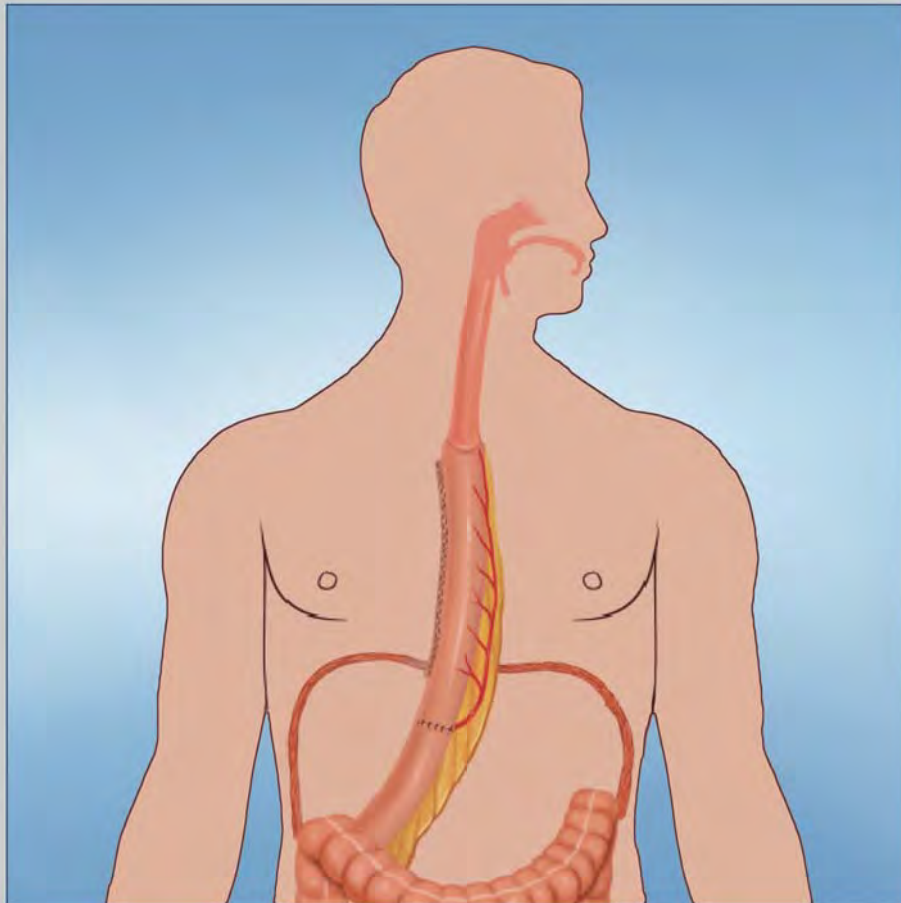


THORACIC ESOPHAGECTOMY

**Transthoracic Esophageal
Resections and Reconstruction**



Shanda H. BLACKMON, MD, MPH, FACS

Head, Section of Thoracic Surgery
Assistant Professor, Weill Cornell Medical College
The Methodist Hospital, Houston, Texas, U.S.A.

THORACIC ESOPHAGECTOMY

Transthoracic Esophageal Resections and Reconstruction

Shanda H. BLACKMON, MD, MPH, FACS

Head, Section of Thoracic Surgery
Assistant Professor, Weill Cornell Medical College
The Methodist Hospital, Houston, Texas, U.S.A.



Shanda H. Blackmon, MD, MPH, FACS

**Thoracic Esophagectomy
Transthoracic Esophageal Resections and Reconstruction**

Shanda H. BLACKMON, MD, MPH, FACS

Head, Section of Thoracic Surgery
Assistant Professor, Weill Cornell Medical College
The Methodist Hospital, Houston, Texas, U.S.A.

Address for correspondence:

Shanda H. Blackmon, MD, MPH, FACS
Head, Section of Thoracic Surgery
Assistant Professor, Weill Cornell Medical College
The Methodist Hospital, Houston, Texas
6550 Fannin Street, Smith Tower, Suite 1661
Houston, Texas, 77030, U.S.A.

© 2013 **Endo:Press**[®] Tuttlingen, Printed in Germany
ISBN 978-3-89756-614-9
P.O. Box, D-78503 Tuttlingen, Germany
Phone: +49 (0) 74 61/1 45 90
Fax: +49 (0) 74 61/708-529
E-Mail: Endopress@t-online.de

Editions in languages other than English and German are in preparation.
For up-to-date information, please contact **Endo:Press**[®] Tuttlingen at
the address shown above.

Illustrations by:

Mike de la Flor (Houston, Tx, U.S.A.)
www.delaflo.com

Yvan Freund, 67000 Strasbourg, France
Figs. 11, 12, 15–17
www.yvanfreund.com

Important notice:

Medical knowledge is ever changing. As new research and clinical experience broaden our knowledge, changes in treatment and therapy may be required. The authors and editors of the material herein have consulted sources believed to be reliable in their efforts to provide information that is complete and in accord with the standards accepted at the time of publication. However, in view of the possibility of human error by the authors, editors, or publisher of the work herein, or changes in medical knowledge, neither the authors, editors, publisher, nor any other party who has been involved in the preparation of this work, warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from use of such information. The information contained within this brochure is intended for use by doctors and other health care professionals. This material is not intended for use as a basis for treatment decisions, and is not a substitute for professional consultation and/or use of peer-reviewed medical literature.

Layout and color image processing:
Endo:Press[®] Tuttlingen, Germany

Printed by:

Straub Druck + Medien AG
D-78713 Schramberg, Germany

07.13-1.0

Some of the product names, patents, and registered designs referred to in this booklet are in fact registered trademarks or proprietary names even though specific reference to this fact is not always made in the text. Therefore, the appearance of a name without designation as proprietary is not to be construed as a representation by the publisher that it is in the public domain.

All rights reserved.

No part of this publication may be translated, reprinted or reproduced, transmitted in any form or by any means, electronic or mechanical, now known or hereafter invented, including photocopying and recording, or utilized in any information storage or retrieval system without the prior written permission of the copyright holder.

Table of Contents

Transthoracic Esophageal Resections and Reconstruction	6
Surgical Technique: Checklist	6
Initial Assessment in the Operating Room	6
Bronchoscopy	7
Endoscopy	7
Abdominal Approach	7
Laparoscopic Approach	7
Open Midline Incision	8
Mobilizing the Esophagus	8
Mobilizing the Stomach	9
Left Gastric Artery Division and Celiac Lymph Node Dissection	10
Creating a Tubularized Stapled Gastric Conduit	11
Mobilization of the Duodenum	11
Pyloric Drainage	11
Feeding Tube Placement	12
Thoracic Incisions	12
Thoracoscopic Approach	13
Thoracotomy	13
Thoracic Esophageal Dissection and Lymphadenectomy	14
Intrathoracic Anastomosis	15
Circular Stapled Anastomosis	16
Stapled Side-to-Side Anastomosis	16
Hand-Sewn Anastomosis	17
Completing the Thoracic Portion	17
Additional Tips	18
Postoperative Management	18
Recommended Reading	19
Endoscopes, Instruments, Units and Video Equipment	20

Transthoracic Esophageal Resections and Reconstruction

Surgical Technique: Checklist

Prior to bringing the patient into the operating room, it is important to ensure the entire team understands what surgery is planned. Having a checklist for equipment will decrease intra-operative delays. The following checklist was developed to define each step.

Initial Assessment in the Operating Room

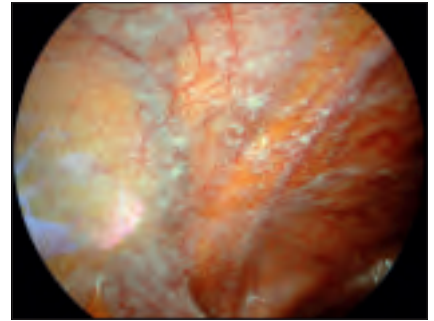
- The patient is brought into the operating room and all appropriate lines and monitors are placed by anesthesia.
- Empiric antibiotics are administered along with beta blockade, when indicated.
- Sequential compression devices are applied to the lower extremities with or without medical prophylaxis.
- General anesthesia with a laryngeal mask airway is initially placed.
- A copy of endoscopy reports, EUS, CT scans, and PET imaging should be available in the room prior to beginning the case.

Table 1: Transthoracic Resections

- Ivor Lewis esophagectomy = right thoracotomy + laparotomy
- Hybrid esophagectomy
 - a. laparoscopic abdominal approach + thoracotomy
 - b. laparotomy + thoracoscopic approach
 - c. (a.) or (b.) + neck anastomosis
- Minimally invasive esophagectomy (MIE)
 - a. laparoscopic abdominal approach + thoracoscopic approach
 - b. (a.) + neck anastomosis
- McKeown esophagectomy = three-field esophagectomy
 - abdominal incision + thoracic incision + neck incision
- Left-sided thoraco-abdominal esophagectomy

Bronchoscopy

- A bronchoscopy is performed for all patients with a tumor in proximity to the airway.
- The bronchoscope is advanced down to the level of the subsegmental bronchi and the entire tracheobronchial tree is visualized for any evidence of abnormality.
- The absence of tracheal tumor is documented. Based on this, the decision is made to proceed with esophagectomy.
- The laryngeal mask airway is removed and a double-lumen endotracheal tube is secured into position.
- Repeat bronchoscopy confirms that the left-sided endotracheal tube is in the left mainstem bronchus and the tracheal opening on the right side allows for visualization of the carina and the entire right mainstem bronchus.



1 Laparoscopic view of diffuse metastatic abdominal disease.

Endoscopy

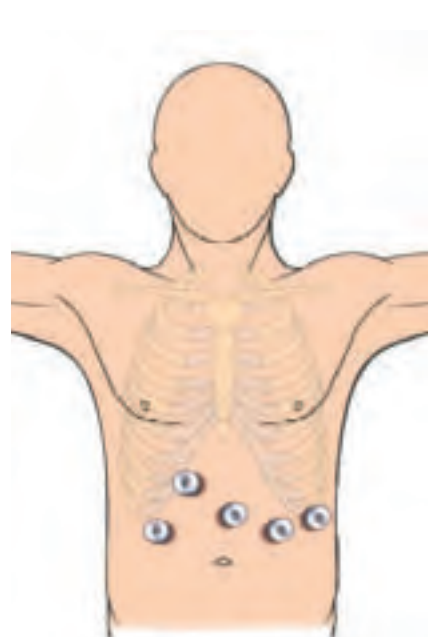
- Endoscopy is performed to identify the proximal aspect of the tumor and any abnormal tissue proximal to the tumor including Barrett's metaplasia.
- As long as the tumor is noted to be distal to 30 cm from the incisors, an Ivor-Lewis esophagectomy should be possible with an intrathoracic anastomosis and more than adequate margin.
- No abnormality within the esophagus should be present proximal to the area of transection including metaplasia.
- The patient is then placed in the supine position and the abdomen is sterilely prepped and draped.

Abdominal Approach

- Either a laparoscopic abdominal approach or an open midline incisional approach to the abdominal portion of the surgery can be made.
- The advantage of an initial laparoscopic approach will be early detection of potentially subclinical metastatic peritoneal or liver disease (**Fig. 1**).

Laparoscopic Approach

- If a laparoscopic approach is taken, five laparoscopic abdominal trocars are placed.
- The patient can be positioned in the dorsal lithotomy position or supine with a footboard.
- A 12-mm trocar in the midline or just to the right of midline and two 5-mm trocars on either subcostal area are placed (**Fig. 2**).
- An additional 12-mm trocar can be placed in the left subcostal position for visualization using an endocameleon.
- The right subcostal trocar is used to place a Mediflex liver retractor to retract the liver anteriorly and laterally to the right.
- An energy source is recommended and is placed through the 12-mm port.
- A camera port is a 5- to 10-mm trocar in the left medial subcostal area, approximately 4 to 5 cm inferior to the subcostal region.
- After all the trocars have been placed safely, exploration of the abdomen is performed.
- The patient is placed into severe reverse Trendelenburg position.
- Checking for evidence of bowel injury or metastatic disease is necessary prior to making a decision to proceed with the esophagectomy.
- A minimally invasive approach should only be taken if the exact same quality of resection can be achieved as in open surgery.



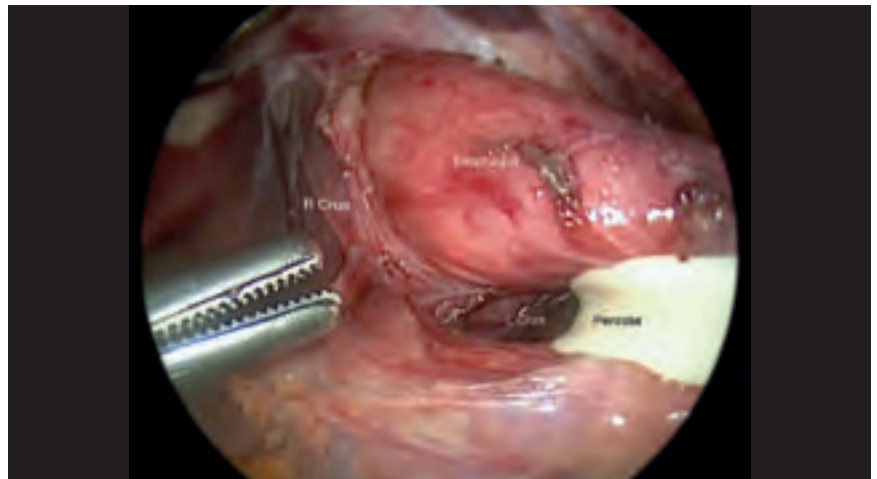
2 Laparoscopic trocar port placement.

Open Midline Incision

- If an open approach is taken, the surgery can typically be performed through an upper midline laparotomy incision.
- The midline incision extends to the xyphoid and just to the side of the xyphoid underneath the skin.
- The incision will infrequently extend below the level of the umbilicus.
- Using an open incision, a Thompson or Bookwalter retractor device may help to pull the liver and adjacent abdominal wall out of the way.

Mobilizing the Esophagus

- An energy source is used to divide the pars flaccida or the hepatogastric ligament.
- The left triangular ligament of the liver can be divided to provide additional exposure. Include all tissue in this ligament with the lesser curve specimen erring towards the liver side.
- The right crus of the diaphragm is dissected with an energy device and the esophagus is mobilized away from the right crus, stripping the peritoneal lining away from the crus to include all tissue with the esophagus to achieve a negative radial margin.
- If the patient has a small hiatus, the right crus can be divided approximately 1 to 2 cm to enlarge the hiatus for additional dissection. This allows for circumferential dissection around the esophagus.
- The phrenoesophageal membrane is taken down and all tissue adjacent to the esophagus is kept with the esophagus.
- The crural decussation is dissected posteriorly and the left crus is identified from the right side of the abdomen (**Fig. 3**).
- A Penrose secured around the esophagus will help when continuing circumferential dissection. An endoloop can secure the Penrose.



3 Development of the posterior esophageal window.

- This Penrose can later be recaptured and pulled into the chest to assist in mobilization of the intrathoracic esophagus.
- Use an Endo-loop to secure the Penrose into position if you are using a laparoscopic approach.
- The posterior esophageal window is developed and all tissue adjacent to the esophagus is dissected away from the right and left crura.
- The borders of the dissection are; anteriorly the pericardium and diaphragm and anterior abdominal wall, right laterally the inferior pulmonary ligament and right crus, and left laterally the inferior pulmonary ligament and left crus, and posteriorly the aorta.

- After dissecting as far in the cranial direction towards the mediastinum, mobilize the segment of the gastrohepatic ligament towards the lesser curve of the stomach.
- Making an adequately sized hiatus for passage of the conduit is important.
- Too large of a hiatus will result in herniation of colon or additional conduit into the chest and too tight of a hiatus can result in an ischemic conduit.
- It is helpful to dissect as far into the chest as can safely be done prior to closing the abdomen, as the inferior pulmonary ligament nodes from both sides can be taken from the abdomen.
- It is occasionally possible to dissect to the inferior pulmonary vein, depending on the anatomy of the patient.

Mobilizing the Stomach

- The gastroepiploic artery is identified and approximately 2 cm lateral to this (away from the stomach), the omentum is divided with an energy device.
- The lesser sac is entered through the greater omentum.
- Please refer to **Fig. 4** entitled 'Gastric mobilization'.
- Instead of just sparing a small segment of omentum, an omental flap can also be created to be delivered into the chest to cover the anastomosis (**Fig. 5**).
- When manipulating the future stomach conduit, take care not to grasp the stomach too hard and especially do not grasp to gastroepiploic artery.
- The division is completed up to the greater curve of the stomach where the short gastric artery vessels are encountered.
- Exposure of the short gastric arteries is enhanced by grasping the posterior aspect of the stomach, rolling the organ towards the liver and away from the spleen.
- The short gastric artery vessels are divided with an energy source towards the left crus of the diaphragm.
- The posterior attachments of the stomach and the pancreas are divided.
- Dissect the cardia of the stomach away from the left crus.
- Create the posterior esophageal window and place a Penrose drain around the esophagogastric junction.
- Dissect the posterior aspect of the stomach away from the pancreas preserving the right gastric artery.
- For benign disease, the modification does not typically require complete esophagectomy or lymphadenectomy.
- Beware of an additional last short gastric artery that may not connect to the spleen but instead pass directly to the splenic artery.



a



b

4 Gastric mobilization.



5 Pedicled omental flap



a



b



c

6 Replaced left hepatic artery off the left gastric artery (a).

Accessory left hepatic artery off the left gastric artery (b).

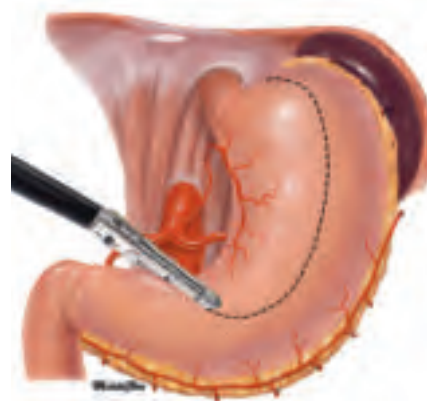
Division of vessels to the stomach during esophagectomy (c).

Left Gastric Artery Division and Celiac Lymph Node Dissection

- Once the posterior attachments of the stomach have been divided along with the lesser curve dissection, it should be possible to lift the entire stomach up towards the anterior aspect of the abdomen and visualize the left gastric artery pedicle.
- It is possible to staple the left gastric artery from either the right side of the abdomen/stomach or the left side of the abdomen/stomach and an endoscopic or linear stapler is passed through the 12-mm midline or slightly right para-midline port if laparoscopic.
- Passing the stapler through this angle allows for direct visualization while safely passing the stapler at the base of the left gastric artery against the celiac trunk.
- Beware of any aberrant left hepatic artery anatomy (**Fig. 6**), especially a replaced left hepatic artery (**Fig. 6a**) coming completely from the left gastric artery or an accessory hepatic coming from the left gastric artery (**Fig. 6b**).
- If this artery is an accessory artery and another left hepatic artery is present, then it can typically be divided without consequence.
- However, if the entire left hepatic artery is replaced from a left gastric artery origin, then either a laparoscopic or open ultrasound probe can be used to monitor the clamping of this vessel and determine portal flow.
- If the blood flow to the liver is not diminished by more than fifty percent, then the artery can typically still be divided.
- In the event the artery has to be preserved, then a more distal ligation of the left gastric artery is necessary (closer to the stomach) to prevent transection of the replaced hepatic branch. This will result in probably a lower lymph node acquisition.
- A low stapler division of this artery (as proximal as possible to celiac axis) allows for incorporation of all lymphatic tissue to be kept with the specimen.
- Celiac lymph nodes can be dissected at this time and sent as a separate pathologic specimen.
- Left gastric artery lymph nodes are then identified and dissected away from the specimen and sent as a separate specimen identified for pathology.
- The author recommends sending the lymph node dissections as separate specimens labeled for the pathologist.

Creating a Tubularized Stapled Gastric Conduit

- Please see **Fig. 7** for stapling and designing the gastric conduit.
- A vascular stapler or energy device can be used to divide the fat along the edge of the lesser curve towards the edge of the stomach.
- Begin by placing the stapler beyond the largest arcade from the right gastric artery and fire one load of a linear stapler towards the greater curve of the stomach.
- An appropriate stapler entry point would be the angular notch or the incisura of the stomach.
- Follow the greater curve of the stomach creating the conduit width of your choice (2–3 cm is typical) and identify the gastroepiploic artery running along the greater curve of the stomach.
- Beginning at the lesser curve and following the greater curve, create a stapled longitudinal gastric conduit, preserving the gastroepiploic artery.
- A conduit that is more narrow risks a higher rate of leakage and a conduit that is wider may shorten the actual length provided.
- Use a retractor from the far left subcostal area to stretch out the superior aspect of the stomach to prevent any twisting of the stomach or shortening the conduit while stapling.
- Once the staple line has been created, oversewing is optional.
- Once delivered into the chest and after the chest anastomosis, the remainder of the staple line can also be oversewn.
- At this point, the conduit can be completely separated from the specimen or left partially attached by not completing the division.
- If the conduit is completely separated, then it will have to be sewn back to the specimen at the lesser curve side in two places to prevent rotation as it is delivered into the chest.
- If an omental pedicled flap is created, it should also be tacked to the edge of the conduit to facilitate delivery into the chest.



7 Stapling and creating the tubularized gastric conduit.

Mobilization of the Duodenum

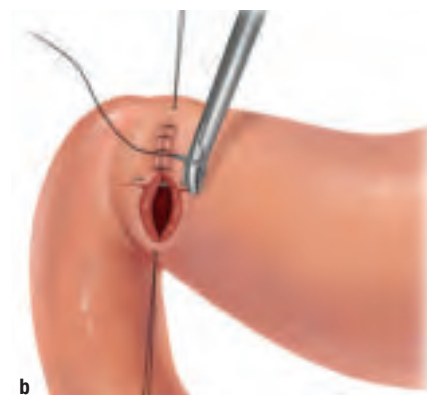
- Kocherize the duodenum to facilitate mobilization of the pylorus to the level of the hiatus, especially when trying to reach the neck.
- Complete the division of the omentum and the posterior attachments of the antrum to allow the conduit to be delivered easily into the chest.
- Any attachments to the pancreas are released and beware not to damage the right gastric artery coming off of the proper hepatic artery just distal to the gastroduodenal artery.

Pyloric Drainage

- There are basically three options available to the surgeon to address the pylorus; pyloroplasty, pyloromyotomy, or injection of paralytic (typically 100–200 IU botox).
- Some surgeons do not believe a pyloric drainage procedure is necessary, however, there are many reports in the literature of conduit obstruction from inadequate drainage owing to a restricting pylorus.
- It is impossible to identify those patients who will not need a drainage procedure, and because of this, the author advocates performing a drainage procedure.
- The pyloroplasty is performed by placing an initial suture on the superior aspect of the pyloric muscle.
- Electrocautery using an L-hook allows the creation of a longitudinal incision extending from the stomach into the duodenum traversing and dividing the pyloric muscle along the way (**Figs. 8a, b**).
- It is possible to perform a pyloromyotomy instead of pyloroplasty and if this is chosen, merely divide the pyloric muscle and preserve the mucosal layer of the stomach and duodenum.



a



b

8 Pyloroplasty technique

- A long-handled electrocautery instrument can be used to achieve hemostasis during division of the pyloric muscle and in the event a pyloroplasty is chosen, the incision should be completed through the mucosa exposing the internal lumen of the internal duodenum and stomach.
- The internal mucosa exposure is facilitated by using the previously placed stay sutures on the superior and inferior aspects of the pyloric muscle to expose.
- Once the longitudinal pyloroplasty has been closed transversely with interrupted sutures, two large endoclips can be placed on the most superior retraction suture to mark the area radiographically in the event of a leak.
- The pyloroplasty can then be covered with a small piece of omentum.

Feeding Tube Placement

- The laparoscopic feeding jejunostomy tube is created and placed by turning the camera towards the lower portion of the abdomen.
- The table may be flat instead of in reverse Trendelenburg at this time.
- Retract superiorly the omentum towards the pyloroplasty area.
- The transverse colon is easily identified underneath the greater omentum and is also retracted superiorly with an atraumatic grasper.
- After retracting the transverse colon superiorly, identify the ligament of Treitz.
- Approximately 20 cm distal to the ligament of Treitz, the proximal jejunum is held to the anterior left abdominal wall.
- In the event a laparoscopic feeding tube is being placed, either a sutured technique with or without an assist device, or a T-fastener technique can be used.
- Hold the bowel in place against the anterior abdominal wall and use a subclavian needle to traverse the left anterior abdominal wall in that same point where the bowel meets the anterior abdominal wall to the enter the antimesenteric side of the proximal jejunum.
- A guide wire is placed into the lumen of the jejunum and guided distally into the bowel.
- T-fasteners are placed in all four quadrants around the entry point of the guide wire. Injection of saline into the bowel lumen often allows safer and easier passage of intra-luminal devices and distends the bowel for easier placement of the T-fasteners.
- As an alternate to T-fasteners, the bowel can be sutured to the anterior abdominal wall as well.
- The T-fasteners are tightened and a dilator and introducer sheath are placed over the guide wire through the left anterior abdominal wall.
- The dilator and guide wire are simultaneously removed leaving the introducer sheath in the distal jejunum allowing placement of the feeding jejunostomy tube through the introducer sheath.
- A grasper is used to guide the catheter into place.
- Ensure the back wall of the bowel is not incorporated into the sutures, as this may cause obstruction.
- The catheter is sewn to the anterior abdominal wall and secured on the outside.
- In the laparotomy approach, the feeding tube is simply sutured to the anterior abdominal wall directly and a whitzel can also provide additional protection of the track.

Thoracic Incisions

- The patient is then taken out of the supine position and is rolled into a left lateral decubitus position with the right side up.
- All pressure points are padded.
- The arms are placed on an arm board and an axillary roll is placed underneath the axilla.
- The table is flexed to open the rib spaces.
- Tape is placed on the hip to secure it into position and a beanbag can be used to hold the patient as well.
- Either a thoracoscopic or open approach can be used for the chest.

Thoracoscopic Approach

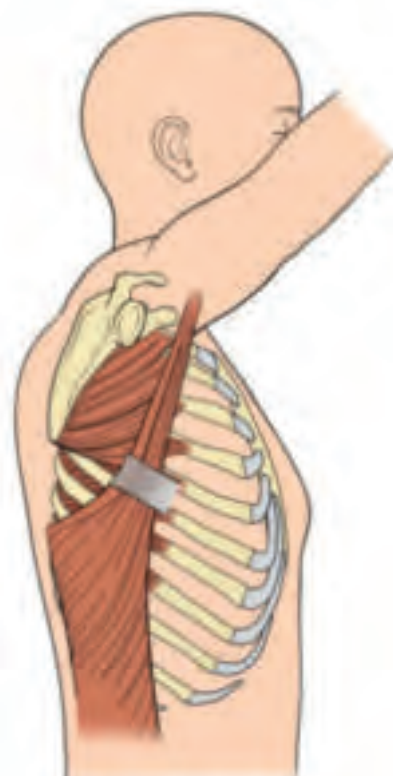
- In the event a thoracoscopic approach is taken, four thoracoscopic trocars are typically placed.
- Please see **Fig. 9** for chest trocar placement.
- A 3-cm utility port is placed in the posterior axillary line at the seventh intercostal space just above the diaphragm and a camera port is placed in the anterior axillary line in the seventh to eighth intercostal space.
- A second access port is placed in the right fifth intercostal space in the anterior axillary line.
- The fourth trocar may be placed approximately 2 to 3 cm superior to the port in the posterior axillary line.
- A port protector may be used at the utility site to retract the soft tissue and facilitate suction and exposure and passing of instruments with ease.
- Beware of sucking within the chest without a vent, as this may cause negative pressure pulmonary edema of the collapsed lung.
- This can also be minimized by asking the anesthesiologist to ‘open’ the tracheal tube to air while ventilating the left bronchial side of the double-lumen tube.



9 Thoracic trocar placement.

Thoracotomy

- Open thoracic incisions can include a muscle-sparing or muscle-cutting approach.
- The advantages of a muscle-sparing approach is preservation of the chest wall musculature in the event a flap is required to repair a leak (**Fig. 10**).
- An incision angling towards the infra-mammary crease in the mid axillary line extending to the auscultatory triangle allows for a muscle-sparing approach.
- The incision is typically 6 – 8 cm long in a muscle-sparing approach. If a longer or larger incision is needed, the latissimus muscle can be divided to provide additional exposure, and it is rare the serratus muscle would need to be divided to provide additional exposure for this procedure.
- Once the ribs are exposed, the chest is entered through the 5th–6th intercostal space.
- The lung is made atelectatic by isolation of ventilation through either a bronchial blocker or double-lumen endotracheal tube.
- Resecting a small portion of the rib may facilitate entry into the chest, and some surgeons even advocate removing a long segment of the fifth rib to provide ample exposure.
- Epidural analgesia is recommended when an open incision is made, as pain control may be improved compared to a traditional patient-controlled analgesia for thoracotomy.



10 Right posterolateral muscle-sparing thoracotomy incision. Mobilization of the latissimus anterior as it is spared.

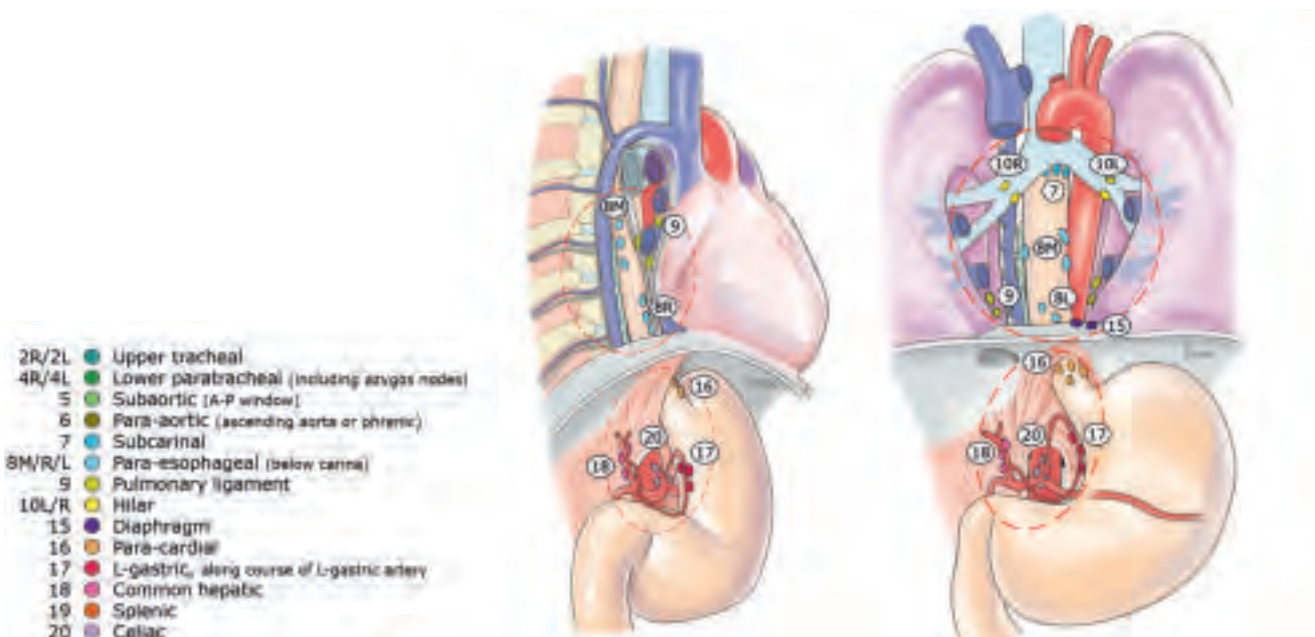


- | | | |
|-------|---|---|
| 2R/2L | ● | Upper tracheal |
| 4R/4L | ● | Lower paratracheal (including azygos nodes) |
| 5 | ● | Subaortic (A-P window) |
| 6 | ● | Para-aortic (ascending aorta or phrenic) |
| 7 | ● | Subcarinal |
| 8M/8L | ● | Para-esophageal (below carina) |
| 9 | ● | Pulmonary ligament |
| 10L/R | ● | Hilar |
| 15 | ● | Diaphragm |
| 16 | ● | Pera-cardial |
| 17 | ● | L-gastric, along course of L-gastric artery |
| 18 | ● | Common hepatic |
| 19 | ● | Splenic |
| 20 | ● | Celiac |

- 11 En bloc lymphadenectomy for esophagectomy.

Thoracic Esophageal Dissection and Lymphadenectomy

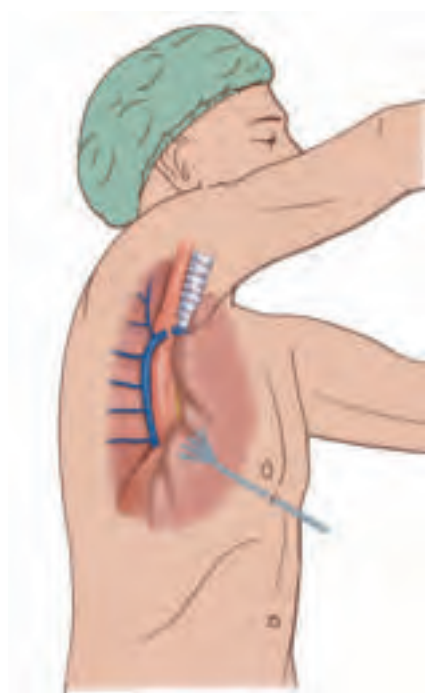
- The lung is retracted anteriorly to expose the mediastinum.
- An energy device is used to incise the pleura on either side of the esophagus extending from the base of the diaphragm superiorly all the way up to the level of the azygos vein.
- The inferior pulmonary ligament is taken down to separate the esophagus from the lung and all lymph nodes in this area are identified and sent for pathologic evaluation.
- A vascular endoscopic stapler or suture ligature is used to seal and divide the azygos vein for additional exposure of the esophagus.
- This stapler can be passed through a chest tube incision in the anterior axillary line in the seventh intercostal space.
- Creating this port even in an open case provides another passageway for instruments that can assist in retraction and provide better visualization or the placement of a camera when teaching others how to perform the surgery.
- An energy source is used to dissect the esophagus circumferentially at the level of the diaphragm. While dissecting towards the abdomen, expose the esophagus inferiorly towards the diaphragm and into the abdomen from the chest to expose the Penrose drain that was left in the abdomen. Placing a suture to retract the diaphragm inferiorly and delivering it out of the chest will facilitate exposure. This Penrose drain is delivered into the chest and is retracted superiorly, allowing identification of the attachments circumferentially around the esophagus.
- By pulling up on the Penrose, the posterior aspect of the esophagus and all tissue adjacent to the esophagus can be safely divided under direct visualization with an energy device.
- When an en bloc lymph node dissection is being performed, the azygos vein and thoracic duct are taken with the specimen and thus a thoracic duct ligation is performed (**Fig. 11**). Some authors advocate ligating the thoracic duct regardless of the dissection to limit postoperative thoracic duct leak. When performing a modified en bloc dissection, as we prefer to do, the azygos vein is spared, but lymphatic tissue adjacent to the area is included. **Fig. 12** depicts the thoracic nodal staging for proper labeling. Dissecting the posterior aspect of the pericardium and the left atrium allows complete dissection around the esophagus keeping all tissue adjacent to the esophagus with the specimen. The right inferior pulmonary ligament is extended all the way up to the level of the right inferior pulmonary vein. The left inferior pulmonary ligament can be identified and lymph nodes dissected from this exposure as well.



- | | | |
|-------|---|---|
| 2R/2L | ● | Upper tracheal |
| 4R/4L | ● | Lower paratracheal (including azygos nodes) |
| 5 | ● | Subaortic (A-P window) |
| 6 | ● | Para-aortic (ascending aorta or phrenic) |
| 7 | ● | Subcarinal |
| 8M/8L | ● | Para-esophageal (below carina) |
| 9 | ● | Pulmonary ligament |
| 10L/R | ● | Hilar |
| 15 | ● | Diaphragm |
| 16 | ● | Pera-cardial |
| 17 | ● | L-gastric, along course of L-gastric artery |
| 18 | ● | Common hepatic |
| 19 | ● | Splenic |
| 20 | ● | Celiac |

- 12 Esophageal lymph node map.

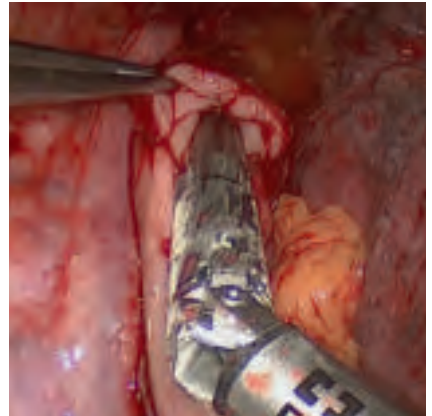
- The esophagus is immobilized all the way up to the level of the azygos vein, taking care to avoid the posterior membranous portion of the trachea and the right and left mainstem bronchi.
- No energy source is used during dissection of the superior aspect of the esophagus to prevent inadvertent cautery injury to the membranous portion of the trachea or mainstem bronchi.
- At this time, the subcarinal lymph nodes can be taken.
- Transection of the esophagus is performed with an energy device or sharp instrument at or above the level of the azygos vein, depending on the location of the tumor and the extent of resection required.
- It is possible to carry the resection to the top of the thoracic inlet and create an anastomosis as high as would be created in a neck anastomosis, but creation of the anastomosis above the level of the azygos vein will be more than adequate in most cases where a GE junction or lower esophageal adenocarcinoma is involved (**Fig. 13**).
- If a circular stapled technique is being employed with the specimen left attached to the conduit during the anastomosis and later removed, a segment of the esophagus can be sent to confirm a negative margin.



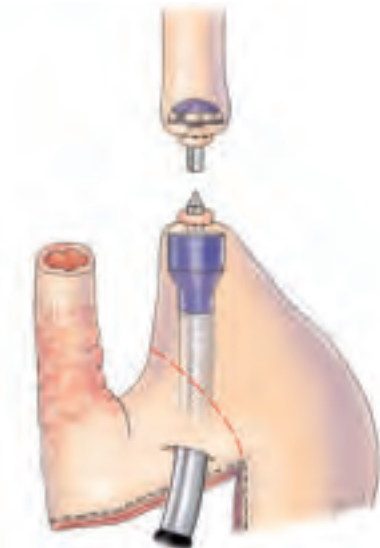
13 Azygos vein in relationship to the thoracic anastomosis.

Intrathoracic Anastomosis

- Refer to **Fig. 14** depicting the sutures that are placed in the terminal end of the esophagus to hold it without damaging or grasping the tissue that will become the anastomosis.
- Three types of intrathoracic anastomoses can be created to join the terminal end of the esophagus to the gastric conduit.
- These anastomoses include the more traditional hand-sewn, stapled side-to-side, and the circular stapled.
- Each will be discussed in detail. The lack of a serosal layer, segmental blood supply, and location make the esophagus a remarkably difficult organ to anastomose.
- Handling the esophagus with the least amount of trauma, limiting the dissection causing less blood supply just proximal to the anastomosis, and avoidance of too much tension on sutures that may cut through the wall instead of create an anastomosis are paramount. A propensity-matched analysis found the thoracic stapled anastomosis to be safe, effective, and less likely to cause postoperative stricture or dysphagia with equal leak rate when compared to a hand-sewn anastomosis [see BLACKMON SH, CORREA AM et al. 2007].
- The conduit is not delivered into the chest until the surgeon is ready to create the anastomosis. Bringing the tissue into the chest too early will result in potentially rotating the conduit or having the tissue obstruct a complete view. If the conduit is sutured to the specimen, then the sutures are simply cut and the specimen is sent for histopathologic examination to confirm a negative margin. If a circular stapled anastomosis is being created, a note will need to go to the pathologist to remind them the final margin will be the end-esophageal portion of the donut from the stapler.
- Do not deliver too much specimen into the chest, or redundancy will cause later dysphagia and poor gastric emptying.
- Either the additional tissue can be resected from the more ischemic tip of the conduit or the redundant conduit can be tucked back into the abdomen and tacked into position after the anastomosis has been created.



14 Stapled intrathoracic side-to-side anastomosis.



15 Circular stapled thoracic anastomosis.

Circular Stapled Anastomosis

- A circular-stapled anastomosis can be created by placing a baseball or purse-string suture on the terminal end of the esophagus. If the specimen has been stapled away from the conduit, the specimen is delivered out of the chest and separated from the gastric conduit by cutting the two stay sutures. Once the baseball suture has run circumferentially around the terminal end of the esophagus at each passage passing through muscle and mucosa, the suture is tied to close the terminal end of the esophagus tightly around the anvil. A second purse-string is placed slightly higher up from the baseball stitch circumferentially around the terminal end of the esophagus leaving more generous suture on the outside of the esophagus than on the inside of the esophagus and this suture is tightened as well. If at this point the esophagus does not appear to be tightly fixed around the anvil, an additional suture may also be placed to facilitate gathering of the terminal end of the esophagus around the anvil. Any redundant tissue left around the anvil that may creep into the anastomosis will cause a leak.
- The anvil is placed into the terminal end of the esophagus.
- The stapler is placed through the open proximal end of the gastric conduit and a spike from the EEA stapler is made to exit on a greater curve side of the gastric conduit approximately 4 to 5 cm away from the most proximal end of the gastric conduit that is opened. This allows the two structures to be married to each other creating an end-to-side functional end-to-end anastomosis.
- The terminal end of the esophagus is stapled to the greater curve side of the gastric conduit in a circumferential fashion again approximately 3 to 4 cm distal to the opened end of the gastric conduit. Please see **Fig. 15** for a circular stapled anastomosis.
- When the specimen is left attached to the gastric conduit, the circular stapler can be passed into a small gastrotomy to exit in a similar fashion out of the greater curve side of the conduit.
- Once the circular connection is made and the stapler is removed, the remaining specimen can be retrieved by finishing the conduit creation by placing either a TA or linear endoscopic stapler to complete the division along the red line in **Fig. 15**.
- Remember not to complete the gastric conduit staple line more than two centimeters close to the circular stapled anastomosis, as this will create a watershed area of poor perfusion and become a potential leak.

Please note that some reports of stricture when using a size 25 circular-stapled anastomosis have been made, however, other surgeons report no difference with regard to stapler size using either a 25 or 28 size stapler. One should never use a circular stapler below smaller than a size 25. If using the OrVil circular stapler, please refer to the end of this guide for tips for deploying the OrVil.

Stapled Side-to-Side Anastomosis

- Once the most proximal end of the gastric conduit has been removed and the gastric conduit is completely stapled closed with a linear stapler, the conduit can be positioned posterior to the terminal end of the esophagus and sutured in this position to lessen tension on the anastomosis.
- The esophagus is laid on top of the gastric conduit and again sutured on either side. A gastrotomy is placed on the greater curve side of the gastric conduit approximately 4 to 5 cm inferior caudally (caudal) to the most proximal end of the gastric conduit.
- A linear stapled side-to-side functional end to end oblique anastomosis is created by firing a size 60 stapler to connect the two structures to one another. The hood of the esophagus is hand-sewn over the opened gastrotomy in an interrupted fashion with either 3-0 vicryl suture or silk suture (**Fig. 16**). This interrupted suture can be reinforced in a Lembert fashion, but beware not to pull too hard and tear the esophageal wall.



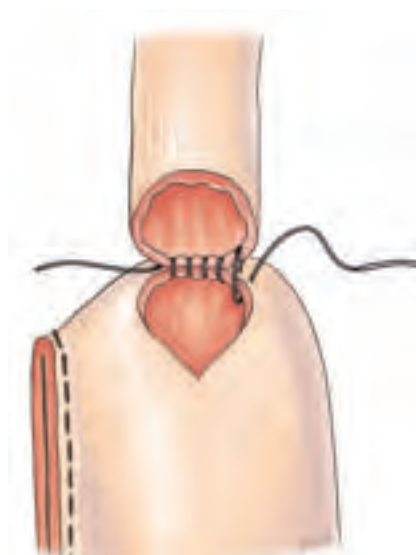
16 Linear stapled thoracic anastomosis.

Hand-Sewn Anastomosis

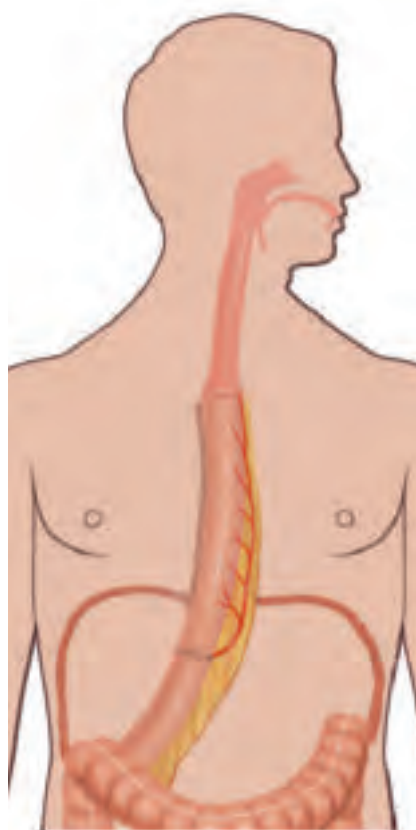
- To create a hand-sewn anastomosis, the terminal end of the esophagus is placed on top of the gastric conduit as described in **Fig. 17** for the beginning of a stapled side-to-side anastomosis.
- A gastrotomy is created on the greater curve side of the stomach to match the opening of the esophagus.
- Interrupted sutures are placed circumferentially connecting the terminal end of the esophagus to the greater curve gastrotomy.
- A second layer of suture is optional, but one must be aware that this may possibly narrow the anastomosis. (note about my study showing higher rate of dysphagia and stricture.)

Completing the Thoracic Portion

- Once the anastomosis is completed and the gastric conduit tip is removed, a nasogastric tube is directed gently into the gastric conduit and the tip is left just above the diaphragm.
- The conduit is sewn to the diaphragm – into the chest.
- Warm (cold irrigation may induce fibrillation of the heart) irrigation and insufflation of the conduit is performed for confirmation of no air bubbles or leakage around the staple line. Inspect the conduit and ensure that there is no abnormal kinking, redundancy, or malposition.
- The staple line should be facing the right side of the patient and the greater curve should be facing the left side of the patient. Shown in **Fig. 18** is the proper orientation of the final conduit and position with the anastomosis ideally above the level of the azygos vein.
- The gastric conduit may be tacked into position by suturing it to the mediastinal pleura in several areas.
- In the event that an omental fat pad vascularized pedicled flap has been harvested, the flap can be positioned on top of the anastomosis or between the trachea and the esophagus.
- Be wary not to rotate the gastric conduit when positioning the omental flap. Reduce any redundancy of the conduit back into the abdomen.
- Once the conduit has been properly positioned, tack the gastric conduit to the diaphragm at the level of the crura. Be sure not to tack the conduit to the dome of the diaphragm, as this will cause the conduit to make an S-shape as it dips down to follow the diaphragm during respiration.
- The conduit should be straight and directly behind the left atrium of the heart. Redundancy will cause patients to potentially develop dysphagia.
- A 24- to 32-French chest tube is placed in the postero-apical position. We do not recommend placing drains directly adjacent to the anastomosis, but in near proximity such that drainage of a leak will be possible.
- The lung is re-insufflated and the incisions are closed. Confirmation of a correct instrument count is made.
- The nasogastric tube can be bridled into position to prevent accidental removal at the end of the case.



17 Hand-sewn thoracic anastomosis.



18 Proper orientation of the gastric conduit.

Additional Tips

- Make sure the patient does not receive any intraoperative pressor agents during the entire surgery or in the immediate postoperative period, as this may cause conduit necrosis.
- Place the nasogastric tube into position after the intrathoracic anastomosis has been completed and after the terminal end of the gastric conduit has been resected to avoid accidentally including the tube in the anastomosis.
- Repeat endoscopy can be performed to evaluate a questionable anastomosis.
- Secure your nasogastric tube into position by creating a bridle, placing two ET suction catheters through either nostril exiting from the mouth. Umbilical tape can be tied to the terminal end of the two ET suction catheters and delivery of the ET suction catheters back outside the nostril allows for delivery of either end of the umbilical tape out of the nostril with the loop passing around the septum. The umbilical tape is loosely tied away from the nostril and then tightly tied around the nasogastric tube. This is not meant to hold the nasogastric tube in place but is only a reminder for the patient in the event they pull on the nasogastric tube. Securing this too tight may result in nasal septum necrosis.
- Remember to place a mesenteric piece of tape on the end of every tube exiting the patient's body to fix it to the patient's body at a point distal from that area from which it exits to prevent accidental tube dislodgement after the surgery.
- Remember it is important when creating an esophagogastric anastomosis using a circular stapler that a lower staple height is recommended (3.5 mm) and as large a stapler as the esophagus can receive. Larger diameter staplers (28 mm) have a better ability to staple outside the tissue that is secured to the anvil and have a smaller chance to develop stricture. Watch when introducing larger staplers into the esophagus, as they may cause tearing of the mucosal surface.
- Having a laparoscopic anvil grasper will facilitate the creation of a circular-stapled anastomosis and will make it easier to grasp the anvil during manipulation.

Table 2: Complications of Thoracic Esophagectomy

- Anastomotic leak
- Bleeding
- Pneumonia
- Stricture
- Dysphagia
- Reflux
- Atrial fibrillation

Postoperative Management

- Once the surgery is complete, the patient should be monitored in a specialized setting that is familiar with esophagectomy patients.
- Post-operative avoidance of intravenous pressors, generous administration of IV fluids, aggressive pulmonary toilet (except positive-pressure oral ventilation or deep vigorous suctioning), maintaining good conduit decompression with a drainage tube, carefully securing all drainage tubes, early ambulation, and careful management of post-operative atrial fibrillation are just a few of the essential keys to good outcomes in such patients.
- For a list of common complications after thoracic esophagectomy, please refer to **Table 2**.

Recommended Reading

- BLACKMON SH, CORREA AM, WYNN B, HOFSTETTER WL, MARTIN LW, MEHRAN RJ, RICE DC, SWISHER SG, WALSH GL, ROTH JA, VAPORCIYAN AA. Propensity-matched analysis of three techniques for intrathoracic esophagogastric anastomosis. *Ann Thorac Surg* 2007; 83: 1805–1813; discussion 1813
- DAI JG, ZHANG ZY, MIN JX, HUANG XB, WANG JS. Wrapping of the omental pedicle flap around esophagogastric anastomosis after esophagectomy for esophageal cancer. *Surgery* 2011; 149: 404–410
- LAI FC, CHEN L, TU YR, LIN M, LI X. Prevention of chylothorax complicating extensive esophageal resection by mass ligation of thoracic duct: a random control study. *Ann Thorac Surg* 2011; 91: 1770–1774
- OKUYAMA M, MOTOYAMA S, SUZUKI H, SAITO R, MARUYAMA K, OGAWA J. Hand-sewn cervical anastomosis versus stapled intrathoracic anastomosis after esophagectomy for middle or lower thoracic esophageal cancer: a prospective randomized controlled study. *Surg Today* 2007; 37: 947–952
- SHACKCLOTH MJ, MCCARRON E, KENDALL J, RUSSELL GN, PENNE-FATHER SH, TRAN J, PAGE RD. Randomized clinical trial to determine the effect of nasogastric drainage on tracheal acid aspiration following oesophagectomy. *Br J Surg* 2006; 93: 547–552
- WALTHER B, JOHANSSON J, JOHANSSON F, VON HOLSTEIN CS, ZILLING T. Cervical or thoracic anastomosis after esophageal resection and gastric tube reconstruction: a prospective randomized trial comparing sutured neck anastomosis with stapled intrathoracic anastomosis. *Ann Surg* 2003; 238: 803–812; discussion 812–804

ENDOCAMELEON® ^{NEW}

Diameter 10 mm, length 32 cm



Special Features:

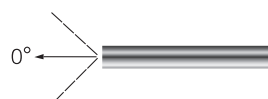
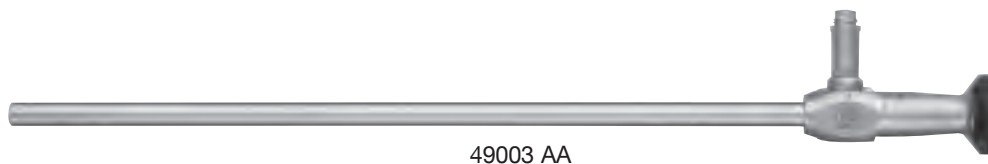
- Variable direction of view 0° – 120°
- HOPKINS® telescope with unique rod lens system
- Easy-to-use adjusting knob for selecting the direction of view
- Rigid sheath with a diameter of 10 mm



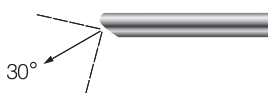
- 49003 AE **ENDOCAMELEON® HOPKINS® Telescope**, diameter 10 mm, length 32 cm, **autoclavable**, variable direction of view 0° – 120°, with adjusting knob for selecting the direction of view, fiber optic light transmission incorporated, color code: gold



HOPKINS® II Telescopes *NEW*
 Diameter 10 mm, length 31 cm



49003 AA **HOPKINS® II Straight Forward Telescope 0°**,
 enlarged view, diameter 10 mm, length 31 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: green

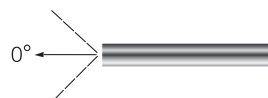
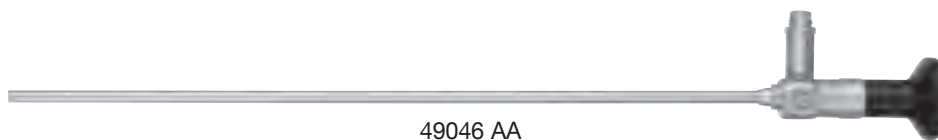


49003 BA **HOPKINS® II Forward-Oblique Telescope 30°**,
 enlarged view, diameter 10 mm, length 31 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: red

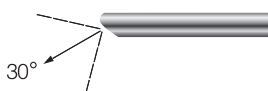


49003 FA **HOPKINS® II Telescope 45°**,
 enlarged view, diameter 10 mm, length 31 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: black

Diameter 5 mm, length 29 cm



49046 AA **HOPKINS® II Straight Forward Telescope 0°**,
 enlarged view, diameter 5 mm, length 29 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: green



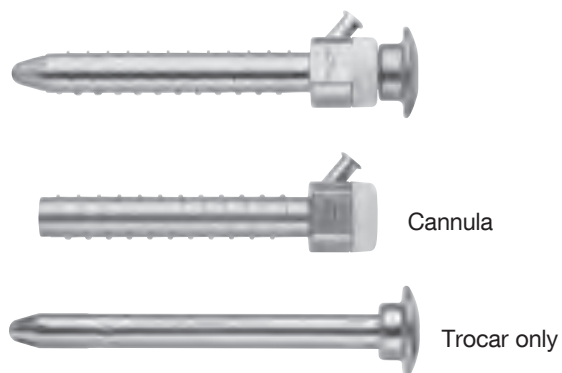
49046 BA **HOPKINS® II Forward-Oblique Telescope 30°**,
 enlarged view, diameter 5 mm, length 29 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: red

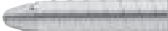


49046 FA **HOPKINS® II Telescope 45°**,
 enlarged view, diameter 5 mm, length 29 cm,
autoclavable,
 fiber optic light transmission incorporated,
 color code: black

Trocars with 45° LUER-Lock Connector

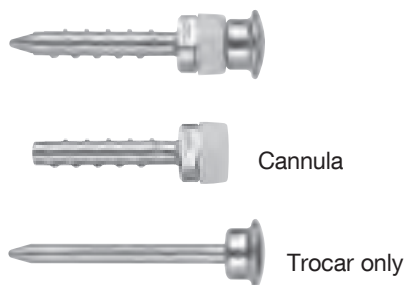
HEIDELBERG Model, Size 11 mm




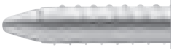
Size:		11 mm
Working length:		8.5 cm
	Trocar, HEIDELBERG model, with blunt tip including: Cannula, with 45° LUER-Lock connector Trocar only	40103 ELX 40103 EL 40103 X


Trocars

Sizes 6, 11 and 13 mm



Size:		6 mm	
Working length:		4 cm	6 cm
	Trocar, with blunt tip including: Cannula Trocar only	40160 AB 40160 A 40160 B	40160 CD 40160 C 40160 D

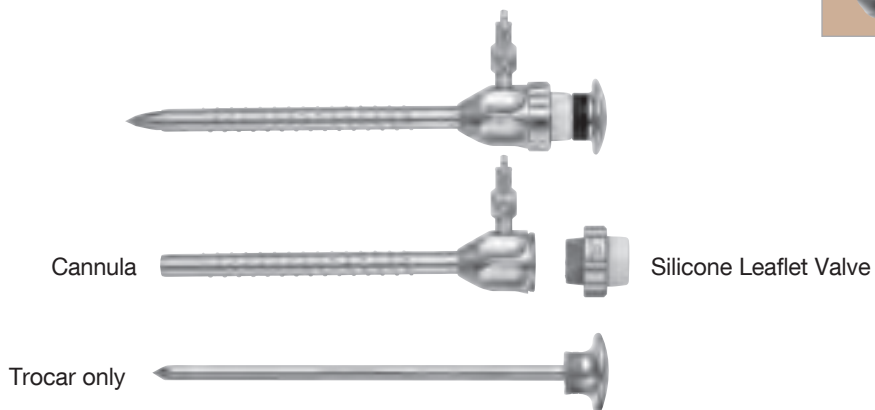
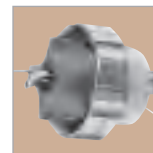
Size:		11 mm	
Working length:		4 cm	6 cm
	Trocar, with blunt tip including: Cannula Trocar only	40103 AB 40103 A 40103 B	40103 CD 40103 C 40103 D


Size:		13 mm	
Working length:		4 cm	6 cm
	Trocar, with blunt tip including: Cannula Trocar only	40107 AB 40107 A 40107 B	40107 CD 40107 C 40107 D

Trocars

Sizes 6

with connector for insufflation

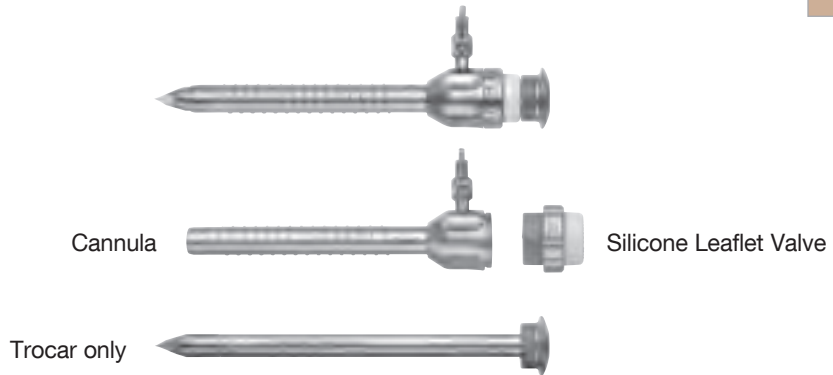
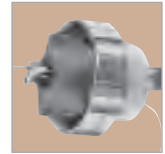



Size:		6 mm	
Working length:		6 cm	10.5 cm
Color code:		black-white	black
	<p>Trocar, with conical tip including:</p> <p>Cannula, with thread</p> <p>Trocar only</p> <p>Silicone Leaflet Valve</p>	30120 EHX	30120 TRX
		30120 EX1	30120 TX1
		30120 H	30120 R
		30120 L1	30120 L1

Trocars

Sizes 11

with connector for insufflation



Size:		11 mm
Working length:		10.5 cm
Color code:		green
	Trocar , with conical tip including:	30123 TCS
	Cannula , with thread	30123 TS1
	Trocar only	30123 C
	Silicone Leaflet Valve	30123 L1

CUSCHIERI Retractors

The distal end of the liver retractor can be activated by rotation of the proximal part of the handle. The retractor is introduced into the peritoneal cavity in its straight, unactivated form. Once inside the abdomen, the distal end is closed with the help of forceps and slipped under the liver. The liver can be safely held clear of the operative site in this manner for extended periods of time.

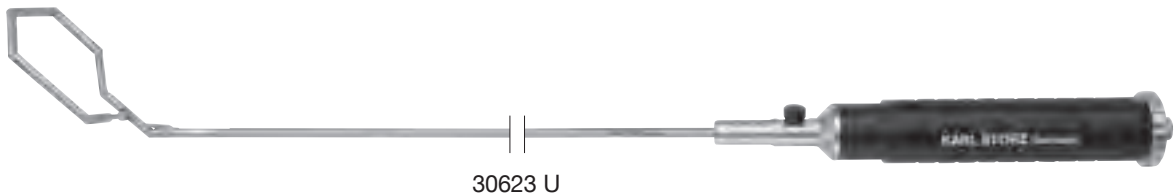
The weighted handle acts as a counter-weight to the liver, making retraction more comfortable for the surgical assistant. In its closed form, the retractor can also be used for manipulation of the bowel and other anatomical structures. This instrument was developed in conjunction with Professor Sir Alfred Cuschieri and his staff at the University of Dundee.

Special Features:

- **Automatic retraction of the liver for extended periods of time**
- **Also suitable for atraumatic manipulation of other anatomical structures**
- **Easy dismantling for cleaning purposes**

Size 5 mm

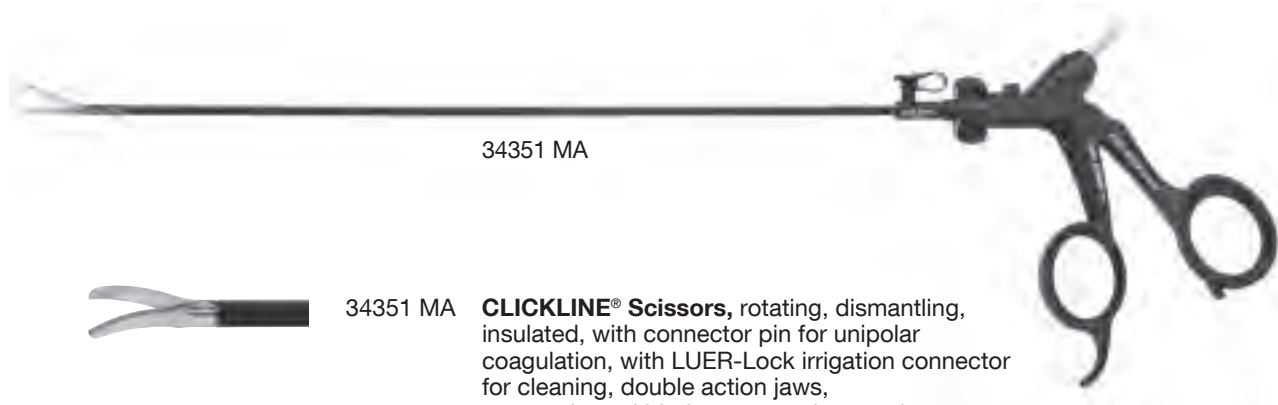
Operating instruments, **length 36 cm**,
for use with trocar size 6 mm



30623 U CUSCHIERI Retractor,
size 5 mm, length 36 cm

CLICKLINE® Scissors and RoBi® Scissors

Size 5 mm, length 36 cm

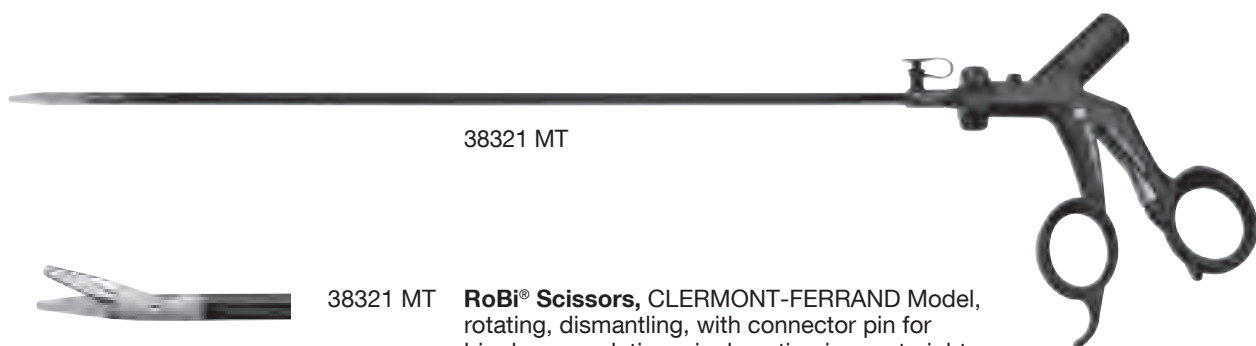


34351 MA



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

including:

Plastic Handle, without ratchet, with larger contact area**Metal Outer Sheath****Scissors Insert**

38321 MT



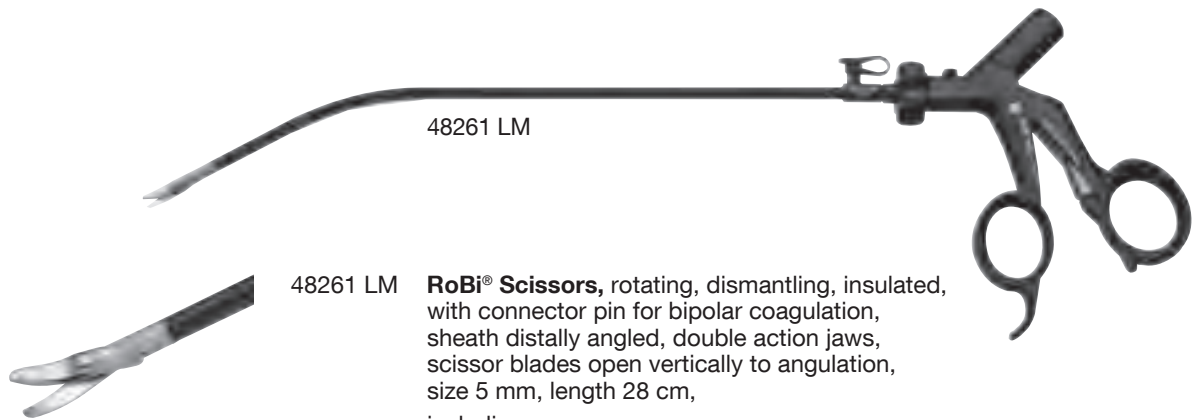
38321 MT **RoBi® Scissors**, CLERMONT-FERRAND Model, rotating, dismantling, with connector pin for bipolar coagulation, single action jaws, straight, for cutting and bipolar coagulation of vessels and tissue layers, size 5 mm, length 36 cm,

including:

Ring Handle**Outer Sheath****Scissors Insert**

RoBi® Scissors

Size 5 mm, length 28 cm



48261 LM



48261 LM

RoBi® Scissors, rotating, dismantling, insulated, with connector pin for bipolar coagulation, sheath distally angled, double action jaws, scissor blades open vertically to angulation, size 5 mm, length 28 cm,

including:

Ring Handle, with larger contact area at the finger ring

Scissors Insert, with outer sheath



48261 LU

RoBi® Scissors, rotating, dismantling, insulated, with connector pin for bipolar coagulation, sheath distally angled, double action jaws, scissor blades open horizontally to angulation, size 5 mm, length 28 cm,

including:

Ring Handle, with larger contact area at the finger ring

Scissors Insert, with outer sheath



48261 MT

RoBi® Scissors, rotating, dismantling, insulated, with connector pin for bipolar coagulation, sheath distally angled, single action jaws, scissor blades open horizontally to angulation, size 5 mm, length 28 cm,

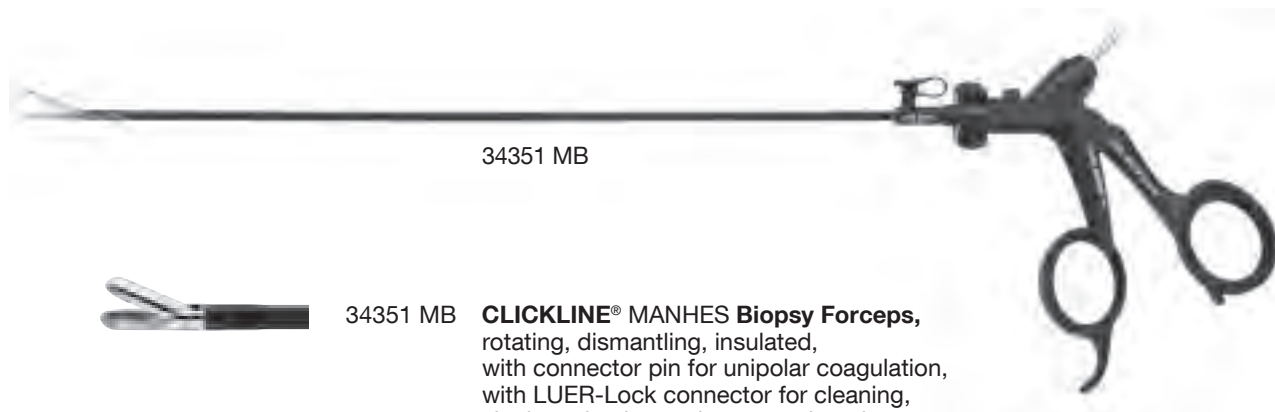
including:

Ring Handle, with larger contact area at the finger ring

Scissors Insert, with outer sheath

CLICKLINE® MANHES Biopsy Forceps

Size 5 mm, length 36 cm



34351 MB

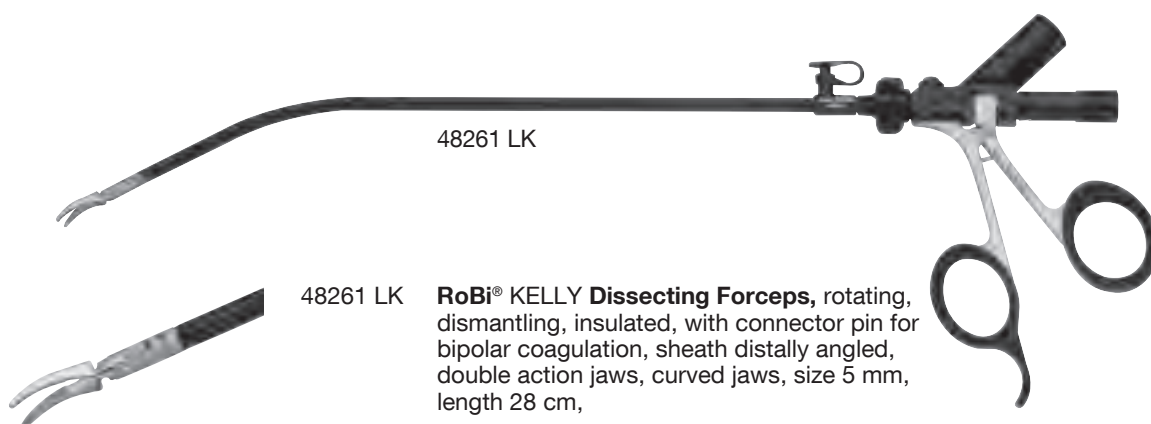


34351 MB **CLICKLINE® MANHES Biopsy Forceps**, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with LUER-Lock connector for cleaning, single action jaws, size 5 mm, length 36 cm, including:

- Plastic Handle**, without ratchet, with larger contact area
- Metal Outer Sheath**, insulated
- Forceps Insert**

RoBi® KELLY Dissecting Forceps

Size 5 mm, length 28 cm



48261 LK

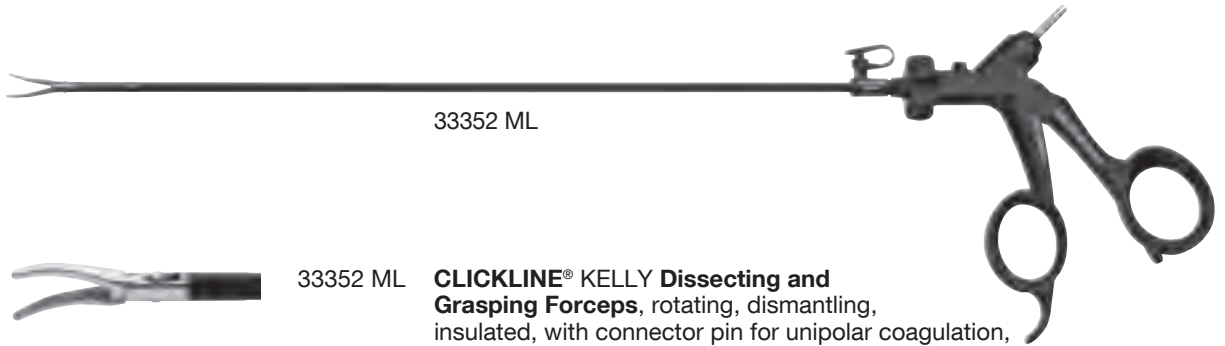


48261 LK **RoBi® KELLY Dissecting Forceps**, rotating, dismantling, insulated, with connector pin for bipolar coagulation, sheath distally angled, double action jaws, curved jaws, size 5 mm, length 28 cm,

- including:
- Ring Handle**, with larger contact area at the finger ring
- Forceps Insert**, with outer sheath

CLICKLINE® Dissecting and Grasping Forceps

Size 5 mm, length 36 cm and 43 cm



33352 ML



33352 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, including:

Plastic Handle, with MANHES style ratchet

Metal Outer Sheath, insulated

Forceps Insert



33352 DY

CLICKLINE® DeBAKEY Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with LUER-Lock irrigation connector for cleaning, single action jaws, atraumatic, size 5 mm, length 36 cm, including:

Plastic Handle, with MANHES style ratchet

Metal Outer Sheath, insulated

Forceps Insert

33452 DY **Same**, length 43 cm



33352 AB

CLICKLINE® MOURET Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with LUER-Lock irrigation connector for cleaning, single action jaws, atraumatic, fenestrated, round jaws, slender, size 5 mm, length 43 cm, including:

Plastic Handle, with MANHES style ratchet

Metal Outer Sheath, insulated

Forceps Insert



33352 DYD

CLICKLINE® DeBAKEY Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with LUER-Lock irrigation connector for cleaning, double action jaws, atraumatic, size 5 mm, length 36 cm, including:

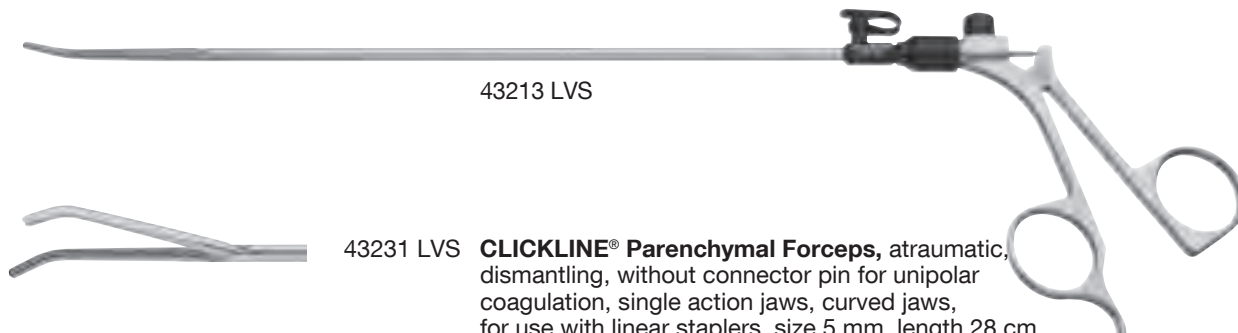
Plastic Handle, with MANHES style ratchet

Metal Outer Sheath, insulated

Forceps Insert

CLICKLINE® Parenchymal Forceps

Size 5 mm, length 28 cm



43213 LVS

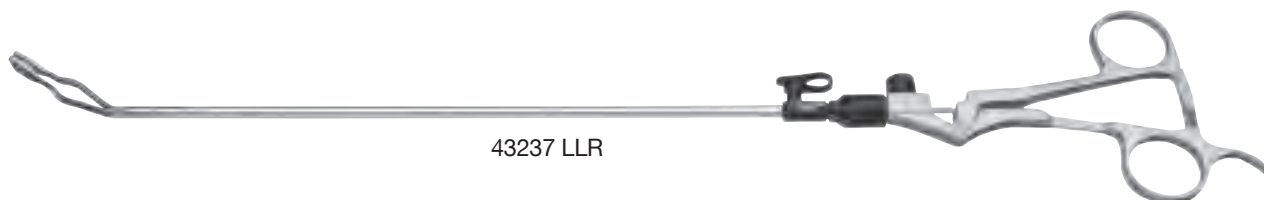
43231 LVS

CLICKLINE® Parenchymal Forceps, atraumatic, dismantling, without connector pin for unipolar coagulation, single action jaws, curved jaws, for use with linear staplers, size 5 mm, length 28 cm, including:

- Metal Handle**, with 4 locking positions
- Outer Sheath with Forceps Insert**

CLICKLINE® Lung Forceps

Size 5 mm, length 28 cm



43237 LLR

43237 LLR

CLICKLINE® Lung Forceps, atraumatic, dismantling, without connector pin for unipolar coagulation, single action jaws, curved jaws, fenestrated, size 5 mm, length 28 cm, including:

- Metal Y-Handle**, with ratchet, axial, with 4 locking positions
- Outer Sheath with Forceps Insert**



43237 LRR

CLICKLINE® Lung Nodule Forceps, atraumatic, dismantling, without connector pin for unipolar coagulation, single action jaws, curved jaws, fenestrated, size 5 mm, length 28 cm, including:

- Metal Y-Handle**, with ratchet, axial, with 4 locking positions
- Outer Sheath with Forceps Insert**

Dissecting Electrodes

Size 5 mm, Trocar size 6 mm



26772 UF



26772 UF

Coagulating and Dissecting Electrode, L-shaped, insulated, with connector pin for unipolar coagulation, size 5 mm, length 30 cm

Surgical Sponge Holder

Size 5 and 10 mm

Trocar size 6 and 11 mm



32540 PT



32340 PT

Surgical Sponge Holder, self-retaining, size 5 mm, length 30 cm including:

Handle

Outer Sheath, insulated

Sponge Holder Insert



32540 PT

Surgical Sponge Holder, self-retaining, size 10 mm, length 30 cm including:

Handle

Outer Sheath, insulated

Sponge Holder Insert

Palpation Probe

Size 5

Trocar size 11 mm



40175 LT



40175 LT

Palpation Probe and Knot Tier,
distally angled sheath, size 5 mm,
length 28 cm

Knot Tier

Size 5

Trocar size 6 mm



26596 SK



26596 SK

KOECKERLING Knot Tier,
for extracorporeal knotting,
size 5 mm, length 36 cm




KOH Macro Needle Holders

dismantling, axial handles

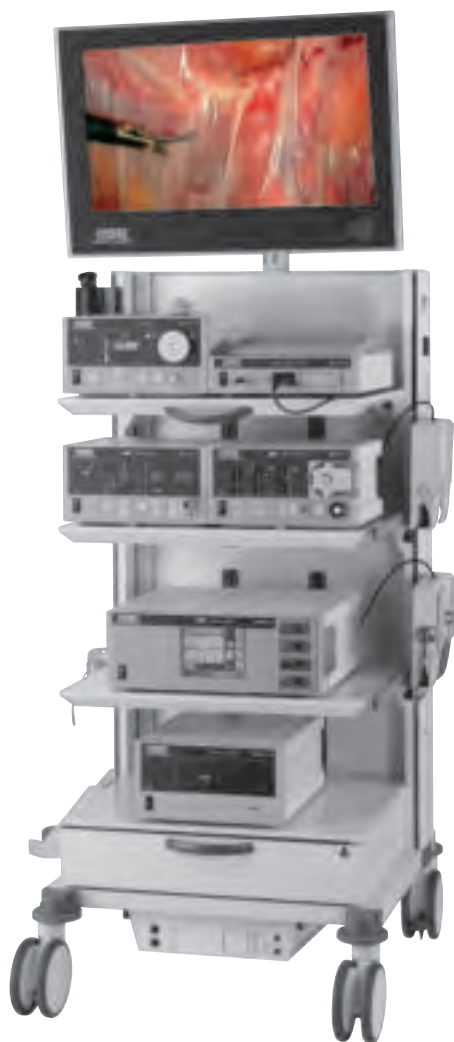
Size 5 mm
Trocar size 6 mm

Length	Handle
	33 cm

Single action jaws

Working Insert	Catalog number for the complete instrument
30173 R 	30173 RAO KOH Macro Needle Holder , jaws curved to right, with tungsten carbide inserts, for use with suture material size 0/0 to 7/0
30173 L 	30173 LAO KOH Macro Needle Holder , jaws curved to left, with tungsten carbide inserts, for use with suture material size 0/0 to 7/0
30173 F 	30173 FAO KOH Macro Needle Holder , straight jaws, with tungsten carbide inserts, for use with suture material size 0/0 to 7/0

Mobile Equipment Cart



Units and Accessories:

9626 NB	26" HD Monitor
20 1331 01-1	Cold Light Fountain XENON 300 SCB
22 201011-102	IMAGE 1 HUB™ HD Camera Control Unit SCB, with SDI module
22 2200 55-3	IMAGE 1 H3-Z Three-Chip HD Camera Head
26 4320 08-1	THERMOFLATOR® SCB
26 3310 09-1	HAMOU® ENDOMAT®, optional accessories required
20 0409 13-EN	KARL STORZ AIDA® compact NEO advanced
20 535201-215	AUTOCON® II 400 High End-Set
2x 29005 DFH	Holder for Three-Pedal Footswitch
27805	Neutral Electrode
27806	Neutral Electrode Connecting Cable
26005 M	Unipolar High Frequency Cord
26176 LE	Bipolar High Frequency Cord
20 0144 30	Double Pedal Footswitch
20 0178 31	Three-Pedal Footswitch, HF generators
29005 DRB	Mobile Equipment Cart
29005 MZD	Monitor Holding Arm
29005 TBG	Isolation Transformer, 2000 VA
29003 FH	Bottle Stand, for CO₂ bottles
29003 IW	Earth Leakage Monitor

Video Gastroscope SILVER SCOPE® Serie



13821 PKS **Video Gastroscope SILVER SCOPE® Serie**

Color system PAL
 Working channel: Ø 2.8 mm
 Diameter: 9.3 mm
 Working length: 1100 mm
 Bending section:
 Up: 190°
 Down: 100°
 Left/Right: 120°/120°

Following Accessories are included:

- 1x **Transport Case**
- 1x **ETO Cap**
- 1x **Suction valve**
- 1x **Air-Water Valve**
- 1x **Leakage tester**
- 1x **Caps for biopsy channel** (10 pcs.)
- 1x **Irrigation tube**
- 1x **Y irrigation tube**
- 1x **Bite protector** (single-use)
- 1x **Biopsy forceps** (single-use)
- 1x **Cleaning brush** (single-use)
- 1x **Valve brush** for video endoscopes
- 1x **Cover** for transportation of flex. endoscopes

13821 NKS **Video Gastroscope SILVER SCOPE® Serie**

Color system NTSC
 Working channel: Ø 2.8 mm
 Diameter: 9.3 mm
 Working length: 1100 mm
 Bending section:
 Up: 210°
 Down: 100°
 Left/Right: 120°/120°

Following Accessories are included:

- 1x **Transport Case**
- 2x **Key for Case**
- 1x **ETO Cap**
- 1x **Leakage tester**
- 1x **Caps for biopsy channel** (10 pcs.)
- 1x **Irrigation tube**
- 1x **Y irrigation tube**
- 1x **Bite protector** (single-use)
- 1x **Biopsy forceps** (single-use)
- 1x **Cleaning brush** (single-use)
- 1x **Valve brush** for video endoscopes
- 1x **Cover** for transportation of flex. endoscopes
- 1x **Cleaning Valve**, reusable
- 1x **Oil** for instruments
- 1x **Instruction Manual**

IMAGE 1 HUB™ HD

FULL HD Camera Control Unit



- Maximum resolution and the consistent use of the 16:9 aspect ratio guarantee FULL HD (High Definition)
- Endoscopic camera systems are equipped with three CCD chips that support the 16:9 input format as well as capturing images with a resolution of 1920 x 1080 pixels

The benefits of FULL HD (High Definition) for medical applications are:

- High input resolution of the camera head delivers more detail and depth of field with natural color rendition
- Using 16:9 format during image acquisition enlarges the field of view
- The 16:9 format of the widescreen monitor supports ergonomic viewing
- Enhanced color brilliance for optimal diagnosis
- Progressive scan technology provides a steady, flicker-free display and helps eliminate eyestrain and fatigue



22201011U1XX

22201011U1

IMAGE 1 HUB™ HD Camera Control Unit SCB

for use with IMAGE 1 FULL HD and IMAGE 1 standard one- and three-chip camera heads, max. resolution 1920 x 1080 pixels, with integrated **KARL STORZ-SCB** and digital Image Processing Module, color systems **PAL/NTSC**, power supply 100 – 240 VAC, 50/60 Hz including:

Mains Cord

BNC/BNC Video Cable

S-Video (Y/C) Connecting Cable

Special RGBS Connecting Cable

2x **Connecting Cable**, for controlling peripheral units

DVI-D Connecting Cable

SCB Connecting Cable

Keyboard, with US English character set

22201011U102

IMAGE 1 HUB™ HD Camera Control Unit SCB, with SDI module

for use with IMAGE 1 FULL HD and IMAGE 1 standard one- and three-chip camera heads, max. resolution 1920 x 1080 pixels, **with integrated SDI (Serial Digital Interface) module**, **KARL STORZ-SCB** and digital Image Processing Module, color systems **PAL/NTSC**, power supply 100 – 240 VAC, 50/60 Hz including:

Mains Cord

BNC/BNC Video Cable

S-Video (Y/C) Connecting Cable

Special RGBS Connecting Cable

2x **Connecting Cable**, for controlling peripheral units

DVI-D Connecting Cable

SCB Connecting Cable

Keyboard, with US English character set

IMAGE 1 HUB™ HD

FULL HD Camera Control Unit



222010 11U11X

222010 11U110 IMAGE 1 HUB™ HD Camera Control Unit SCB, with ICM module

for use with IMAGE 1 FULL HD and IMAGE 1 standard one- and three-chip camera heads, max. resolution 1920 x 1080 pixels, **with integrated ICM (Image Capture Module), KARL STORZ-SCB** and digital Image Processing Module, color systems **PAL/NTSC**, power supply 100 – 240 VAC, 50/60 Hz including:

Mains Cord

BNC/BNC Cable

S-Video (Y/C) Connecting Cable

Special RGBS Connecting Cable

2x **Connecting Cable**, for controlling peripheral units

DVI-D Connecting Cable

SCB Connecting Cable

Keyboard, with US English character set

2x **KARL STORZ USB Stick**, 4 GB

222010 11U112 IMAGE 1 HUB™ HD Camera Control Unit SCB, with SDI/ICM module

for use with IMAGE 1 FULL HD and IMAGE 1 standard one- and three-chip camera heads, max. resolution 1920 x 1080 pixels, **with integrated ICM (Image Capture Module) and SDI (Serial Digital Interface) modules, KARL STORZ-SCB** and integrated digital Image Processing Module, color systems **PAL/NTSC**, power supply 100 – 240 VAC, 50/60 Hz including:

including:

Mains Cord

BNC/BNC Video Cable

S-Video (Y/C) Connecting Cable

Special RGBS Connecting Cable

2x **Connecting Cable**, for controlling peripheral units

DVI-D Connecting Cable

SCB Connecting Cable

Keyboard, with US English character set

2x **KARL STORZ USB Stick**, 4 GB

Specifications:

Signal-to-noise ratio	IMAGE 1 HUB™ HD, three-chip camera systems ≥ 60 dB
AGC	Microprocessor-controlled
Video output	- FULL HD signal to DVI-D socket (2x) - SDI signal to BNC socket, (only IMAGE 1 HUB™ HD with SDI module (2x)) - RGBS signal to D-Sub socket - S-Video to 4-pin Mini-DIN socket (2x) - Composite signal to BNC socket
Input	Keyboard for title generator, 5-pin DIN socket

Control output/input	- KARL STORZ-SCB to 6-pin socket Mini-DIN socket (2x) - 3.5 mm stereo jack plug (ACC 1, ACC 2), - Serial port at RJ-11 - USB port (only IMAGE 1 HUB™ HD with ICM) (2x)
Dimensions w x h x d	305 x 89 x 335 mm
Weight	3.35 kg
Power supply	100–240 VAC, 50/60 Hz
Certified to:	IEC 601-1, 601-2-18, CSA 22.2 No. 601, UL 2601-1 and CE acc. to MDD, protection class 1/CF defibrillation-safe

IMAGE 1 HD
FULL HD Camera Control Unit



222020 11U1XX

222020 11U110 IMAGE 1 HD Camera Control Unit SCB, with ICM module

for use with IMAGE 1 FULL HD three-chip camera heads, max. resolution 1920 x 1080 pixels, **with integrated ICM (Image Capture Module), KARL STORZ-SCB** and digital Image Processing Module, power supply 100 – 240 VAC, 50/60 Hz

including:

Mains Cord

2x **Connecting Cable**, for controlling peripheral units

DVI-D Connecting Cable

SCB Connecting Cable

Keyboard, with US English character set

2x **KARL STORZ USB Stick**, 4 GB

222020 11U1 IMAGE 1 HD Camera Control Unit SCB

for use with IMAGE 1 FULL HD three-chip camera heads, max. resolution 1920 x 1080 pixels, with integrated **KARL STORZ-SCB** and digital Image Processing Module, power supply 100 – 240 VAC, 50/60 Hz

including:

Mains Cord

2x **SCB Connecting Cable**

DVI-D Connecting Cable

Connecting Cable, for controlling peripheral units

Keyboard, with US English character set

Specifications:

Signal-to-noise ratio	IMAGE 1 HD, three-chip camera systems ≥ 60 dB
AGC	Microprocessor-controlled
Video output	FULL HD Signal to DVI-D socket
Input	Keyboard for title generator, 5-pin DIN socket
Control output/input	- USB port (only IMAGE 1 HD with ICM) (2x) - Serial port at RJ-11 - 3.5 mm stereo jack plug (ACC 1, ACC 2) - KARL STORZ-SCB to 6-pin socket Mini-DIN socket (2x)

Dimensions w x h x d	305 x 89 x 335 mm
Weight	3.35 kg
Power supply	100–240 VAC, 50/60 Hz
Certified to	IEC 601-1, 601-2-18, CSA 22.2 No. 601, UL 2601-1 and CE acc. to MDD, protection class 1/CF defibrillation-safe

IMAGE 1 HUB™ HD FULL HD Camera Heads



22 2200 55-3

22 2200 55-3	50 Hz	IMAGE 1 H3-Z
	60 Hz	Three-Chip FULL HD Camera Head

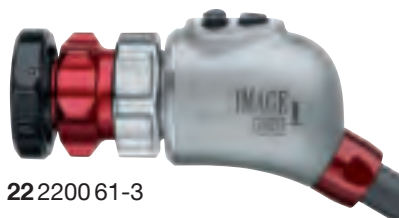
max. resolution 1920 x 1080 pixels, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length $f = 15 - 31$ mm (2x),
2 freely programmable camera head buttons

Specifications:

IMAGE 1 FULL HD Camera Heads	H3-Z
50 Hz	22 2200 55-3 (50/60 Hz)
60 Hz	-
Image sensor	3x 1/3" CCD chip
Pixel output signal H x V	1920 x 1080
Dimensions (w x h x l)	39 x 49 x 114 mm
Weight	270 g
Optical interface	integrated Parfocal Zoom Lens, $f = 15-31$ mm (2x)
Min. sensitivity	F 1.4/1.17 Lux
Grip mechanism	standard eyepiece adaptor
Cable	non-detachable
Cable length	300 cm

For use with IMAGE 1 HUB™ HD Camera Control Unit SCB 22 2010 11U1xx and IMAGE 1 HD Camera Control Unit SCB 22 2020 11U1xx

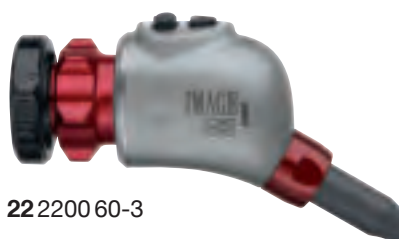
IMAGE 1 HUB™ HD
FULL HD Camera Heads – autoclavable



22220061-3

22220061-3 **50 Hz** **IMAGE 1 H3-ZA**
 60 Hz **Three-Chip FULL HD Camera Head**

autoclavable, max. resolution 1920 x 1080 pixels, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length f = 15 – 31 mm (2x), 2 freely programmable camera head buttons, for use with color systems **PAL/NTSC**



22220060-3

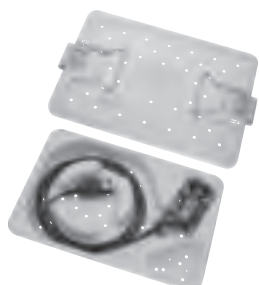
22220060-3 **50 Hz** **IMAGE 1 H3-FA**
 60 Hz **Three-Chip FULL HD Camera Head**

autoclavable, max. resolution 1920 x 1080 pixels, progressive scan, soakable, gas- and plasma-sterilizable, **fixed focus**, focal length f = 17 mm, 2 freely programmable camera head buttons, for use with color systems **PAL/NTSC**

Specifications:

IMAGE1 FULL HD Camera Heads	H3-ZA	H3-FA
50/60 Hz	22220061-3 (PAL/NTSC)	22220060-3 (PAL/NTSC)
Image sensor	3x 1/3" CCD chip	3x 1/3" CCD chip
Pixels output signal H x V	1920 x 1080	1920 x 1080
Dimensions (w x h x l)	39 x 49 x 100 mm	39 x 49 x 93 mm
Weight	299 g	261 g
Optical interface	integrated Parfocal Zoom Lens, f = 15-31 mm	fixed focus f = 17 mm
Min. sensitivity	F 1.4/1.17 Lux	F 1.4/1.17 Lux
Grip mechanism	standard eyepiece adaptor	standard eyepiece adaptor
Cable	non-detachable	non-detachable
Cable length	300 cm	300 cm

For use with IMAGE 1 HUB™ HD Camera Control Unit SCB 22201011-1xx and IMAGE 1 HD Camera Control Unit SCB 22202011-1xx



39301 Z3TS **Plastic Container for Sterilization and Storage** of camera heads **IMAGE1 H3-Z, H3-ZA and H3-FA**, **autoclavable**, suitable for use with steam, gas and hydrogen peroxide sterilization, Sterrad® compatible, external dimensions (w x d x h): 385 x 255 x 75 mm

Please note: The instrument displayed is not included in the plastic container.

Only camera heads marked “autoclave” can be placed in the tray for steam sterilization.

KARL STORZ FULL HD Monitors



9619 NB



9626 NB/NB-2

KARL STORZ HD and FULL HD Monitors	19"	26"	26"
Wall-mounted with VESA 100 adaption	9619 NB	9626 NB	9626 NB-2
Inputs:			
DVI-D	1x	1x	2x
Fiber Optic	optional	optional	optional
RGBS/VGA	1x	1x	2x
S-Video	1x	1x	2x
Composite/FBAS	1x	1x	2x
Outputs:			
DVI-D	●	●	●
S-Video	●	●	●
Composite/FBAS	●	●	●
Signal Format Display:			
4:3	●	●	●
5:4	●	●	●
16:9	●	●	●
Picture-in-Picture	●	●	●
PAL/NTSC compatible	●	●	●

The following accessories are included:

Mains Cord

External 24VDC Power Supply

Signal cables: DVI-D, BNC

Optional accessories:

9626 SF

Pedestal, for 96XX monitor series

Specifications:

KARL STORZ FULL HD Monitors	19"	26"
Desktop with pedestal	optional	optional
Wall-mounted with 100 adaption	9619 NB	9626 NB/NB-2
Brightness	280 cd/m ²	400 cd/m ²
Max. viewing angle	178° vertical	178° vertical
Pixel distance	0.29 mm	0.30 mm
Reaction time	12 ms	12 ms
Contrast ratio	700:1	700:1
Mount	100 mm VESA	100 mm VESA
Weight	10 kg	14 kg
Rated power	120 W	120 W
Operating conditions	0–40°C	0–40°C
Storage	-20–60°C	-20–60°C
Rel. humidity	max. 80%	max. 80%
Dimensions w x h x d	469.5 x 416 x 75.5 mm	699 x 445.6 x 87.5 mm
Power supply	85–264 VAC	85–264 VAC

**KARL STORZ HD, HD WIDEVIEW™
and HD LED Backlight Monitors**



9524 NB, 9526 NBL, 9726 NB

	TFT Flat Screens		HD WIDEVIEW Monitors		
	15"	19"	24"	26"	
Wall-mounted with VESA 100 adaption	9515 NB	9519 NB	9524 NB	9526 NBL	9726 NB
Inputs:					
SDI	●	●	–	–	–
HD-SDI	●	●	●	●	●
3G-SDI	–	–	–	●	●
RGBS	●	●	●	●	●
S-Video	●	●	●	●	●
Composite/FBAS	●	●	●	●	●
SOG	–	●	●	●	●
DVI-D	●	●	●	●	●
VGA	●	●	●	●	●
Outputs:					
SDI	–	●	●	●	●
HD-SDI	–	●	●	●	●
3G-SDI	–	–	–	●	●
RGBS	–	●	●	●	●
S-Video	–	●	●	●	●
Composite/FBAS	–	●	●	●	●
DVI-D	–	●	●	●	●
Signal Format Display:					
4:3	●	●	●	●	●
5:4	–	●	●	●	●
16:9	–	–	●	●	●
16:10	–	–	●	–	–
Picture-in-Picture	–	●	●	●	●
PAL/NTSC compatible	●	●	●	●	●

The following accessories are included:

Mains Cord

External 24VDC Power Supply

Signal cables

Optional accessories:

9526 SF **Pedestal** for 15", 19", 24" and 26" monitors from the 95XX- and 97XX-series

KARL STORZ HD, HD WIDEVIEW™ and HD LED Backlight Monitors



Specifications:

Wall-mounted with VESA 100 adaption	15"	19"	24"	26"	26"
	9515 NB	9519 NB	9524 NB	9526 NBL	9726 NB
Brightness	430 cd/m ²	300 cd/m ²	400 cd/m ²	400 cd/m ²	800 cd/m ²
Max. viewing angle	178° vertical	178° vertical	178° vertical	178° vertical	178° vertical
Pixel distance	0.297 mm	0.294 mm	0.270 mm	0.3 mm	0.3 mm
Reaction time	10–15 ms	10–16 ms	5–12 ms	8 ms	8 ms
Contrast ratio	500:1	600:1	1000:1	1000:1	1000:1
Mount	100 mm VESA	100 mm VESA	100 mm VESA	100 mm VESA	100 mm VESA
Weight	4.8 kg	6.8 kg	7.3 kg	7.3 kg	8.2 kg
Rated power	40 Watt	65 Watt	115 Watt	60 Watt	130 Watt
Operating conditions	0–40 °C	0–38 °C	0–40 °C	0–40 °C	0–40 °C
Storage	-20–60 °C	-20–60 °C	-20–60 °C	-20–60 °C	-20–60 °C
Rel. humidity	5–85%, non-condensing	5–85%, non-condensing	20–85%, non-condensing	20–85%, non-condensing	20–85%, non-condensing
Dimensions w x h x d	386 x 302 x 81 mm	465 x 400 x 98 mm	597 x 401 x 100 mm	73 x 418 x 88 mm	673 x 418 x 88 mm
Power supply	100–240 VAC	100–240 VAC	100–240 VAC	100–240 VAC	100–240 VAC

9515 NB 15" Monitor

Wall-mounted with VESA 100 adaption, color systems **PAL/NTSC**, max. screen resolution 1024 x 768, power supply 100 – 240 VAC, 50/60 Hz

including:

Power Supply

Mains Cord

Signal cables: S-Video (Y/C), DVI-D

9519 NB 19" HD Monitor

Wall-mounted with VESA 100 adaption, color systems **PAL/NTSC**, max. screen resolution 1280 x 1024, power supply 100 – 240 VAC, 50/60 Hz

including:

Power Supply

Mains Cord

Signal cables: DVI-D, BNC

9524 NB 24" HD WIDEVIEW Monitor

Wall-mounted with VESA 100 adaption, color systems **PAL/NTSC**, max. screen resolution 1920 x 1200, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz

including:

Power Supply

Mains Cord

Signal cables: DVI-D, BNC

LED Backlight Monitors

9526 NBL 26" HD Monitor with LED Backlight

Wall-mounted with VESA 100 adaption, color systems **PAL/NTSC**, max. screen resolution 1920 x 1080, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz

including:

Power Supply

Mains Cord

Signal cables: DVI-D, BNC

9726 NB 26" HD Monitor (Highbright with LED Backlight)

Wall-mounted with VESA 100 adaption, optical input, color systems **PAL/NTSC**, max. screen resolution 1920 x 1080, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz

including:

Power Supply

Mains Cord

Signal cables: DVI-D, BNC

Accessories for Video Documentation



For use with telescopes, size 10 mm:

495 NCS **Fiber Optic Light Cable,**
diameter 4.8 mm, length 250 cm

For use with telescopes, size 5 mm:

495 NA **Fiber Optic Light Cable,**
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

Silicone Tubing Set, autoclavable,
length 250 cm

SCB Connecting Cord, length 100 cm

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

20133028 **XENON Spare Lamp,** only,
300 watt, 15 volt

Cold Light Fountain XENON 100 SCB



20132601-1 **Cold Light Fountain XENON 100 SCB,**
with integrated KARL STORZ SCB,
with integrated insufflation pump,
for use with KARL STORZ Videoendoscopes,
one 100 watt Xenon lamp,
power supply: 100–240 VAC, 50/60Hz
including:

Cold Light Fountain XENON 100 SCB

Mains cord

Water bottle

Bottle holder

Rinsing connector for water bottle

System requirements for use with SCB-PC:
SCB-R-UI-software-release V 200900 01-28
and from V 200900 01-41, but not usable with
V 200900 01-40

THERMOFLATOR® with KARL STORZ SCB with High Flow Insufflation (30 l/min.)



26 4320 08-1 **THERMOFLATOR® SCB**

including:

THERMOFLATOR® with KARL STORZ SCB
power supply 100 – 240 VAC, 50/60 Hz

Mains Cord

OPTITHERM® Heating Element, sterilizable

Silicone Tubing Set, sterilizable

Universal Wrench

SCB Connecting Cable, length 100 cm

* **CO₂/N₂O Gas Filter**, sterile,
for single use, package of 10

Subject to the customer's application-specific requirements additional accessories must be ordered separately.

* 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

HAMOU ENDOMAT® with KARL STORZ SCB Suction and Irrigation System



263311 01-1 **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

Subject to the customer's application-specific requirements additional accessories must be ordered separately.

* 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

The New Design of Excellence – Hybrid **OR₁** Suite



- Endoscopy integration
- Image integration
- Patient vital signs monitoring
- Designed for vein harvesting team
- Images captured from trans-esophageal echocardiography
- Ultrasound image routing
- PACS image routing
- HD image capture
- High resolution Pip/Quad video
- In-light surgical camera connectivity for open procedure viewing
- Plasma screen technology for visiting guests
- Telestration for teaching
- Lighting control for room and surgical lights with SCB® system

Data Management and Documentation

KARL STORZ AIDA® compact NEO advanced/standard

The Compact Documentation Solution

The new KARL STORZ AIDA® compact NEO advanced/standard system combines all the required functions for integrated and precise documentation in a single system. All functions are centrally controlled via touch screen, footswitch, camera head buttons or voice control directly from the sterile area.

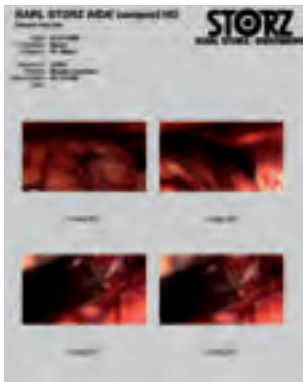


AIDA compact NEO advanced/standard: Review screen

Data Acquisition

AIDA compact NEO advanced/standard records still images, video sequences (in HD quality) and spoken comments of findings and intraoperative procedures directly from the sterile area. Recordings are activated via touch screen, footswitch or camera head buttons.

Live display of camera images on the touch screen enables immediate monitoring and selection of the recorded data.



AIDA compact NEO advanced/standard: Automatic creation of standard reports

Flexible Review

Before final archiving, the saved data can be viewed or listened to on the review screen. Data no longer required can be simply deleted.

Individual images, video and audio sequences can be renamed and given more meaningful names. A pre-defined selection list with keywords simplifies and speeds up data entry.

A voice entry of the case report can even be recorded while viewing video and image files.



AIDA compact NEO advanced/standard: Efficient archiving

Automated Data Archiving

Once a treatment is completed, AIDA compact NEO advanced/standard automatically stores the data on a DVD, creates a standard report and prints it as an overview if required.

Multipatient

Efficient data archiving is assured as the data of multiple patients can be saved on a DVD.

Data Management and Documentation

KARL STORZ AIDA® compact NEO advanced/standard

Special Features:

- Digital storage of still images with a resolution of 1920 x 1080 in both systems (advanced/standard) possible. Video sequences to 1080p with advanced and to 720p with standard variant possible (via HD-SDI)
- Audio files can be archived in both systems
- DICOM/HL7 interface package included
- Printing from review area (individual images with meta-data)
- DVD burning, Blu-ray reading capabilities
- AIDA Restore Configuration supports simple import and export of system settings
- Reference screen with new QuickView (favorites folder)
- Video settings (e.g., contrast, ...) separate for all channels
- Adaptation options for GUI
- Compressed DICOM
- Supports OR1™ Checklist V1.1
- Enhanced support of 15" monitors with OR1™ checklist installation
- Scalable watermark
- High-quality function and switching of image/video quality without additional settings
- Sterile, ergonomic operation via touch screen, camera head buttons and/or footswitch
- Data export to DVD, CD-ROM or USB flash drive, multi-session and multi-patient
- Network storage possible
- Automatic creation of standard reports
- Systems for use in the OR area certified according to EN 60601-1
- Compatible with KARL STORZ Communication Bus (SCB) and KARL STORZ OR1™ AV NEO
- KARL STORZ AIDA® compact advanced/standard as an attractive, digital alternative to video printers, video recorders and dictating machines



200409 13-EN KARL STORZ AIDA® compact NEO advanced

Documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz including:

KARL STORZ AIDA® control NEO, with integrated DVD/CD writer, Blu-ray reading possible

AIDA compact HD Frame Grabber Card

PS/2 Compact Keyboard, US English, with cover

KARL STORZ AIDA® compact NEO Software, with voice control and software protection

KARL STORZ USB Flash Drive

2x **Connecting Cables**, for controlling peripheral units

BNC/BNC Video Cable

BNC Connecting Cable

DVI-D Connecting Cable

Mains Cord

Connecting Cable, Mini-DIN plug to BNC socket

200409 12-EN KARL STORZ AIDA® compact NEO standard

Documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz

Specifications:

Video systems	- PAL, NTSC
Signal inputs	- S-Video (Y/C) - Composite - RGB (only standard) - SD-SDI (only standard) - HD-SDI (only standard) - DVI-D (only advanced)
Image formats	- JPG - BMP

Video formats	- MPEG2
Audio formats	- WAV
Storage media	- DVD+R - DVD+RW - DVD-R - DVD-RW - CD-R - CD-RW - USB flash drive

Notes:

**WITH COMPLIMENTS OF
KARL STORZ—ENDOSKOPE**