LAPAROSCOPIC PARTIAL NEPHRECTOMY
WITHOUT USING BOLSTERS
AND LAPAROSCOPIC ANATROPHIC
NEPHROLITHOTOMY

Nasser SIMFOROOSH
Mohammad H. RADFAR
LAPAROSCOPIC PARTIAL NEPHRECTOMY WITHOUT USING BOLSTERS AND LAPAROSCOPIC ANATROPHIC NEPHROLITHOTOMY

Nasser SIMFOROOSH, M.D.
Head, Department of Urology, Shahid Labbafinejad Hospital, Shahid Beheshty University of Medical Sciences, Tehran, Iran

Mohammad H. RADFAR, M.D.
Chief Resident, Department of Urology, Shahid Labbafinejad Hospital, Shahid Beheshty University of Medical Sciences, Tehran, Iran
Laparoscopic Partial Nephrectomy Without Using Bolsters and Laparoscopic Anatrophic Nephrolithotomy

Nasser Simforoosh1, M.D. and Mohammad H. Radfar2, M.D.

1Head, 2Chief Resident

Department of Urology, Shahid Labbafinejad Hospital, Shahid Beheshty University of Medical Sciences, Tehran – Iran

Correspondence address of the author:

Nasser Simforoosh, M.D
Head, Department of Urology, Shahid Labbafinejad Hospital
9th Boosan Alley, Pasdaran Avenue, Tehran – Iran
Phone and Fax: +98 21 22 58 80 16
E-mail: simforoosh@iurtc.org.ir

All rights reserved.
1st edition 2011

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

Design and Composing:

Endo-Press® GmbH, Germany

Printing and Binding:

Straub Druck + Medien AG
Max-Planck-Straße 17, 78713 Schramberg, Germany

ISBN 978-3-89756-339-1
## Content

Laparoscopic Partial Nephrectomy Without Using Bolsters
- Simplification of the Technique ........................................ 6
  Introduction ........................................................................... 6
  Indications and Contraindications ..................................... 6
  Surgical Technique .............................................................. 7
  Surgical Outcome ............................................................... 9
  Conclusion .......................................................................... 9

Laparoscopic Management of Staghorn Calculi by Anatrophic Nephrolithotomy ............................................. 10
  Introduction ........................................................................... 10
  Indications ............................................................................ 10
  Technique ........................................................................... 10
  Surgical Outcome ............................................................... 12
  Conclusion .......................................................................... 12

References ............................................................................. 13

Instrument Set for Laparoscopic Partial Nephrectomy and Laparoscopic Anatrophic Nephrolithotomy ................. 14
Laparoscopic Partial Nephrectomy Without Using Bolsters – Simplification of the Technique

Introduction

Renal cell carcinoma (RCC) accounts for 2–3% of all adult malignant neoplasms, and is the most lethal of all urologic malignancies. With increasing use of ultrasonography and computed tomography (CT) scan, the prevalence of incidental renal masses has increased. Nephron-sparing treatments including partial nephrectomy, and thermal ablative therapies are nowadays performed more widely in selected cases. While patients with a solitary kidney derive particular benefit from nephron-sparing approaches, these are electively applied in patients with bilaterally functional kidneys.

Partial nephrectomy is an established treatment option for tumors smaller than 4 cm, with a local recurrence rate of less than 3%. The goal of partial nephrectomy is to remove a renal tumor completely with a safe margin while preserving the normal parenchyma as much as possible. To deploy the advantages of minimally invasive surgery, laparoscopic partial nephrectomy (LPN) has gained widespread acceptance as valid and reliable treatment option. Several reports on LPN have been published and demonstrated a 5-year oncologic and functional outcome equivalent to its open counterpart.

However, LPN still remains a technically challenging procedure. Difficulties of LPN mainly arise from the requirement that of completing precise pelvicalyceal and parenchymal suturing and hemostasis in a limited warm ischemia time (WIT) of less than 30 minutes. To facilitate the technique and consequently shorten WIT, various strategies have been proposed. Nguyen and Gill described an early unclamping technique applied in 50 patients and yielded a significant reduction of WIT. In our technique, we have used four modifications:

- To omit the time-consuming procedure of knot tying, we apply Hem-o-Lok clips instead of knot tying.
- We do not use ureteral catheter or Double-J stent.
- We reconstruct the kidney with one row of continuous intraparenchymal sutures, without repairing the collecting system separately.

Each of these modifications were previously reported to be applied to selected patients. In this manuscript, we introduce our technique using a combination of all of modifications in all patients, regardless of tumor size and location.

Indications and Contraindications

Indications for LPN are the same as those applied for open partial nephrectomy, and include circumstances in which radical nephrectomy would make the patient anephric or involve a high risk of renal failure. Partial nephrectomy is also an acceptable therapeutic option for single small (< 4 cm) tumors in the presence of a normal kidney.

Generally, absolute contraindications for laparoscopic surgery include bowel obstruction, uncorrectable coagulopathy, abdominal wall infection, massive hemoperitoneum or hemoretroperitoneum, generalized peritonitis or retroperitoneal abscess, and suspected malignant ascites.
Surgical Technique

Positioning and Port Placement

The patient is placed in the lateral decubitus position with minimal flexion of the operating table and supported by adequate padding. We use a four-port transperitoneal approach. The first 12-mm camera port is placed at the level of umbilicus, lateral to the rectus muscle. After establishing the pneumoperitoneum, the other ports are placed. Two 5-mm ports are placed at the anterior axillary line, one at the level of umbilicus and the other about 10 cm inferior. A 10-mm port is placed at midline 10 cm inferior to the camera port. For the right side, a 5-mm subxiphoid port is used to retract the liver.

**Step 1** Kidney Mobilization, Intraoperative Assessment and Delineation of Tumor Margins

After incising the white line of Toldt, superior retraction of the spleen/liver and medial mobilization of the colon (and duodenum on the right side), the renal pedicle is exposed. Gerota’s fascia is incised, and the surface of the renal cortex that borders the lesion is stripped off the fatty tissue to permit visualization of the tumor’s lateral margins. Gerota’s fascia is mobilized beyond the margin of the resection to facilitate later kidney reconstruction (Figs. 1–3). If necessary, the authors use intraoperative ultrasonography to delineate tumor margins more precisely.

1. Mobilization of the kidney.
2. The tumor border is stripped off the overlying fatty tissue.
3. Exposure of the renal vascular pedicle.
Step 2  Hilar Clamping of the Renal Artery
Complete dissection of both the renal artery and vein is performed. Subsequently, the renal artery is clamped using one or two bulldog clamps (Fig. 4). Twenty minutes before starting kidney ischemia 12.5 g of mannitol is infused.

Step 3  Tumor Removal
An incision line with a safety margin of no less than 5 mm from the tumor, is marked with monopolar current (Fig. 5). Tumor excision is performed using cold endoscissors. The aim is to maintain a perpendicular orientation with respect to the tumor surface while cutting through the whole layer of the parenchyma to achieve tumor-free surface margins (Fig. 6).
Step 4: Kidney Reconstruction

The tumor bed is closed with one row of polyglactin 2/0 (needle, 31 mm) running sutures without using any bolster or hemostatic agent. According to our protocol, in all patients, even those with a wide longitudinal tumor bed, including cases who require that the collecting system is entered, the defect is closed using the modality of repair described above. Instead of tying knots, sutures are buttressed by applying Hem-o-lok® clips. Hem-o-lok® clips are placed after each throw of running suture (Figs. 7, 8).

Final Step: Once the previous step has been completed successfully, the bulldog clamp/s is released. The site of tumor resection is examined carefully to ensure hemostasis, and another 12.5 g of mannitol is infused.

Using a surgical glove, the specimen is extracted from the abdominal cavity through a 2- to 3-cm muscle-splitting extension of the lower abdominal port-site incision. An external drain is placed. Neither a ureteral catheter nor a Double-J stent is used.

Surgical Outcome

From June 2005 to May 2008, 33 patients underwent LPN using our technique. The mean age of patients was 47 (range 32–87) years. The mean tumor size was 4.06 (range 1.80–6.00) cm. Fifteen tumors were larger than 4 cm in the largest diameter. The mean WIT was 25.8 (range 14–39) min. None of the patients had significant hemorrhage. Only one patient developed urine leakage lasting 5 days and resolved spontaneously. Surgical margins were free from tumor in all patients except for one. However, this patient was successfully managed with radical nephrectomy, and no residual tumor was found upon pathologic evaluation.

Conclusion

We duplicated the traditional technique for open partial nephrectomy in which renal parenchymal reconstruction is performed without using any bolster and tissue sealants. Our experience suggests that obviating the placement of bolsters and using a one-layer knotless continuous suture closure of the tumor bed facilitates the performance of LPN, and may contribute to a more widespread acceptance of the technique among average urolaparoscopists.
Laparoscopic Management of Staghorn Calculi 
by Anatrophic Nephrolithotomy

Introduction
Stone disease is one of the most common problems of the modern world. The lifetime prevalence range of kidney stones is 1–15%. Complete staghorn renal stones are a challenging issue in urology. They can cause severe morbidity, particularly when associated with infection, e.g., renal failure, pyelonephritis, and even death. Moreover, minimally invasive methods such as percutaneous nephrolithotomy (PCNL) and/or shockwave lithotripsy (SWL) are supposed to have limited efficacy in the management of staghorn calculi. Due to the significantly higher recurrence rate of staghorn stones, complete stone clearance is the ultimate goal of treatment. In order to minimize the need for secondary interventions, many investigators thus consider open stone surgery (OSS) as the first-line strategy for management of large staghorn stones. Avoiding disadvantages and keeping benefits of OSS, laparoscopy can be used effectively also in patients who were initially identified as candidates for the open surgery approach.

Wickham was the first to describe the use of laparoscopy for urolithiasis. Later, Eshghi et al. reported laparoscopic stone removal in a pelvic kidney. Several reports on laparoscopic treatment of stones associated with anomalous renal anatomy have been published. Valdivia-Uria et al. described laparoscopic management of complex stones in horseshoe kidneys. Kaouk et al. reported the first experience with laparoscopic anatrophic nephrolithotomy (LAN) in a porcine model which showed the feasibility of LAN in the therapeutic management of staghorn stones. Deger et al. reported the use of LAN for treating a staghorn stone in an adult patient.

In this manuscript, we describe the technique of LAN according to our protocol. This is the largest series ever reported in the literature about LAN. (SIMFOROOSH N, AMINSHARIFI A, TABIBI A, NOOR-ALIZADEH A, ZAND S, RADFAR MH, JAVAHER-FOROOSSHZADEH A. Laparoscopic anatrophic nephrolithotomy for managing large staghorn calculi. BJU Int. 2008 May;101(10):1293–6. Epub 2008 Feb 18.)

In line with the technique applied in laparoscopic partial nephrectomy, one-layer knotless continuous suture closure of the renal parenchyma and pelvicaliceal system was used for renal reconstruction.

Indications
In our experience, LAN is an equally valid alternative treatment option for the surgical management of staghorns with an established indication of OSS. At present, no reference threshold has been defined to determine whether a staghorn stone is amenable to OSS or to minimally invasive techniques.

Technique
Port placement and patient positioning are the same as those used for LPN.

Step 1 Kidney Mobilization
Kidney mobilization is performed in the same way as in LPN. Gerota’s fascia is incised and the kidney is fully mobilized within this fascia.

Step 2 Hilar Clamping of the Renal Artery
This step is performed similarly to LPN.
Step 3  Stone Removal

Renal parenchyma and the collecting system are sharply incised through an incision along Brodel’s avascular line (Fig. 9). The stone is mobilized intrarenally (Fig. 10), rotated and removed as completely as possible (Figs. 11, 12). The collecting system is irrigated with normal saline. Intraoperative ultrasonography is used to seek for any significant residual stone.

Step 4  Renal Reconstruction

Both the collecting system and renal cortex are closed with one row of polyglactin 2/0 (needle, 31 mm) running sutures. We do not repair the collecting system separately. This step is performed similarly to LPN.

Final Step  After closing the nephrotomy, the bulldog clamp/s is released. The nephrotomy site is examined carefully to ensure hemostasis, and another 12.5 g of mannitol is infused. Using a surgical glove as an endo-bag, the stone is extracted from the abdominal cavity. An external drain is placed.
**Surgical Outcome**

We performed LAN in 5 patients with mean age of 53 (range 45–58) years. The mean stone size was 53 (45–65) mm. The mean operative time and warm ischemia time were 170 (range 120–225) min, and 32 (range 29–35) min, respectively. The mean estimated blood loss was less than 100 mL. The mean hospital stay was 5.4 (range 4–8) days. External drain was removed in all patients before discharge from hospital.

Postoperative ultrasonography and plain films revealed residual stone in three patients; all of them became stone free after one session of SWL. **Figs. 13 and 14** show the preoperative plain film and postoperative intravenous urography (IVU) of the same patient, respectively.

**Conclusion**

Although in rare instances, OSS is still indicated in some patients with large, complicated staghorn renal stones. Open surgery is associated with morbidities such as flank incision, long recovery period, and cost-effectiveness concerns. Incorporating laparoscopy into the treatment of staghorn stones may combine advantages of the open approach.

Preoperative plain film shows a large staghorn in left kidney.

Postoperative IVU of the same patient.
References

**Bolsterless Laparoscopic Partial Nephrectomy; Simplification of the Technique**


**Laparoscopic Management of Staghorn Calculi by Anatrophic Nephrolithotomy**


HOPKINS® Forward-Oblique Telescopes
diameter 10 mm, length 31 cm

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

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

ENDOCAMELEON® HOPKINS® Telescope

diameter 10 mm, length 32 cm,
autoclavable,
variable direction of view from 0° – 120°,
adjustment knob for selecting the desired direction of view,
fiber optic light transmission incorporated,
color code: gold

It is recommended to check the suitability of the product for the intended procedure prior to use.
TERNAMIAN EndoTIP Cannula
size 11 mm

30103 TMR TERNAMIAN EndoTIP Cannula, with thread and rotatable insufflation stopcock, size 11 mm, working length 10.5 cm, color code: green
including:
Cannula
Multifunctional Valve
Telescope Stopper, sterile, package of 12

Trocars and Accessories
Size 6 mm and 11 mm

30123 TBS Trocar, with blunt tip, with insufflation stopcock, size 11 mm, working length 10.5 cm, color code: green, including:
Cannula, with thread
Trocar only
Silicone Leaflet Valve

30120 TUX Trocar, with blunt tip, with insufflation stopcock, size 6 mm, working length 10.5 cm, color code: black, including:
Cannula, with thread
Trocar only
Silicone Leaflet Valve

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

30141 DB Reducer 11/5 mm
CLICKLINE Dissecting and Grasping Forceps
Size 5 mm, length 36 cm

33351 A

CLICKLINE BABCOK Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with irrigation connection for cleaning, double action jaws, atraumatic, fenestrated, size 5 mm, length 36 cm, including:
Plastic Handle, without ratchet
Metal Outer Sheath, insulated
Forceps Insert

33351 MD

CLICKLINE KELLY Dissecting and Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with Luer-Lock irrigation connector for cleaning, double action jaws, size 5 mm, length 36 cm, including:
Plastic Handle, without ratchet
Metal Outer Sheath, insulated
Forceps Insert

33351 ME

CLICKLINE MANHES Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with Luer-Lock irrigation connection for cleaning, with multiple teeth, single action jaws, width of jaws 4.8 mm, for atraumatic and accurate grasping, size 5 mm, length 36 cm, including:
Plastic Handle, without ratchet
Outer Sheath, insulated
Forceps Insert
CLICKLINE Dissecting and Grasping Forceps
Size 5 mm, length 36 cm

CLICKLINE KELLY Dissecting and Grasping Forceps, rotating, dismantling, insulated, with connector pin for unipolar coagulation, with Luer-Lock connector for cleaning, double action jaws, long, size 5 mm, length 36 cm, including:
Plastic Handle, without ratchet
Outer Sheath, insulated
Forceps Insert

Size 10 mm, length 36 cm

CLICKLINE Forceps, rotating, dismantling, without connector pin for unipolar coagulation, with irrigation connection for cleaning, double action jaws, to retrieve lost gallstones, size 10 mm, length 36 cm, including:
Metal Handle, without ratchet
Outer Sheath, insulated
Forceps Insert
CLICKLINE Scissors
Size 5 mm, length 36 cm

34351 MA

CLICKLINE Scissors,
rotating, dismantling,
with connector pin for unipolar coagulation,
with LUER-Lock irrigation connector for cleaning,
double action jaws, curved, length of jaws 15 mm,
size 5 mm, length 36 cm, for use with trocars size 6 mm,
including:
Plastic Handle, without ratchet
Metal Outer Sheath, insulated
Scissors Insert

34351 MS

CLICKLINE METZENBAUM Scissors,
rotating, dismantling,
with connector pin for unipolar coagulation,
with LUER-Lock irrigation connector for cleaning,
double action jaws, curved, length of jaws 20 mm,
size 5 mm, length 36 cm, for use with trocars size 6 mm,
including:
Plastic Handle, insulated, without ratchet
Metal Outer Sheath, insulated
Scissors Insert

34351 MW

CLICKLINE Scissors,
rotating, dismantling, insulated,
with connector pin for unipolar coagulation,
with LUER-Lock irrigation connector for cleaning,
double action jaws, serrated, curved, conical,
size 5 mm, length 36 cm,
including:
Plastic Handle, without ratchet
Metal Outer Sheath
Scissors Insert
Insulated Handles
for Dissecting and Grasping Forceps CLICKLINE, rotating
with connector pin for unipolar coagulation

Plastic Handles, with and without ratchets
Made of high-quality plastics meeting even the highest safety requirements

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33121</td>
<td>Plastic Handle, without ratchet</td>
</tr>
<tr>
<td>33152</td>
<td>Plastic Handle, with MANHES style ratchet</td>
</tr>
<tr>
<td>33153</td>
<td>Plastic Handle, with hemostat style ratchet</td>
</tr>
<tr>
<td>33156</td>
<td>Plastic Handle, insulated, with disengageable ratchet</td>
</tr>
<tr>
<td>33151</td>
<td>Plastic Handle, without ratchet</td>
</tr>
</tbody>
</table>
Metal Handle
for Dissecting and Grasping Forceps,
CLICKLINE – rotating, with connector pin for unipolar coagulation

Metal Handles, insulated, without ratchets

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33125</td>
<td>Metal Handle, insulated, without ratchet</td>
</tr>
<tr>
<td>33125 P</td>
<td>Metal Handle, insulated, without ratchet, with 4 locking positions</td>
</tr>
<tr>
<td>33149</td>
<td>CLICKLINE Plastic Handle, axial, without ratchet</td>
</tr>
<tr>
<td>33149 P</td>
<td>CLICKLINE Plastic Handle, axial, without ratchet</td>
</tr>
</tbody>
</table>
Metal Handles
for Dissecting and Grasping Forceps,
CLICKLINE – rotating, without connector pin for unipolar coagulation

Metal Handles, with and without ratchets

33161  Metal Handle, without ratchet
33162  MANHES Metal Handle, with ratchet
33163  Metal Handle, with hemostat style ratchet

33139  Metal Handle, with ratchet
33166  Metal Handle, with disengageable ratchet

30131  Metal Handle, without ratchet, small
30132  Metal Handle, with disengageable ratchet, small

Please note:
The CLICKLINE metal handles shown on this page, except for 30131, 30132 and 33143, are also available with force limiters. Should you wish to order this special design, please add the letter "K" to the part number, i.e. 33131 K
Metal Handles
for Dissecting and Grasping Forceps,
CLICKLINE – rotating, without connector pin for unipolar coagulation

33138  **Metal Handle**, straight, without ratchet

33144  **MOURET Metal Handle**, straight, with **hemostat style** ratchet

33145  **MOURET Metal Handle**, straight, with long shanks, with **hemostat style** ratchet
Outer Sheaths
Size 5 mm

Metal Outer Sheaths, insulated

<table>
<thead>
<tr>
<th>33300</th>
<th>with LIVER-Lock connector, for cleaning</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>33200</td>
<td></td>
<td>30 cm</td>
</tr>
<tr>
<td>33300</td>
<td></td>
<td>36 cm</td>
</tr>
<tr>
<td>33400</td>
<td></td>
<td>43 cm</td>
</tr>
</tbody>
</table>

Metal Outer Sheaths

<table>
<thead>
<tr>
<th>33300 M</th>
<th>with LIVER-Lock connector, for cleaning</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>33200 M</td>
<td></td>
<td>30 cm</td>
</tr>
<tr>
<td>33300 M</td>
<td></td>
<td>36 cm</td>
</tr>
<tr>
<td>33400 M</td>
<td></td>
<td>43 cm</td>
</tr>
</tbody>
</table>

Size 10 mm

Outer Sheath, insulated, with LIVER-Lock connection for cleaning

| 33500, length 36 cm |

Metal Outer Sheath, with LIVER-Lock connection for cleaning

| 33500 M, length 36 cm |

Please note: The metal outer sheaths may only be used in conjunction with handles without a connector pin for unipolar coagulation.
RoBi® Grasping Forceps
Size 5 mm, length 36 cm

RoBi® Dissecting and Grasping Forceps, rotational, with connector pin for bipolar coagulation, CLERMONT-FERRAND Model, small jaws, for fine dissecting and grasping, single-action jaws, size 5 mm, length 36 cm, including:
- Ring Handle
- Outer Sheath
- Forceps Insert

RoBi® Dissecting and Grasping Forceps, rotational, with connector pin for bipolar coagulation, CLERMONT-FERRAND Model, flat and fenestrated jaws, for dissection and grasping, single-action jaws, size 5 mm, length 36 cm, including:
- Ring Handle
- Outer Sheath
- Forceps Insert
RoBi® Scissors
Size 5 mm, length 36 cm

RoBi® METZENBAUM Scissors, rotational, with connector pin for bipolar coagulation, CLERMONT-FERRAND Model, curved jaws, double-action jaws, thinner scissor blades, size 5 mm, length 36 cm, including:
- Ring Handle
- Outer Sheath
- Forceps Insert

Coagulating and Dissecting Electrode

Coagulation and Dissection Electrode, L-shaped, with connector pin for unipolar coagulation, size 5 mm, length 36 cm

Fan Retractor

Fan Retractor, dismantling, distendable, size 5 mm, length 36 cm
KOH Macro Needle Holder

dismantable

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>Handle Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 AR</td>
<td>Handle, axial, with disengageable ratchet, ratchet release on the right side</td>
</tr>
<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>
<tr>
<td>30173 PR</td>
<td>Handle, pistol grip, with disengageable ratchet, ratchet release on the right side</td>
</tr>
<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

<table>
<thead>
<tr>
<th>Handle Code</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 A</td>
<td>Metal Outer Sheath with Luer-Lock connector for cleaning</td>
<td>33 cm</td>
</tr>
<tr>
<td>30178 A</td>
<td>Metal Outer Sheath with Luer-Lock connector for cleaning</td>
<td>43 cm</td>
</tr>
</tbody>
</table>
KOH Macro Needle Holder

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 30173 RAL 30173 RAO</td>
</tr>
<tr>
<td>30178 R</td>
<td>30178 RAR 30178 RAL 30178 RAO</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 30173 LAL 30173 LAO</td>
</tr>
<tr>
<td>30178 L</td>
<td>30178 LAR 30178 LAL 30178 LAO</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 30173 FAL 30173 FAO</td>
</tr>
<tr>
<td>30178 F</td>
<td>30178 FAR 30178 FAL 30178 FAO</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

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 G</td>
<td>30173 GAR 30173 GAL 30173 GAO</td>
</tr>
</tbody>
</table>

KOH Macro Needle Holder, dismantling, straight jaws
**KOH Macro Needle Holder**

dismantable

### Size 5 mm

<table>
<thead>
<tr>
<th>Working Length</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 cm</td>
<td>30173 PR</td>
</tr>
<tr>
<td>43 cm</td>
<td><img src="image1" 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</td>
</tr>
<tr>
<td>30178 R</td>
<td>30178 RPR</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 LPR</td>
</tr>
<tr>
<td>30178 L</td>
<td>30178 LPR</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 FPR</td>
</tr>
<tr>
<td>30178 F</td>
<td>30178 FPR</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

<table>
<thead>
<tr>
<th>Insert No.</th>
<th>Complete Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>30173 G</td>
<td>30173 GPR</td>
</tr>
</tbody>
</table>

**KOH Macro Needle Holder**, dismantling, straight jaws
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
- Sustainable investment
- Compatible with all light sources

**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
- 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**
**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.
### 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

*Available in the following languages:* DE, ES, FR, IT, PT, RU

#### Specifications:

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

### For use with IMAGE1 S

**IMAGE1 S CONNECT Module TC 200EN**

TC 300

**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

#### Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>TC 300 (H3-Link)</th>
</tr>
</thead>
</table>
| Camera System                        | TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S)  
| Supported camera heads/video endoscopes | 22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3,  
| LINK video outputs                   | 1x |
| Power supply                         | 100–120 VAC/200–240 VAC |
| Power frequency                      | 50/60 Hz |
| Protection class                     | I, CF-Defib |
| Dimensions w x h x d                 | 305 x 54 x 320 mm |
| Weight                               | 1.86 kg |

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
### IMAGE1 S Camera Heads

**NEW**

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 $f = 15–31$ mm (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

#### Specifications:

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 100</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x $1/3^\circ$ 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, $f = 15–31$ 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 $f = 15–31$ mm (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

#### Specifications:

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-ZA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 104</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x $1/3^\circ$ 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, $f = 15–31$ 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></th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall-mounted with VESA 100 adaption</td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
</tbody>
</table>

Inputs:
- DVI-D
- Fibre Optic
- 3G-SDI
- RGBS (VGA)
- S-Video
- Composite/FBAS

Outputs:
- DVI-D
- S-Video
- Composite/FBAS
- RGBS (VGA)
- 3G-SDI

Signal Format Display:
- 4:3
- 5:4
- 16:9
- Picture-in-Picture
- PAL/NTSC compatible

Optional accessories:
- 9826 SF Pedestal, for monitor 9826 NB
- 9626 SF Pedestal, for monitor 9619 NB

Specifications:

<table>
<thead>
<tr>
<th>KARL STORZ HD and FULL HD Monitors</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop with pedestal</td>
<td>optional</td>
<td>optional</td>
</tr>
<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>
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.

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.

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.

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.

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.

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.
Fiber Optic Light Cable

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

Cold Light Fountain XENON NOVA® 300

201340 01 Cold Light Fountain XENON NOVA® 300,
power supply: 100–125 VCA/220–240 VAC, 50/60 Hz
including:
Mains Cord

201320 28 XENON Spare Lamp, only,
300 Watt, 15 Volt

Cold Light Fountain Power LED 175 SCB

201614 01-1 Cold Light Fountain Power LED 175 SCB,
with integrated SCB, high-performance LED
and one KARL STORZ light outlet,
power supply 110–240 VAC, 50/60 Hz
including:
Mains Cord
SCB Connecting Cable, length 100 cm

201320 26 Xenon-Spare-Lamp, 175 watt, 15 volt
**ENDOFLATOR® 50 SCB**

UI500S1

ENDOFLATOR® 50 SCB, integrated SCB module, power supply 100–40 VAC, 50/60 Hz

including:

- **ENDOFLATOR® 50 SCB**
- SCB Connecting Cable, length 100 cm
- Universal Wrench
- Heated Insufflation Tubing Set, with gas filter, sterile, for single use, package of 3∗
- HiCap® Trocar, size 11 mm

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

---

**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

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

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

DUOMAT®
Suction and Irrigation Pump

20321008 DUOMAT®,
Suction and Irrigation Pump,
including:
DUOMAT®,
power supply 100 – 120, 230 – 240 VAC, 50/60 Hz
Mains Cord
* VACUsafe Promotion Pack Suction, 2 l
(not illustrated)

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
Equipment Cart

 Equipments Cart

- wide, high, rides on 4 antistatic dual wheels
- equipped with locking brakes
- 3 shelves
- mains switch on top cover
- central beam with integrated electrical subdistributors
- with 12 sockets, holder for power supplies
- potential earth connectors and cable winding
- Dimensions:
  - Equipment cart: 830 x 1474 x 730 mm (w x h x d)
  - shelf: 630 x 510 mm (w x d)
  - caster diameter: 150 mm

including:

- Base module equipment cart, wide
- Cover equipment, equipment cart wide
- Beam package equipment, equipment cart high
- 3x Shelf, wide
- Drawer unit with lock, wide
- 2x Equipment rail, long
- Camera holder

Monitor Swivel Arm,

- height and side adjustable
- can be turned to the left or the right side
- swivel range 180°
- overhang 780 mm
- overhang from centre 1170 mm
- load capacity max. 15 kg
- with monitor fixation VESA 5/100
- for usage with equipment carts UG xxx
Recommended Accessories for Equipment Cart

**Isolation Transformer,**
200 V–240 V; 2000 VA with 3 special mains socket, expulsion fuses, 3 grounding plugs, dimensions: 330 x 90 x 495 mm (w x h x d), for usage with equipment carts UG xxx

**Earth Leakage Monitor,**
200 V–240 V, for mounting at equipment cart, control panel dimensions: 44 x 80 x 29 mm (w x h x d), for usage with isolation transformer UG 310

**Monitor Holding Arm,**
height adjustable, inclinable, mountable on left or right, turning radius approx. 320°, overhang 530 mm, load capacity max. 15 kg, monitor fixation VESA 75/100, for usage with equipment carts UG xxx