easier to reach through a transthoracic approach than through a transthoracic approach. The trocar ports are based on the pattern traditionally used for minimally invasive operations in the gastroesophageal region. We place the trocars in a crescent-shaped pattern about the epigastric angle.

The esophageal hiatus is opened, and the esophagus is visualized. The tumor is enucleated using a rendezvous technique much like that in the thoracoscopic operation. After the tumor has been removed and the plane of the dissection covered, the hiatus is closed with nonabsorbable suture material. A chest tube should be placed if the pleural cavity has been opened.
3.2 Discussion
Following developments in recent years, the important role of minimally invasive techniques in thoracic and esophageal surgery has been universally recognized. The main advantage of minimally invasive surgery over conventional thoracotomy-based procedures is the reduction of surgical trauma13.

Use of the rendezvous technique makes it easier to locate the lesion and increases the safety and accuracy of the the mucosa. This is aided by the fact that the surgeon can view the intrathoracic and intraluminal images simultaneously during the operation. Also, direct visual control is aided by the transillumination effect described above (see Fig. 10 and Fig. 11). Endoscopic transillumination aids in the differentiation of muscle and mucosa, since all the anatomical planes can be clearly seen and identified.

This minimally invasive technique can be performed safely and with few complications and is well tolerated by patients in comparison with thoracotomy11, 13. Suitable for all benign tumors of the esophagus, this technique increases the safety of the dissection and is a valuable aid for the surgeon. A meticulous operating technique is essential in preventing complications.

No serious complications have occurred in our patients, and none have been reported by other groups of authors11, 13. A specific, serious complication that may occur in this type of operation is injury to the esophageal mucosa. The surgeon is strongly advised to check for the integrity of the mucosa at the end of the procedure (Fig. 14). Any injury noted at this time should be repaired with sutures. If a leak in the esophageal mucosa is detected during the postoperative course, it requires an individualized treatment concept19. The management of this complication is described in Chapter 4.

Benign esophageal tumors are a very good indication for enucleation using a minimally invasive technique. The rendezvous technique with simultaneous endoscopy allows for a safe and accurate dissection. This is evidenced by the consistently good published results, although we do not have access to randomized clinical data due to the low incidence of these lesions11, 13, 15, 18, 20-22.

Operator experience in minimally invasive surgery and in conventional esophageal surgery are essential.

4.0 Operative Treatment of Achalasia

4.1 Introduction
Achalasia is a rare disease of the distal esophagus. It is characterized by abnormal peristalsis of the esophageal musculature and a failure of the lower esophageal sphincter to relax with swallowing23, 24. Heller first described a cardiomyotomy for the operative treatment of achalasia in 191425. Owing to their low mortality and complication rate, endoscopic techniques such as pneumatic dilation and the injection of botulinum toxin into the lower esophageal sphincter have become the treatment methods of choice at many institutions. The endoscopic treatments yield unsatisfactory long-term results, however, and usually they have to be repeated at regular intervals26-28.

With the rapid development of minimally invasive surgery in recent years, cardiomyotomy through a laparoscopic or thoracoscopic approach has become an established technique for the treatment of achalasia, yielding excellent long-term results that are comparable to those of conventional cardiomyotomy29, 30.

In practice, laparoscopic cardiomyotomy must be measured against the endoscopic techniques for the treatment of achalasia, and often it is used only in cases where endoscopic therapy has been unsuccessful29, 30-32. But at the same time, there is evidence that the complication rates of laparoscopic cardiomyotomy are increased after previous failed attempts at endoscopic dilation or botulinum toxin injections30, 34.
4.2 Case Presentation

A 32-year-old man with confirmed achalasia and a 10-year history of complaints was referred to us for operative treatment. The patient had already undergone multiple endoscopic treatments (balloon dilations and botulinum toxin injections) with no lasting success. At the time of admission, the patient was able to eat only semisolid foods (dysphagia score of 2). The preoperative workup included esophagoscopy with manometry and barium esophagography, and findings were consistent with achalasia.

We decided to perform a laparoscopic cardiomyotomy with anterior hemifundoplication, aided by simultaneous endoscopic control. The preoperative preparations were the same as for a laparoscopic fundoplication.

4.3 Operating Technique

The patient is positioned supine in the French position. We generally use four or five trocars. After transhiatal mobilization of the distal esophagus, extramucous cardiomyotomy is performed, beginning with the hypertrophic lower esophageal sphincter. The myotomy is extended approximately 5–7 cm in the oral direction and 1–3 cm in the aboral direction onto the anterior stomach wall. In some cases it is extremely difficult to locate a definite submucous plane of dissection because of marked submucous fibrosis at the gastroesophageal junction caused by previous endoscopic treatments. With the aid of simultaneous intraluminal endoscopy, it is much easier to see the planes of the dissection and the underlying mucosa owing to the diaphanoscopic effect of the light emitted by the flexible endoscope. First the longitudinal muscle fibers are spread apart with the dissector, and then the inner circular muscle fibers are picked up and carefully divided with the ultrasonic scalpel (Fig. 16). The endoscopic transillumination enables the surgeon to see the intact mucosa. Additionally, the extent of the functional obstruction can be accurately evaluated by intraluminal endoscopic inspection. In this way a safe cardiomyotomy can be performed without iatrogenic perforation even in cases with significant submucous fibrosis and sclerosis. An anterior hemifundoplication completes the operation.

The flexible gastroscope is left in place to provide a supportive stent for the reconstruction. The total operating times in our patients have ranged from 80 to 120 minutes. An oral diet is generally resumed on the evening after the operation. As a rule, the patients were released from the hospital after 4–6 days of inpatient care.

Fig. 16
Complete longitudinal myotomy of the gastroesophageal junction.
4.4 Discussion

The goal in the treatment of achalasia is to eliminate the functional esophageal stricture and restore the esophagogastric passage of food. At present the standard, clinically tested treatments for this rare disorder are endoscopic procedures as well as open conventional and laparoscopic/thoracoscopic cardiomyotomy using the Heller technique. Endoscopic dilation of the esophageal stricture is certainly the oldest minimally invasive treatment method. But the long-term results of endoscopic dilation for achalasia are unsatisfactory, with only a 50–70% rate of permanent improvement. Moreover, it is usually necessary to repeat this procedure at regular intervals. The endoscopic injection of botulinum toxin into the lower esophageal sphincter has also failed to produce convincing long-term results.

Even before the establishment of laparoscopic treatment methods, we were able to achieve outstanding long-term results (85–90%) with the Heller cardiomyotomy performed through a thoracotomy or laparotomy, obtaining a markedly better success rate compared with endoscopic methods in prospective and open studies, especially in young patients. But given the higher mortality and complication rates of conventional surgical cardiomyotomy, endoscopic techniques have become well established in the primary treatment of achalasia. In the past, the conventional Heller cardiomyotomy was most commonly used in cases where multiple endoscopic treatments had failed to produce the desired long-term result. With the rapid development of endoscopic surgery, the cardiomyotomy has increasingly been performed through a minimally invasive approach. Experience to date has shown that laparoscopic and thoracoscopic cardiomyotomy for achalasia can yield excellent long-term results that are equivalent to those of conventional operative treatment while resulting in less procedure-related comorbidity, a shorter hospital stay, and less postoperative pain.

Several studies have documented the superiority of cardiomyotomy through a laparoscopic approach over the thoracoscopic approach in terms of relieving dysphagia, shortening the hospital stay, and reducing complications (postoperative reflux, conversion rate, etc.). Reports in the current literature differ on the need for a fundoplication and the optimum type of fundoplication that may be added to laparoscopic cardiomyotomy as an antireflux procedure. To date, convincing results have been reported for the Toupet posterior hemifundoplication and the Dor anterior hemifundoplication in the prevention of postoperative reflux. Some authors have found that an antireflux procedure can be omitted under certain conditions to simplify the operating technique and still achieve satisfactory relief of dysphagia. But other groups of authors observed a higher postoperative reflux rate in the absence of an antireflux procedure, and so it is still unclear whether an antireflux wrap should be routinely added. Prospective randomized studies are needed to further evaluate the general benefit and preferred technique of fundoplication in patients who undergo laparoscopic cardiomyotomy for achalasia.

Despite its convincing results, laparoscopic cardiomyotomy often is not included among the treatment options for achalasia until the patient has already received unsuccessful endoscopic treatments and is experiencing recurrent dysphagia. It appears, however, that the risk of an iatrogenic perforation during laparoscopic cardiomyotomy is increased in patients who have already undergone preoperative endoscopic dilation or botulinum toxin injection. Perforations in the setting of laparoscopic cardiomyotomy have been observed in 25–30% of patients who received previous endoscopic treatment. This contrasts with a perforation rate of 0–8% reported in patients who did not receive prior treatment. This is believed to result from scarring and fibrosis of the submucous layer due to uncontrolled stretching of
the esophageal wall by pneumatic dilation or by the circumscribed injection of botulinum toxin. The effect of these tissue changes is to make the laparoscopic dissection more difficult and obscure the local anatomy. We feel that simultaneous intraoperative endoscopy can be helpful in these cases, as the transillumination from the endoscope tip makes it easier for the surgeon to identify the submucous plane and underlying mucosa and to visually evaluate the length of the functional obstruction. Endoscopy also makes it possible to exclude an undesired perforation by inspecting the interior of the esophagus.

With laparoscopic cardiomyotomy as with the purely endoscopic techniques, the dysphagia associated with confirmed achalasia can be effectively relieved with a low risk of complications through a minimally invasive approach. The long-term success rate of laparoscopic cardiomyotomy appears to be better than that of endoscopic balloon dilation and botulinum toxin injection. It should be added that even endoscopic balloon dilation is associated with a significant, 7–15% incidence of esophageal perforation. For these reasons and due to the higher perforation risk of laparoscopic cardiomyotomy after failed preoperative endoscopic treatment, it is natural to raise the following question: What is the current indication for the purely endoscopic treatment of achalasia, and in what cases would laparoscopic cardiomyotomy be considered the treatment of choice? A definitive answer to this question will require additional studies. Until then, the treatment decision should be based on individual considerations. The Heller laparoscopic cardiomyotomy should be considered as a primary treatment option for achalasia, particularly in younger patients and patients who have a low anesthetic risk.

A very low complication rate has been reported in association with laparoscopic myotomies. Perforation of the esophagus is the most serious complication in the operative treatment of achalasia. The perforation may occur intraoperatively due to surgical manipulations, or it may not be manifested until later in the postoperative course. The management of this serious complication is based on an exacting and individualized treatment concept that depends on the size of the leak, the timing of the diagnosis, and the clinical presentation.

Esophagography with a water-soluble contrast medium and endoscopy should be performed to evaluate the extent of the leak and its drainage. CT scans of the chest and upper abdomen should also be obtained to assess the extent of mediastinal or intra-abdominal infection and check the feasibility of the interventional insertion of a pigtail catheter for drainage. If the esophageal mucosa is injured during the operation, generally the defect can be oversewn right away with simple interrupted sutures (vicryl or PDS). The site should additionally be covered by an anterior hemifundoplication, and the integrity of the repair should be tested intraoperatively. In patients who develop a postoperative esophageal leak, endoscopic treatment is frequently an option when adequate external drainage of the fistula can be established. Smaller perforations can be closed endoscopically with clips or by the injection of fibrin glue. Larger fistulas can be managed by the temporary implantation of fully covered stents. Some cases may require reexploration because of a long defect in the esophageal wall, an undrained perforation, or an esophageal leak accompanied by clinical signs of mediastinitis or peritonitis. Most defects can be oversewn and additionally covered with autologous material (pleura, pericardium, fundoplication, diaphragm). Resection of the distal esophagus or of the gastroesophageal junction should be reserved for exceptional cases. It is important to establish adequate drainage of the inferior mediastinum or subphrenic space in the revision procedure to allow for any additional endoscopic treatment options that may be required.
5.0 Rendezvous Techniques in Gastric Surgery

With current diagnostic procedures and the frequent use of diagnostic endoscopy in the stomach, pathological changes are sometimes detected incidentally at an early stage. Frequent uncertainty as to whether the lesion is benign or malignant requires histological confirmation, and this is best accomplished by performing a complete resection\textsuperscript{50, 51}. Endoscopic removal with a polypectomy snare cannot always provide a complete resection with tumor-free margins. On the other hand, the trauma associated with a conventional resection through an abdominal approach is excessive when viewed in relation to these small, usually asymptomatic lesions. Thus, benign tumors, indeterminate lesions, premalignant lesions, and possible early forms of carcinoma in the stomach may be an indication for the use of a combined laparoscopic-endoscopic procedure\textsuperscript{52-55}. The location of the lesion, its size, penetration depth, and biological behavior determine the necessary operative strategy. Particularly with regard to oncological criteria, the preoperative investigation of the lesion should be as accurate and complete as possible. In all cases, of course, these local, limited resection techniques must conform to the oncological requirements of tumor surgery. Suspicious lymph node enlargement suggestive of nodal metastasis, the infiltration of adjacent organs, or the concomitant presence of metastases are contraindications to this minimally invasive technique\textsuperscript{54, 56}.

With mucosa-associated lesions of the stomach, the preoperative workup should include endoscopic tissue sampling with histological evaluation and also the endosonographic detection of a limited penetration depth. This is necessary to ensure that a limited resection can be done with primary curative intent.

Submucous tumors in the stomach are very heterogeneous\textsuperscript{57}. Gastroscopic biopsies of intramural lesions often fail to provide definite histological confirmation. Endosonography is useful only for localizing the lesion to a particular wall layer. Total resection of the lesion is necessary in order to make a precise histological evaluation and plan further treatment\textsuperscript{58, 59}.

Minimally invasive methods reduce the surgical access trauma and are suitable for the resection of this tumor entity\textsuperscript{60}. Endoscopic procedures have been characterized in the literature as safe and practical\textsuperscript{50, 52, 61-64}.

5.1 Operating Technique – Criteria for Selecting a Procedure

The extent of the resection depends on the anatomical location of the tumor. Gastroscopy with transillumination is a crucial factor in selecting the procedure, as it demonstrates the precise location of the lesion. The preoperative localization must be confirmed intraoperatively. The operating technique must be individually adapted to the location, size, and nature of the tumor. If local lymph-node mapping is necessary, it can easily be done during laparoscopy with the aid of an ultrasonic scalpel or vessel sealing system. The following criteria should be taken as guidelines in selecting a procedure and are helpful in the individual decision-making process.

A tangential extragastric wedge resection is indicated for tumors of the anterior stomach wall and tumors on the greater and lesser curvatures (Figs. 17–21).

An intragastric resection is indicated for tumors of the posterior stomach wall (upper and lower portions) and tumors of the cardial and pyloric regions (Figs. 17, 22–27).

With the patient supine under general anesthesia, the primary trocar for the laparoscope is placed at a periumbilical site using standard technique. The procedure is based on the simultaneous use of laparoscopy and video gastroscopy. The tumor location is checked by gastroscopy.
5.2 Extragastric Resection

If the tumor is located on the anterior stomach wall, the greater or lesser curvature, or mobile portions of the posterior stomach wall, the extragastric wedge resection is indicated. In addition to the primary trocar for the laparoscope, one 6-mm trocar and one 13-mm trocar are needed and should be placed an adequate distance from the potential resection site. Following gastroscopic localization by transillumination, traction sutures are placed in the tumor region to allow for necessary manipulations of the stomach wall (Figs. 18, 19). If the tumor is on the greater or lesser curvature, it is first necessary to divide the greater or lesser omentum with the ultrasonic scalpel and expose the gastric serosa above the tumor (Fig. 18).

Regional lymph nodes can also be taken at this time for histological examination.

The stomach wall is elevated so that the endostapler can be applied (Fig. 20). The gastroscopic view shows the location of the stapler and confirms that it completely encompasses the tumor with adequate healthy margins before the stapler is fired. The staple line may be placed in small steps if necessary by repeated applications of the stapler (Fig. 21).

The extent of the gastric wall resection should be carefully checked during and after the resection to avoid creating a stenotic gastric lumen. Meticulous hemostasis is achieved by oversewing or coagulating the bleeding sites via gastroscopy and laparoscopy. The surgical specimen is placed in a extraction bag and removed through the median trocar port.

The operation is concluded by closing the trocar ports. A drain may be inserted if desired.
If the tumor is not on the anterior stomach wall, the posterior wall is reached by dissecting along the greater curvature. This creates the mobility necessary for resecting the tumor.

Following gastroscopic visualization and transillumination, a traction suture is placed to facilitate manipulation of the stomach wall in the region of the tumor base.

Tangential resection of the stomach wall with an endostapler. The initial placement of the stapler determines the direction of the resection. Simultaneous gastroscopy aids in maintaining an adequate gastric lumen.

The stapler is repeatedly fired, depending on the necessary length of the staple line.
5.3 Intragastric Resection

After creating the pneumoperitoneum (12 mmHg), we place one 11-mm periumbilical trocar and introduce a camera to inspect the abdominal cavity. Next we place an 11-mm and a 6-mm trocar. Meanwhile the tumor is visualized by intraluminal endoscopy. After localizing the tumor site (posterior stomach wall, cardial region, or pyloric region), we place two traction sutures in the stomach wall that can be used to raise the anterior stomach wall to the abdominal wall. A pursestring suture can then be preplaced between the traction sutures, and the gastrostomy can be performed at the center of the pursestring. The gastrostomy is positioned such that the stapler can be introduced later at an optimum angle in relation to the tumor base (Figs. 22, 23). The pursestring suture should always be used as it permits an airtight closure and also maintains hemostasis of the stomach wall during the resection phase. The trocar for the endostapler can now be introduced into the stomach and sealed (Figs. 23, 24). Intragastric vision is provided by the video gastroscope. Meanwhile the tumor is pulled into the gastric lumen with a polypectomy snare (Fig. 25). This ensures that the endostapler can be applied well beneath the tumor to provide an adequate tumor-free margin in the stomach wall (Fig. 25).

The endostapler is then fired to make the intragastric wedge resection. This may be done in several incremental steps if necessary. The specimen is removed in a retrieval bag via the gastroscope or through the abdominal wall, depending on the tumor size. After the intragastric trocar has been withdrawn, the stomach wall is closed with an endosuture or endostapler (Fig. 26).

Finally, intragastric endoscopy is used to confirm a secure, airtight, bloodless staple line and the secure closure of the trocar port (Fig. 27).
The Rendezvous Technique in the Upper Gastrointestinal Tract

Fig. 23
The trocar is advanced into the stomach between traction sutures through a small incision in the anterior stomach wall.

Fig. 24
The balloon trocar is placed within the stomach and pulled against the abdominal wall to seal off the incision site.

Fig. 25
Intraoperative view of the intragastric resection. The tumor on the stomach wall is pulled into the gastric lumen with a polypectomy snare, and the stapler arms are applied below it.

Fig. 26
The incision site for the intragastric trocar is closed with endoscopic all-layer sutures or, as illustrated here, with a staple line.

Fig. 27
Endoscopy confirms an airtight, bloodless staple line.
5.4 Discussion

In the technique that we have described, the procedure of choice depends on the anatomical location, size, and type of the tumor. This technique requires strict patient selection criteria and is limited to cases that can be treated with curative intent. Rendezvous surgery in the stomach represents an extremely valuable addition to the therapeutic spectrum.

This problem-oriented approach that transcends interdisciplinary boundaries offers definite advantages for the patient. The team concept requires new ways of thinking and workflow management in the hospital setting. The practical implementation of collaborative work in the operating room will require new forms of organization at many institutions.

Gastroscopy is used in locating the lesion, viewing the interior of the stomach during the operation, and mobilizing the tumor. We do not feel that simple endoscopic removal with a polypectomy snare is optimal for most cases, as it cannot guarantee adequate resection margins around an intramural tumor. Because the tumor is pulled into the gastric lumen and the endostapler is applied well beneath the tumor base in the stomach wall, the lesion can be adequately encompassed.

The intragastric resection requires only a small gastrostomy for introducing the trocar. Digital palpation as described by Tangoku et al. is unnecessary with this method and tumor size. The small gastrotomy can be closed safely and easily with sutures or staples. Possible method-specific complications are staple-line bleeding and anastomotic leak. These complications are very rare, however, and they did not occur in our series.

Intraoperative extragastric bleeding is controlled by oversewing the bleeding site, and intragastric bleeding can be controlled by endoscopic electrocautery or argon-plasma coagulation. In all cases, hemostasis and the integrity of the staple line should be checked and confirmed by gastroscopy. Any clinical suspicion of anastomotic leak during the postoperative course should be excluded or confirmed as quickly as possible by gastroscopic inspection. The primary treatment goal with an anastomotic leak is to establish rapid, effective drainage of the site and all collections. Generally this can be accomplished by second look laparoscopy with upper abdominal lavage, oversewing the site with staples, and inserting a drain.

Laparoscopic resection under endoscopic control results in less trauma compared with open surgery. We can recommend our procedure as a safe, well-tolerated option for the extirpation of benign tumors, indeterminate lesions, premalignant lesions, and perhaps even early forms of carcinoma. At present, however, there are no randomized controlled studies that objectively document the efficacy of the rendezvous techniques. Thus, the surgeon who applies these techniques should possess a high level of technical expertise and should apply rigorous criteria for patient selection.
6.0 References


The Rendezvous Technique in the Upper Gastrointestinal Tract

Recommended Instrument Set, Units and Accessories
The Rendezvous Technique in the Upper Gastrointestinal Tract

Recommended Instrument Set, Units and Accessories

Basic Set for Laparoscopy

26003 BA  
**HOPKINS® Forward-Oblique Telescope 30°**, enlarged view, diameter 10 mm, length 31 cm, autoclavable, fiber optic light transmission incorporated, color code: red

30160 MP  
3 x **Trocar**, with pyramidal tip, with insufflation stopcock, size 6 mm, working length 10.5 cm, color code: black, including:
- **Cannula**, without valve
- **Trocar only**
- **Multifunctional Valve**

30103 MP  
2 x **Trocar**, with pyramidal tip, with insufflation stopcock, size 11 cm, working length 10.5 cm, color code: green, including:
- **Cannula**, without valve
- **Trocar only**
- **Multifunctional Valve**

30103 AO  
**Trocar**, size 11 mm, color code: green
including:
- **Trocar only**, with blunt tip
- **Cannula**, with 2 flanges for fixation of sutures, adjustable cone, with insufflation stopcock, working length 13 cm
- **Automatic Valve**
- **Cone**

30108 MTR  
**TERNAMIAN EndoTIP Cannula**, with thread and rotating stopcock, size 13.5 mm, working length 11.5 cm, color code: blue, including:
- **Cannula**
- **Multifunctional Valve**

30140 DB  
**Reduction Sleeve**, reusable, instrument diameter 5 mm, trocar cannula outer diameter 11 mm, color code: green

30142 HB  
**Double Reducer**, 13/10 mm, 13.5/10 mm, 13/5 mm and 13.5/5 mm

33333 ON  
**CLICKLINE Grasping Forceps**, rotating, dismantling, without connector pin for unipolar coagulation, with Luer-Lock irrigation connector for cleaning, single action jaws, with especially fine atraumatic serration, fenestrated, size 5 mm, length 36 cm

33351 ML  
**CLICKLINE KELLY Dissecting and Grasping Forceps**, rotating, dismantling, insulated, with connector pin for unipolar coagulation, Luer-Lock connector for cleaning, double action jaws, long, size 5 mm, length 36 cm

33351 DF  
**CLICKLINE Dissecting and Grasping Forceps**, rotating, dismantling, insulated, with connector pin for unipolar coagulation, Luer-Lock connector for cleaning, double action jaws, atraumatic, size 5 mm, length 36 cm

34351 MA  
**CLICKLINE Scissors**, rotating, dismantling, insulated, with connector pin for unipolar coagulation, Luer-Lock irrigation connector for cleaning, double action jaws, spoon-shaped blades, serrated, curved, size 5 mm, length 36 cm

33561 BC  
**CLICKLINE BABCOCK Grasping Forceps**, rotating, dismantling, without connector pin for unipolar coagulation, double action jaws, size 10 mm, length 36 cm

38651 ON  
**RoBi® Grasping Forceps**, CLERMONT-FERRAND Model, rotating, dismantling, with connector pin for bipolar coagulation, with Luer-Lock irrigation connector for cleaning, double action jaws, fenestrated, with especially fine atraumatic serration, size 5 mm, length 36 cm

30173 FAR  
**KOH Macro Needle Holder**, dismantling, with Luer-Lock irrigation connector for cleaning, single action jaws, straight jaws, with tungsten carbide inserts, with ergonomic handle, axial, disengageable ratchet, ratchet position right, size 5 mm, length 33 cm
The Rendezvous Technique in the Upper Gastrointestinal Tract

Recommended Instrument Set, Units and Accessories

Basic Set for Gastroscopy

13821 PKS  Video Gastroscope, SILVER SCOPE® series, color system PAL, sheath outer diameter 9.3 mm, working channel diameter 2.8 mm, working length 1100 mm, deflection up/down 210°/100°, deflection left/right 120°/120°, field of vision 140°, depth of field 2 - 100 mm

Following accessories are included in delivery:
1x Case
1x Pressure compensation cap
1x Suction valve
1x Air/water valve
1x Leakage tester
1x Cap, for working channel, package of 10
1x Irrigation tube, for suction/biopsy channel
1x Y-irrigation tube, for suction/irrigation
1x Bite protector, for single use
1x Biopsy forceps, for single use
1x Cleaning brush, for single use
1x Valve brush, for video endoscopes
1x Protective Film, for transporting flexible endoscopes

TC 200EN  IMAGE1 CONNECT, connect module, for use with up to 3 link modules, resolution 1920 x 1080 pixels, with integrated KARL STORZ-SCB and digital Image Processing Module, power supply 100 – 120 VAC/200 – 240 VAC, 50/60 Hz

including:
Mains Cord, length 300 cm
DVI-D Connecting Cable, length 300 cm
SCB Connecting Cable, length 100 cm
USB Flash Drive, 32 GB

TC 300  IMAGE1 H3-LINK, link module, for use with IMAGE1 FULL HD three-chip camera heads, power supply 100 – 120 VAC/200 – 240 VAC, 50/60 Hz, for use with IMAGE1 CONNECT TC 200EN

including:
Mains Cord, length 300 cm
Link Cable, length 30 cm

TC 301  IMAGE1 X-LINK, link module, for use with flexible video endoscopes, power supply 100 – 120 VAC/200 – 240 VAC, 50/60 Hz, for use with IMAGE1 CONNECT TC 200EN

including:
Mains Cord, length 300 cm
Link Cable, length 30 cm

9619 NB  19” HD Monitor, color systems PAL/NTSC, max. resolution 1280 x 1024, power supply 100 – 240 VAC, 50/60 Hz

including:
External 24VDC Power Supply
DVI-D Connecting Cable
BNC Video Cable
VGA Video Cable
S-Video (Y/C) Connecting Cable

20132601-1  Cold Light Fountain XENON 100 SCB, incl. integrated insufflation pump, power supply 100 – 240 VAC, 50/60 Hz, for use with KARL STORZ video endoscopes

including:
Cold Light Fountain XENON 100 SCB, incl. integrated insufflation pump
Mains Cord
Water Bottle, 250 ml
Irrigation Adaptor, for water bottle
Irrigation Bottle Holder
HOPKINS® Straight Forward Telescopes
Diameter 10 mm, length 31 cm

Advantages of the HOPKINS® Laparoscopic Telescopes:
- Two and a half times greater image brightness
- Uniform image brightness, i.e. no reduction in luminous intensity from the center to the margin of the image
- Lower risk of object burns, i.e. the telescope requires a lower lamp output for the same perception of brightness
- Increased resolution of detail

It is recommended to check the suitability of the product for the intended procedure prior to use.
Trocars and Accessories

**size 11 mm**

![Image of a trocar and cannula set]

- **30103 AO** *Trocars*, size 11 mm, color code: green
  - *Trocar only*, with blunt tip
  - *Cannula*, with 2 flanges for fixation of sutures, adjustable cone, with insufflation stopcock, working length 13 cm
  - *Automatic Valve Cone*

- **30103 C2** *Sliding Cone*, size 11 mm, for use with Cannula 30103 H6

![Image of a cannula and trocar]

- **26031 SO** *Retractor*, S-shaped, 2 pieces, length 17 cm

**VERESS Pneumoperitoneum Needles**

- **26120 J** *VERESS Pneumoperitoneum Needle*, with spring-loaded blunt inner cannula, LUER-Lock, autoclavable, diameter 2.1 mm, length 10 cm

- **26120 JL** *Same*, length 13 cm

**TERNAMIAN EndoTIP Cannula**

**size 13.5 mm**

![Image of an endoTIP cannula]

- **30108 MTR** *TERNAMIAN EndoTIP Cannula*, with thread and rotating stopcock, size 13.5 mm, working length 11.5 cm, color code: blue, including:
  - *Cannula*
  - *Multifunctional Valve*
**Trocars and Accessories**
size 6, 11 and 13 mm

30160 MP

**Trocar**, with pyramidal tip, with insufflation stopcock, size 6 mm, working length 10.5 cm, color code: black, including:
- **Cannula**, without valve
- **Trocar only**
- **Multifunctional Valve**

30103 MP

**Trocar**, with pyramidal tip, with insufflation stopcock, size 11 cm, working length 10.5 cm, color code: green, including:
- **Cannula**, without valve
- **Trocar only**
- **Multifunctional Valve**

30107 MP

**Trocar**, with pyramidal tip, with insufflation stopcock, size 13 mm, working length 11.5 cm, color code: black, for use with linear staplers from the company Covidien (formerly Tyco), including:
- **Cannula**
- **Trocar only**
- **Multifunctional Valve**

30140 DB

**Reduction Sleeve**, reusable, instrument diameter 5 mm, trocar cannula outer diameter 11 mm, color code: green

30142 HB

**Double Reducer**, 13/10 mm, 13.5/10 mm, 13/5 mm and 13.5/5 mm
## Dissecting and Grasping Forceps

**CLICKLINE** – rotational, can be dismantled, insulated, with and without connector pin for unipolar coagulation size 5 mm, trocar size 6 mm

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### Double-action jaws

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**CLICKLINE KELLY Dissecting and Grasping Forceps, long**

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**CLICKLINE Dissecting and Grasping Forceps,”Dolphin Nose”**

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**CLICKLINE Grasping Forceps, atraumatic, fenestrated**

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</table>

**CLICKLINE Dissecting and Grasping Forceps, atraumatic**

Please note:

- For **CLICKLINE** instruments only the individual component parts are numbered. The catalog number for the complete instrument is not on the instrument. Instruments with insulated handles with connector pin for unipolar coagulation, are shown against the red background, instruments with handles without connector pin for unipolar coagulation are shown against the blue background. The colour **green** indicates the inserts.
Dissecting and Grasping Forceps

CLICKLINE – rotational, can be dismantled, insulated, with and without connector pin for unipolar coagulation.

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| 43 cm          | 33351    |
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|                | 33363    |

Double-action jaws

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CLICKLINE BABCOCK Grasping Forceps

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CLICKLINE CROCE-OLMI Grasping Forceps, atraumatic, fenestrated, curved

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CLICKLINE Grasping Forceps, with especially fine atraumatic serration, fenestrated

Please note:
For CLICKLINE instruments only the individual component parts are numbered. The catalog number for the complete instrument is not on the instrument. Instruments with insulated handles with connector pin for unipolar coagulation, are shown against the red background, instruments with handles without connector pin for unipolar coagulation are shown against the blue background. The colour green indicates the inserts.
**Dissecting and Grasping Forceps**

CLICKLINE – rotational, can be dismantled, without connector pin for unipolar coagulation
size 10 mm, trocar size 11 mm

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- **CLICKLINE BABCOCK Grasping Forceps**
  - Insert No. 33510 BC, Catalog number 33561 BC, 33562 BC, 33563 BC
  - Insert No. 33510 BL, Catalog number 33561 BL, 33562 BL, 33563 BL
  - Insert No. 33510 AF, Catalog number 33561 AF, 33562 AF, 33563 AF

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**Please note:**
For CLICKLINE instruments only the individual component parts are numbered. The catalog number for the complete instrument is not on the instrument. Instruments with handles without connector pin for unipolar coagulation are shown against the blue background. The colour green indicates the inserts.
**Scissors**

CLICKLINE – rotational, can be dismantled, with and without connector pin for unipolar coagulation
size 5 mm, trocar size 6 mm

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**Single-action jaws**

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**CLICKLINE METZENBAUM Scissors**, curved, length of blades 12 mm

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**CLICKLINE Scissors**, with serrated jaws, curved, spoon blades, length of blades 17 mm

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**Please note:**
For CLICKLINE instruments only the individual component parts are numbered. The catalog number for the complete instrument is not on the instrument. Instruments with insulated handles with connector pin for unipolar coagulation, are shown against the red background, instruments with handles without connector pin for unipolar coagulation are shown against the blue background. The colour green indicates the inserts.
**RoBi® Bipolar Grasping Forceps and Scissors**

RoBi® – rotational, can be dismantle with connector pin for **bipolar** coagulation, CLERMONT-FERRAND Model, size 5 mm, trocar size 6 mm

<table>
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<tr>
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<th>Handle</th>
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<tbody>
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<td>36 cm</td>
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**Double-action jaws:**

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<tbody>
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<td>38651 ON</td>
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<tr>
<td>38710 ON</td>
<td>38751 ON</td>
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</table>

**RoBi® Grasping Forceps, CLERMONT-FERRAND Model, fenestrated, with especially fine atraumatic serration**

<table>
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<tr>
<th>Insert No.</th>
<th>Catalog number</th>
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</thead>
<tbody>
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<td>38651 MD</td>
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**KELLY RoBi® Grasping Forceps, CLERMONT-FERRAND Model, especially suitable for dissection**

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**MANHES RoBi® Grasping Forceps, CLERMONT-FERRAND Model, especially suitable tying intracorporeal knots**

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<tr>
<td>38710 MW</td>
<td>38751 MW</td>
</tr>
</tbody>
</table>

**METZENBAUM, RoBi® Scissors CLERMONT-FERRAND Model, curved jaws, double-action jaws, thinner scissor blades**

**Please note:**

For **RoBi® Bipolar Grasping Forceps** instruments only the **individual component parts** are numbered. The catalog number for the **complete instrument**, as shown above against the **red background** is **not** on the instrument. The colour **green** indicates the **inserts**.
**Surgical Sponge Holder**

size 5 mm
trocar size 6 mm

![Surgical Sponge Holder](image)

| 32340 PT | Surgical Sponge Holder, self-retaining, size 5 mm, length 30 cm including: Handle Outer Sheath, insulated Sponge Holder Insert |

**Irrigation and Suction Tubes**

size 5 mm,
trocar size 6 mm

![Irrigation and Suction Tubes](image)

<table>
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<th>Working Length</th>
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<td>37360 LH</td>
<td>Cannula, with lateral holes</td>
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</tr>
<tr>
<td>43 cm</td>
<td>37460 LH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 cm</td>
<td>37360 SC</td>
<td>Cannula</td>
<td></td>
</tr>
</tbody>
</table>

**Knot Tier**

size 5 mm
trocar size 6 mm

![Knot Tier](image)

| 26596 SK | KÖCKERLING Knot Tier, for extracorporeal knotting, size 5 mm, length 36 cm |

**Distance Tip Working Length**

<table>
<thead>
<tr>
<th>Instrument No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37460 LH</td>
<td>Cannula, with lateral holes</td>
</tr>
<tr>
<td>37360 SC</td>
<td>Cannula</td>
</tr>
<tr>
<td>26596 SK</td>
<td>KÖCKERLING Knot Tier, for extracorporeal knotting, size 5 mm, length 36 cm</td>
</tr>
</tbody>
</table>
KOH Macro Needle Holder, size 5 mm, dismantling, including:
- Handle
- Outer Sheath
- Working Insert

Cleaning and sterilization are gaining increasing importance for KARL STORZ as a manufacturer of surgical instruments.

Similar to all our surgical instruments, the cleaning and hygiene of our needle holders also play an important role. Our KOH macro needle holders feature consistent effectiveness and precision, with significantly improved cleaning results achieved by dismantling the instrument. The handle, outer sheath and inner part can be cleaned and sterilized separately for perfect results.

This unique reusable three-piece design offers the user the following benefits:
- Can be disassembled into three separate components
- Fully autoclavable
- Cleaning adaptor
- Choice of six different handles and three different working inserts
- With tungsten carbide inserts
- Environmentally correct: In the event of damage, only the component with the defect needs to be replaced
- User-friendly and ergonomic handling
Handles and Outer Tubes

KOH Macro Needle Holders, dismantable

Handles axial and pistol grip with disengageable ratchet

<table>
<thead>
<tr>
<th>30173 AR</th>
<th>Handle, axial, with disengageable ratchet, ratchet release on the right side</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 AL</td>
<td>Handle, axial, with disengageable ratchet, ratchet release on the left side</td>
</tr>
<tr>
<td>30173 AO</td>
<td>Handle, axial, with disengageable ratchet, ratchet release on top</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>30173 PR</th>
<th>Handle, pistol grip, with disengageable ratchet, ratchet release on the right side</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 PL</td>
<td>Handle, pistol grip, with disengageable ratchet, ratchet release on the left side</td>
</tr>
<tr>
<td>30173 PO</td>
<td>Handle, pistol grip, with disengageable ratchet, ratchet release on top</td>
</tr>
</tbody>
</table>

Metal Outer Sheath
Size 5 mm

With Luer-Lock connector for cleaning

<table>
<thead>
<tr>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
</tr>
<tr>
<td>43 cm</td>
</tr>
</tbody>
</table>
**KOH Macro Needle Holder**

**NEW**

dismantable

### Size 5 mm

<table>
<thead>
<tr>
<th>Working Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
<td>30173 AR</td>
</tr>
<tr>
<td>43 cm</td>
<td></td>
</tr>
</tbody>
</table>

### Single-action jaws

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 R</td>
<td>30173 RAR</td>
</tr>
<tr>
<td>30178 R</td>
<td>30178 RAR</td>
</tr>
</tbody>
</table>

KOH **Macro Needle Holder**, dismantling, jaws curved to right, with tungsten carbide inserts, for use with suture material size 0/0 – 7/0

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 L</td>
<td>30173 LAR</td>
</tr>
<tr>
<td>30178 L</td>
<td>30178 LAR</td>
</tr>
</tbody>
</table>

KOH **Macro Needle Holder**, dismantling, jaws curved to left, with tungsten carbide inserts, for use with suture material size 0/0 – 7/0

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 F</td>
<td>30173 FAR</td>
</tr>
<tr>
<td>30178 F</td>
<td>30178 FAR</td>
</tr>
</tbody>
</table>

KOH **Macro Needle Holder**, dismantling, straight jaws, with tungsten carbide inserts, for use with suture material size 0/0 – 7/0
KOH *Macro Needle Holder* NEW
dismantable

### Size 5 mm

<table>
<thead>
<tr>
<th>Working Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30173 PR</td>
</tr>
<tr>
<td>33 cm</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>43 cm</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

### Single-action jaws

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 R</td>
<td>30173 RPR 30173 LPR 30173 FPR</td>
</tr>
<tr>
<td>30178 R</td>
<td>30178 RPR 30178 LPR 30178 FPR</td>
</tr>
<tr>
<td>30173 L</td>
<td>30173 LPR 30173 LPL 30173 FPL</td>
</tr>
<tr>
<td>30178 L</td>
<td>30178 LPR 30178 LPL 30178 FPL</td>
</tr>
<tr>
<td>30173 F</td>
<td>30173 FPR 30173 FPL 30173 FPO</td>
</tr>
<tr>
<td>30178 F</td>
<td>30178 FPR 30178 FPL 30178 FPO</td>
</tr>
</tbody>
</table>

KOH *Macro Needle Holder*, dismantling, straight jaws, with tungsten carbide inserts, for use with suture material size 0/0 – 7/0
Gastroscopes
2 Working Channels

Specifications:
Field of view: 140°
Depth of field: 2 – 200 mm
(2 freely programmable buttons with double function, i.e. for freeze/print or zoom/brightness)

The following accessories are included:
Carrying Case
EtO Cap
Leakage Tester
Caps for Working Channel
Irrigation Tube
Instrument Oil, 50 ml

Bite Protector
Biopsy Forceps, oval cup
Cleaning Brush
Cleaning Valve
Video Connecting Cable

* only for 13806 NKS/PKS
### Recommended Flexible Video Endoscopes

**Gastroscope**

<table>
<thead>
<tr>
<th>Flexible Gastroscope</th>
<th>Type</th>
<th>Order No.</th>
<th>Distal Tip Outer Diameter</th>
<th>Working Channel Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.3 mm x 110 cm</td>
<td>Gastroscope</td>
<td>13821 PKS</td>
<td>9.3 mm</td>
<td>2.8 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13821 NKS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0 mm x 110 cm</td>
<td>Gastroscope</td>
<td>13806 PKS</td>
<td>12.0 mm</td>
<td>2.8 mm 3.4 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13806 NKS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Suitable accessories for our flexible gastrosopes for single and multiple use can be found in our catalogue GASTROENTEROLOGY.
### Working Length and Deflection of Distal Tip

<table>
<thead>
<tr>
<th>Working Length</th>
<th>Deflection of Distal Tip</th>
<th>Field of View</th>
<th>Depth of Field</th>
<th>Accessories included</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 cm</td>
<td>up 210°; down 100°; left 120°; right 120°</td>
<td>140°</td>
<td>2-100 mm</td>
<td>110282-01* single-use</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>110910-01* single-use</td>
</tr>
<tr>
<td>110 cm</td>
<td>up 180°; down 100°; left 120°; right 120°</td>
<td>140°</td>
<td>2-100 mm</td>
<td>13250 LP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27651 H</td>
</tr>
</tbody>
</table>
Mobile Equipment Cart

Monitor:
9627 NB 27" FULL HD Monitor

Camera System:
TC 200 DE IMAGE1 S CONNECT, connect module
TC 300 IMAGE1 S H3-LINK, link module
TH 100 IMAGE1 S H3-Z Three-Chip FULL HD Camera Head

Light Source:
20133101-1 XENON 300 SCB Cold Light Fountain
495 NCSC Fiber Optic Light Cable

HF-Device:
20535201-125 AUTOCON® II 400
20017830 Two-Pedal Footswitch

Insufflation:
UI 400 S1 ENDOFLATOR® 40
UP 501 S3 S-PILOT™

Pump System:
26331101-1 HAMOU® ENDOMAT®

Equipment Cart:
UG 120 COR™ Equipment Cart, narrow, high
UG 500 Monitor Holder
UG 609 Bottle Holder, for CO₂-Bottles
29005 DFH Foot-Pedal Holder, for Two- and Three-Pedal Footswitches
UG 310 Isolation Transformer, 200V–240V
UG 410 Earth Leakage Monitor, 200V–240V

Additional for documentation purposes:
WD 250 AIDA® with SmartScreen®
TC 009 USB Adaptor, for ACC 1 and ACC 2
The Rendezvous Technique in the Upper Gastrointestinal Tract

IMAGE1 S Camera System NEW

Economical and future-proof
- Modular concept for flexible, rigid and 3D endoscopy as well as new technologies
- Forward and backward compatibility with video endoscopes and FULL HD camera heads

Innovative Design
- Dashboard: Complete overview with intuitive menu guidance
- Live menu: User-friendly and customizable
- Intelligent icons: Graphic representation changes when settings of connected devices or the entire system are adjusted

- Sustainable investment
- Compatible with all light sources

Automatic light source control
- Side-by-side view: Parallel display of standard image and the Visualization mode
- Multiple source control: IMAGE1 S allows the simultaneous display, processing and documentation of image information from two connected image sources, e.g., for hybrid operations

Dashboard
Live menu
Intelligent icons
Side-by-side view: Parallel display of standard image and Visualization mode

Dashboard: Complete overview with intuitive menu guidance
Live menu: User-friendly and customizable
Intelligent icons: Graphic representation changes when settings of connected devices or the entire system are adjusted

Automatic light source control
Side-by-side view: Parallel display of standard image and the Visualization mode
Multiple source control: IMAGE1 S allows the simultaneous display, processing and documentation of image information from two connected image sources, e.g., for hybrid operations
**IMAGE1 S Camera System**

**Brilliant Imaging**
- Clear and razor-sharp endoscopic images in FULL HD
- Natural color rendition

- Reflection is minimized
- Multiple IMAGE1 S technologies for homogeneous illumination, contrast enhancement and color shifting

**FULL HD image**

**CLARA**

**FULL HD image**

**CHROMA**

**FULL HD image**

**SPECTRA A**

**FULL HD image**

**SPECTRA B**

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
The Rendezvous Technique in the Upper Gastrointestinal Tract

**IMAGE1 S Camera System**

TC 200EN

TC 200EN* **IMAGE1 S CONNECT**, connect module, for use with up to 3 link modules, resolution 1920 x 1080 pixels, with integrated KARL STORZ-SCB and digital Image Processing Module, power supply 100–120 VAC/200–240 VAC, 50/60 Hz including:

- **Mains Cord**, length 300 cm
- **DVI-D Connecting Cable**, length 300 cm
- **SCB Connecting Cable**, length 100 cm
- **USB Flash Drive**, 32 GB, USB silicone keyboard, with touchpad, US

**Specifications:**

<table>
<thead>
<tr>
<th>HD video outputs</th>
<th>- 2x DVI-D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- 1x 3G-SDI</td>
</tr>
<tr>
<td>Format signal outputs</td>
<td>1920 x 1080p, 50/60 Hz</td>
</tr>
<tr>
<td>LINK video inputs</td>
<td>3x</td>
</tr>
<tr>
<td>USB interface</td>
<td>4x USB, (2x front, 2x rear)</td>
</tr>
<tr>
<td>SCB interface</td>
<td>2x 6-pin mini-DIN</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–120 VAC/200–240 VAC</td>
</tr>
<tr>
<td>Power frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>I, CF-Defib</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>305 x 54 x 320 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>2.1 kg</td>
</tr>
</tbody>
</table>

*Available in the following languages: DE, ES, FR, IT, PT, RU*
The Rendezvous Technique in the Upper Gastrointestinal Tract

**IMAGE1 S Camera System**

TC 300

**IMAGE1 S H3-LINK**, link module, for use with IMAGE1 FULL HD three-chip camera heads, power supply 100–120 VAC/200–240 VAC, 50/60 Hz, for use with IMAGE1 S CONNECT TC 200EN including:
- Mains Cord, length 300 cm
- Link Cable, length 20 cm

TC 301

**IMAGE1 X-LINK**, link module, for use with flexible video endoscopes, power supply 100 – 120 VAC/200 – 240 VAC, 50/60 Hz, for use with IMAGE1 CONNECT TC 200EN including:
- Mains Cord, length 300 cm
- Link Cable, length 20 cm

TC 001

**IMAGE1 S Video Endoscope Adaptor**, color systems PAL/NTSC, length 60 cm, for use with IMAGE1 S X-LINK TC 301

**Specifications:**

<table>
<thead>
<tr>
<th>Camera System</th>
<th>TC 300 (H3-Link)</th>
<th>TC 301 (X-Link)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported camera heads/video endoscopes</td>
<td>TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S) 22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3, 22220054-3, 22220055-3 (compatible without IMAGE1 S technologies CLARA, CHROMA, SPECTRA*)</td>
<td>11900 AP/AN, 11900 BP/BN, 11101 VP/VN, 13820 PKS/NKS, 13821 PKS/NKS, 13885 PKS/NKS, 13984 PKS/NKS, 13925 PKS/NKS, 11272 VP/VNI, 11272 VP/UI/NIUU, 11272 VP/UI/VNI, 11272 VP/UI/VNIU, 11272 VP/UI/VNU, 11272 VP/UI/VNU, 11272 VP/UI/VNUU, 11272 VP/UI/VNUU, 11272 VP/UI/VNUU (IMAGE1 S modes available)</td>
</tr>
<tr>
<td>LINK video outputs</td>
<td>1x</td>
<td>1x</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–120 VAC/200–240 VAC</td>
<td>100 – 120 VAC/200 – 240 VAC</td>
</tr>
<tr>
<td>Power frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>I, CF-Defib</td>
<td>I, CF-Defib</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>305 x 54 x 320 mm</td>
<td>305 x 54 x 320 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1.86 kg</td>
<td>1.86 kg</td>
</tr>
</tbody>
</table>

* SPECTRA A: Not for sale in the U.S. **SPECTRA B: Not for sale in the U.S.
The Rendezvous Technique in the Upper Gastrointestinal Tract

**IMAGE1 S Camera Heads**

For use with IMAGE1 S Camera System
IMAGE1 S CONNECT Module TC 200EN, IMAGE1 S H3-LINK Module TC 300
and with all IMAGE1 HUB™ HD Camera Control Units

**TH 100**

**IMAGE1 S H3-Z Three-Chip FULL HD Camera Head**, 50/60 Hz, IMAGE1 S compatible, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length \( f = 15–31 \text{ mm} \) (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

<table>
<thead>
<tr>
<th>Specifications:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IMAGE1 FULL HD Camera Heads</strong></td>
<td><strong>IMAGE1 S H3-Z</strong></td>
</tr>
<tr>
<td>Product no.</td>
<td>TH 100</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x ( \frac{1}{3} ) CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>39 x 49 x 114 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>270 g</td>
</tr>
<tr>
<td>Optical interface</td>
<td>integrated Parfocal Zoom Lens, ( f = 15–31 \text{ mm} ) (2x)</td>
</tr>
<tr>
<td>Min. sensitivity</td>
<td>F 1.4/1.17 Lux</td>
</tr>
<tr>
<td>Grip mechanism</td>
<td>standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>

**TH 104**

**IMAGE1 S H3-ZA Three-Chip FULL HD Camera Head**, 50/60 Hz, IMAGE1 S compatible, autoclavable, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length \( f = 15–31 \text{ mm} \) (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

<table>
<thead>
<tr>
<th>Specifications:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IMAGE1 FULL HD Camera Heads</strong></td>
<td><strong>IMAGE1 S H3-ZA</strong></td>
</tr>
<tr>
<td>Product no.</td>
<td>TH 104</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x ( \frac{1}{3} ) CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>39 x 49 x 100 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>299 g</td>
</tr>
<tr>
<td>Optical interface</td>
<td>integrated Parfocal Zoom Lens, ( f = 15–31 \text{ mm} ) (2x)</td>
</tr>
<tr>
<td>Min. sensitivity</td>
<td>F 1.4/1.17 Lux</td>
</tr>
<tr>
<td>Grip mechanism</td>
<td>standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>
Monitors

9619 NB

19" HD Monitor, color systems PAL/NTSC, max. screen resolution 1280 x 1024, image format 4:3, power supply 100–240 VAC, 50/60 Hz, wall-mounted with VESA 100 adaption, including:
External 24 VDC Power Supply
Mains Cord

9826 NB

26" FULL HD Monitor, wall-mounted with VESA 100 adaption, color systems PAL/NTSC, max. screen resolution 1920 x 1080, image format 16:9, power supply 100–240 VAC, 50/60 Hz including:
External 24 VDC Power Supply
Mains Cord
Monitors

KARL STORZ HD and FULL HD Monitors

<table>
<thead>
<tr>
<th>Wall-mounted with VESA 100 adaption</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
<tr>
<td>Brightness</td>
<td>200 cd/m² (typ)</td>
<td>500 cd/m² (typ)</td>
</tr>
<tr>
<td>Max. viewing angle</td>
<td>178° vertical</td>
<td>178° vertical</td>
</tr>
<tr>
<td>Pixel distance</td>
<td>0.29 mm</td>
<td>0.3 mm</td>
</tr>
<tr>
<td>Reaction time</td>
<td>5 ms</td>
<td>8 ms</td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>700:1</td>
<td>1400:1</td>
</tr>
<tr>
<td>Mount</td>
<td>100 mm VESA</td>
<td>100 mm VESA</td>
</tr>
<tr>
<td>Weight</td>
<td>7.6 kg</td>
<td>7.7 kg</td>
</tr>
<tr>
<td>Rated power</td>
<td>28 W</td>
<td>72 W</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0–40°C</td>
<td>5–35°C</td>
</tr>
<tr>
<td>Storage</td>
<td>-20–60°C</td>
<td>-20–60°C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 85%</td>
<td>max. 85%</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>469.5 x 416 x 75.5 mm</td>
<td>643 x 396 x 87 mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 VAC</td>
<td>100–240 VAC</td>
</tr>
<tr>
<td>Certified to</td>
<td>EN 60601-1, protection class IPX0</td>
<td>EN 60601-1, UL 60601-1, MDD93/42/EEC, protection class IPX2</td>
</tr>
</tbody>
</table>

Optional accessories:
- 9826 SF Pedestal, for monitor 9826 NB
- 9626 SF Pedestal, for monitor 9619 NB
Cold Light Fountain XENON 100 SCB
with Integrated Insufflation Pump

for use with KARL STORZ video endoscopes

Special features:
- Optimal light efficiency
- Continuously adjustable light intensity
- Powerful ventilation with low noise level
- No overheating of environment
- Special diaphragm focuses the light onto the field of view
- New dielectric heat protection filter improves light efficiency by around 20%
- With KARL STORZ Communication Bus (KARL STORZ-SCB®)
- Problem-free lamp replacement
- Integrated insufflation pump
- High light intensity
- Xenon lamp provides daylight coloration
- Display of lamp service life
- Insufflation pump with 3 performance levels
- 100 W Xenon lamp

Specifications:

<table>
<thead>
<tr>
<th>Cold Light Fountain XENON 100 SCB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Xenon Lamp</strong></td>
</tr>
<tr>
<td>- Capacity: 100 W</td>
</tr>
<tr>
<td>- Lamp life: approx. 500 h</td>
</tr>
<tr>
<td>- Color temperature: approx. 6000 K</td>
</tr>
<tr>
<td><strong>Pump</strong></td>
</tr>
<tr>
<td>- Pressure levels: 3</td>
</tr>
<tr>
<td>- Max. pressure: 0.51 bar</td>
</tr>
<tr>
<td>- Max. flow rate: 5 l/min.</td>
</tr>
<tr>
<td>Operating Conditions</td>
</tr>
<tr>
<td>- Operating temperature: 0 °C – +40 °C</td>
</tr>
<tr>
<td>- Humidity: 30 – 90%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 230 VAC +/-10%, 50/60 Hz</td>
</tr>
<tr>
<td>- 115 VAC +/-10%, 50/60 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>305 x 110 x 380 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>5.4 kg</td>
</tr>
<tr>
<td>Certified to</td>
<td>- IEC 60601-1, 60601-2-18, UL 2601.1, CSA 22.2, No. 601.1-M 90</td>
</tr>
<tr>
<td></td>
<td>- Mode of operation: continuous</td>
</tr>
</tbody>
</table>

Accessories:
- Air Filter, XENON 100
- Mains Cord
- Water Bottle, 250 ml
- Irrigation Adaptor, for water bottle
- Bottle Holder
Cold Light Fountains and Accessories

For use with telescopes, size 10 mm:

495 NCS  Fiber Optic Light Cable,
with straight connector,
extremely heat-resistant,
diameter 4.8 mm, length 250 cm

For use with telescopes, size 5 mm:

495 NA  Fiber Optic Light Cable,
with straight connector,
diameter 3.5 mm, length 230 cm

Cold Light Fountain XENON 300 SCB

20133101-1  Cold Light Fountain XENON 300 SCB
with built-in antifog air-pump, and integrated
KARL STORZ Communication Bus System SCB
power supply:
100–125 VAC/220–240 VAC, 50/60 Hz
including:
Mains Cord
SCB Connecting Cable, length 100 cm

20133027  Spare Lamp Module XENON
with heat sink, 300 watt, 15 volt

20133028  XENON Spare Lamp, only,
300 watt, 15 volt
Data Management and Documentation
KARL STORZ AIDA® – Exceptional documentation

The name AIDA stands for the comprehensive implementation of all documentation requirements arising in surgical procedures: A tailored solution that flexibly adapts to the needs of every specialty and thereby allows for the greatest degree of customization.

This customization is achieved in accordance with existing clinical standards to guarantee a reliable and safe solution. Proven functionalities merge with the latest trends and developments in medicine to create a fully new documentation experience – AIDA.

AIDA seamlessly integrates into existing infrastructures and exchanges data with other systems using common standard interfaces.

WD 200-XX*  AIDA Documentation System, for recording still images and videos, dual channel up to FULL HD, 2D/3D, power supply 100-240 VAC, 50/60 Hz including:
USB Silicone Keyboard, with touchpad  ACC Connecting Cable  DVI Connecting Cable, length 200 cm  HDMI-DVI Cable, length 200 cm  Mains Cord, length 300 cm

WD 250-XX*  AIDA Documentation System, for recording still images and videos, dual channel up to FULL HD, 2D/3D, including SMARTSCREEN® (touch screen), power supply 100-240 VAC, 50/60 Hz including:
USB Silicone Keyboard, with touchpad  ACC Connecting Cable  DVI Connecting Cable, length 200 cm  HDMI-DVI Cable, length 200 cm  Mains Cord, length 300 cm

*XX Please indicate the relevant country code (DE, EN, ES, FR, IT, PT, RU) when placing your order.
Workflow-oriented use

**Patient**
Entering patient data has never been this easy. AIDA seamlessly integrates into the existing infrastructure such as HIS and PACS. Data can be entered manually or via a DICOM worklist. All important patient information is just a click away.

![Patient screenshot](image1.png)

**Checklist**
Central administration and documentation of time-out. The checklist simplifies the documentation of all critical steps in accordance with clinical standards. All checklists can be adapted to individual needs for sustainably increasing patient safety.

![Checklist screenshot](image2.png)

**Record**
High-quality documentation, with still images and videos being recorded in FULL HD and 3D. The Dual Capture function allows for the parallel (synchronous or independent) recording of two sources. All recorded media can be marked for further processing with just one click.

![Record screenshot](image3.png)

**Edit**
With the Edit module, simple adjustments to recorded still images and videos can be very rapidly completed. Recordings can be quickly optimized and then directly placed in the report. In addition, freeze frames can be cut out of videos and edited and saved. Existing markings from the Record module can be used for quick selection.

![Edit screenshot](image4.png)

**Complete**
Completing a procedure has never been easier. AIDA offers a large selection of storage locations. The data exported to each storage location can be defined. The Intelligent Export Manager (IEM) then carries out the export in the background. To prevent data loss, the system keeps the data until they have been successfully exported.

![Complete screenshot](image5.png)

**Reference**
All important patient information is always available and easy to access. Completed procedures including all information, still images, videos, and the checklist report can be easily retrieved from the Reference module.

![Reference screenshot](image6.png)
**ENDOFLATOR® 40 with KARL STORZ SCB**

with High Flow Insufflation (40 l/min.)

* This product is marketed by mtp.
For additional information, please apply to:

mtp medical technical promotion gmbh,
Take-Off Gewerbepark 46,
D-78579 Neuhausen ob Eck, Germany

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**HAMOU® ENDOMAT® with KARL STORZ SCB**

Suction and Irrigation System

26331101-1 HAMOU® ENDOMAT® SCB,
power supply 100 – 240 VAC, 50/60 Hz
including:

- Mains Cord
- 5x HYST Tubing Set*, for single use
- 5x LAP Tubing Set*, for single use
- SCB Connecting Cable, length 100 cm
- VACUsafe Promotion Pack Suction*, 2 l

* This product is marketed by mtp.
For additional information, please apply to:

mtp medical technical promotion gmbh,
Take-Off Gewerbepark 46,
D-78579 Neuhausen ob Eck, Germany
WITH COMPLIMENTS OF KARL STORZ — ENDOSKOPE