Urology
Use and practical tips
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Important information

While Erbe Elektromedizin GmbH has taken the greatest possible care in preparing this brochure and compiling the proven user settings, we cannot completely rule out errors. The information and data contained in the recommended settings cannot be used to justify any claims against Erbe Elektromedizin GmbH. In the event of compelling legal justification for a claim, liability shall be limited to intent and gross negligence.

Although the information on proven user settings, application sites, duration of application and the use of instruments is based on clinical experience, individual centers and physicians also favor settings other than those recommended here. This information is intended only as a guideline and must be evaluated by the surgeon for applicability. Depending on individual circumstances, it may be necessary to deviate from the information provided in this brochure.

Medicine is constantly subject to new developments based on research and clinical experience.

This is another reason why departing from the information provided here may be appropriate.
Electrosurgery plays an important role in urology, making a crucial contribution to the therapeutic success of the different procedures.

The range of electrosurgical applications extends from open, laparoscopic surgery through to endoscopic procedures. It comprises all areas of the upper and lower urinary tract. The upper urinary tract includes the kidneys, adrenal glands and the ureters. The lower urinary tract is comprised of the prostate, bladder and urethra.

There are a variety of instruments available to the urologist for this range of applications. Instruments are provided with electrosurgical modes by the OR modules of the urology workstation. The tissue effects of these modes are cutting and coagulation, vessel sealing and devitalization. Hydrosurgery is used to dissect and expose tissue, and tissue layers can be elevated. The Hydrosurgery unit supports urological applications. Vessels can be selectively and gently exposed, and tissue layers separated and elevated.

Using this brochure, we would like to provide you with helpful information and recommendations which will permit you to make the most of electrosurgery and hydrosurgery in urology.
The fully equipped version of the urology workstation consists of the electrosurgical unit (VIO 300 D), units for argon plasma coagulation (APC 2) and hydrosurgery (ERBEJET 2), as well as an ESM 2 unit for the suction of secretions. It is optimized for use in urology in terms of its software, hardware and modules, as well as a large choice of instruments. The functions of the individual modules are described in the chapters on cutting and coagulation modes (from page 12) and on applications (from page 20).

A urologist can use the electrosurgical units and instruments to perform open, laparoscopic and endoscopic surgery. Electrosurgery allows cutting without the application of force, effective coagulation and vessel sealing as well as devitalization of the target tissue throughout the urinary tract. Argon plasma coagulation, a special form of electrosurgery, staunches bleeding evenly and devitalizes tissue lesions without the instrument coming into direct contact with the tissue. Hydrosurgery is used to dissect tissue while at the same time protecting vessels and nerves. Layers can also be separated and detached from one another.

For more information, please refer to the product brochures of the respective devices.
CUTTING 01
At voltages of 200 V or more, sparks are created between the active electrode and the tissue. In the cutting modes, electrical energy gives rise to temperatures of 100°C or higher. Intracellular and extracellular fluids vaporize so quickly that the cell membranes and cell layers rupture and; the result is cutting of the tissue.

COAGULATION 02
Coagulation current is used to staunch bleeding. Converting electrical energy into heat results in temperatures of 60 °C to 100 °C during coagulation. As the cytoplasm vaporizes, the tissue dries out and shrinks. Coagulation can also be used to mark a tumor with a radial safety margin.

DEVITALIZATION 03
APC or conventional electrosurgery is used to devitalize the tissue surface. At temperatures of 50–60°C or above and with a corresponding activation time, the damage to the tissue is irreversible.

VESSEL SEALING 04
Sealing reliably closes vessels and tissue bundles. The target tissue can then be dissected mechanically. Vessel sealing is increasingly replacing the use of clips and sutures.
Using the waterjet, tissue structures are selectively and gently dissected and exposed. Blood vessels and nerves remain intact until a certain pressure is reached. Vessels are then treated in accordance with their size.

Waterjet elevation can be used to create fluid cushions in the tissue. Anatomical layers can also be separated from one another.

Electrosurgical procedures

**MONOPOLAR TECHNIQUE**

In monopolar electrosurgery, high-frequency current (I_{HF}) flows in a closed loop from the unit to the instrument, then through the patient’s body to the return electrode, and from there back to the unit again. The surgical effect is produced at the tip of the active electrode (AE), which, due to its relatively small contact surface, is where the highest current density is reached. The second electrode, the return electrode, has a large surface area and is placed against the patient’s skin at an appropriate location to allow the current to discharge.

At the points of application, the high current density and resulting thermal effect generate an incision or coagulation. By contrast, the increase in temperature on the large surface of the return electrode is not significant due to the low current density.

**Safety in monopolar electrosurgery**

Both components – the NESSY return electrode safety system of the VIO 300 D and the Erbe NESSY Ω return electrode – reduce the safety risks involved in monopolar electrosurgery in urology. NESSY verifies whether the two-piece return electrode has been positioned correctly and whether its entire surface is in contact with the patient, and also continually compares the currents flowing through the two surfaces of the return electrode.

If there are only slight differences, activation is possible. If there are major differences, activation is interrupted a warning signal is sounded. Reactivation is not possible until the return electrode has been correctly positioned. This prevents thermal necrosis.

**Simple and safe application with NESSY Ω**

The NESSY Ω return electrode is equipped with a non-contact ring surface that surrounds the actual electrode surface. The equipotential ring distributes the current evenly across the inner contact surfaces and prevents the return electrode from heating up on one side (leading-edge effect). This means it can be positioned in any direction. Compared with conventional return electrodes, NESSY Ω (Fig. 02↑ and ↓) simplifies positioning and therefore enhances safety. As it is smaller than conventional electrodes, NESSY Ω is easier to position against the patient’s body, making it universally suitable for children and adults alike.

We recommend using NESSY Ω – for maximum safety in monopolar electrosurgery.

Further information on monopolar electrosurgery is provided in the “Information on safe use” chapter.
BIPOLAR TECHNIQUE

The advantage of the bipolar technique is that the flow of current to the target area between each pole is limited. Unlike monopolar electrosurgery, this protects sensitive structures such as nerves that are located within the flow of current between the operating field and the return electrode against inadvertent thermal damage. Bipolar electrosurgical instruments have two integrated active electrodes. Current flows only in the area of tissue between the two poles and not through the patient’s body. The bipolar technique does not require the use of a return electrode.

ARGON PLASMA COAGULATION (APC)

In APC, ionized argon gas conducts the current to the target tissue without contact between the instrument and the tissue. The procedure has few complications, safely staunches bleeding, and facilitates homogeneous surface coagulation with an adjustable penetration depth. Because it is a non-contact procedure, the advantage of APC is that the distal end of the instrument cannot adhere to the coagulated tissue and tear open the scab that has just formed. The tissue effect depends on the type of probe, the power setting, the APC mode and the duration of application. Further information on APC is provided in the “Information on safe use” chapter.
Waterjet procedures

**WATERJET DISSECTION** 05

The waterjet dissects tissue using finely adjustable pressure according to the varying firmness and elastic properties of the tissue. The parenchyma is fragmented; blood vessels and nerves are retained in this procedure and can be treated in a targeted fashion. In addition to separating the vessels, the expansion effect of the waterjet is used to detach the tissue layers.

For urology procedures users have a choice of instruments for open, laparoscopic and endoscopic surgery.

The effect levels can be set between 1 to 80. The waterjet meets the tissue; the separation medium is aspirated together with the tissue particles through the external lumen of the applicator.

**WATERJET DISSECTION WITH ELECTROSURGERY** 06

Using the monopolar electrosurgical applicator, both surgical techniques can be used at the same time. In partial kidney resection, the waterjet dissects the parenchyma. Blood vessels are retained and are treated simultaneously with coagulation current or alternately. Larger vessels are ligated using clips or sutures.

The diagram shows the monopolar current flowing in a closed loop from the unit to the applicator, then through the patient’s body to the return electrode, and from there back to the unit. The separation medium also flows from the ERBEJET 2 pump unit through the waterjet nozzle of the applicator and meets the target tissue. The tissue is fragmented and aspirated through the external lumen of the applicator together with the separation medium.
Waterjet Elevation with Electrosurgery

With HybridKnife, the waterjet function is used for elevation: prior to resection of bladder tumors, a fluid cushion is generated in the submucosa so that the mucosa where the lesion is located is elevated. Subsequent electrosurgical cutting using HybridKnife can thus be performed at a defined resection level. Elevation reduces the risk of perforation.
AUTO CUT®

This is the standard mode for cutting with reproducible cutting quality as well as minimum necrosis, for example in subcutaneous tissue. This mode permits clean, precise cutting with hemostasis to protect tissue, as well as effective histological evaluation of the resected tissue. AUTO CUT can be used in almost any urological procedure, such as monopolar TUR-B, for example.

HIGH CUT

This mode is suitable for cutting in adipose structures or under water. Due to the high level of hemostasis at the margins of the incision, HIGH CUT is particularly suited to cutting vascular tissue. This mode is distinguished by a sharp incision. The arc intensity is controlled during cutting, so that hemostasis is ensured during all phases of the cut, for example in TUR-P procedures.

DRY CUT®

This cutting mode offers a significant level of hemostasis with voltage control and modulated forms of current, for example for cutting highly vascular tissue.
In urology, DRY CUT is suitable for TUR-P. This mode is generally suited to surgical procedures requiring a significant level of hemostasis, for example when accessing and exposing organs.

SOFT COAG®

SOFT COAG is a gentle, conventional mode of coagulation for deep tissue penetration. It minimizes adhesion between the electrode and the coagulated tissue.
This mode is mainly used in urology for hemostasis of parenchymal bleeding in partial kidney resection.
FORCED COAG® 05
This mode provides fast and effective standard coagulation with medium thermal penetration. Due to the slight carbonization, the instrument may adhere to the tissue. In urology, FORCED COAG is used as the standard mode in almost all cases where hemostasis is required.

SWIFT COAG® 06
This mode offers effective and fast coagulation with a significant level of hemostasis that is also suitable for targeted, precise exposure, e.g. in cystectomies.

FORCED APC® 07
This mode of plasmasurgery delivers high energy to the target tissue. FORCED APC provides deep coagulation and effective, even devitalization. In the case of partial kidney resection or in other vascular tissue, parenchymal bleeding is staunched using FORCED APC and the resection bed devitalized.

PRECISE APC® 08
Unlike FORCED APC, PRECISE APC works at lower energy ranges. This allows uniform coagulation effects to be precisely adjusted in the target tissue, regardless of the distance between the probe and the tissue. With PRECISE APC, precancerous conditions or other changes in tissue in the external genital area are devitalized.
Cutting and coagulation modes

Bipolar

BiClamp®

BiClamp mode supports the BiClamp and BiCision instruments with a form of current that seals vessels of up to 7 mm diameter.* Generally, neither clips nor sutures are required. BiClamp mode is suitable for vessel sealing in laparoscopic or open procedures. Examples: cystectomy, prostatectomy, lymphadenectomy or partial nephrectomy (to seal the distinct collateral vessels of the kidney).

BIPOLAR CUT

BIPOLAR CUT is suitable for cutting with reproducible cutting quality and minimum necrosis. This mode generates precise cutting with hemostasis to protect tissue. This mode can be used in urology, for example to open the renal capsule.

BIPOLAR CUT++

This mode is distinguished by fast, controlled arc formation with immediate incision and low energy input. It is used in saline during bipolar TUR. The controlled arc intensity ensures safe hemostasis during resection.

BIPOLAR SOFT COAG

This mode is the standard mode for safe coagulation using the bipolar forceps or laparoscopic clamp.

* individual models, depending on the specification
This mode creates a safe coagulation in bipolar resection. BIPOLAR SOFT COAG++ is used in saline in TUR procedures where plasma should not be formed on the snare.
For urological procedures, we recommend the instruments listed on both double pages. In addition to these application-specific products, standard instruments are also used in urology that are not described individually or in detail here. These include monopolar electrodes of varying lengths and shapes such as ball, spatula, needle or snare electrodes, as well as PREMIUM forceps of varying lengths and shaft shapes, and forceps tips. All Erbe instruments are listed in our accessories catalog.

Open-surgery BiClamp 280 with anatomically-curved jaw

BiClamp Kelly LAP forceps with curved jaw

BiClamp allows vessels of up to 7 mm diameter to be sealed* so that clips and sutures are generally not required. BiClamp instruments are available in various lengths and jaw shapes. In urology, BiClamp 280 is used, for example in open prostatectomies or to seal renal tumor vessels.

All BiClamp instruments are reusable. The thermal capacity of the jaws is low, reducing the risk of thermal injury to adjacent structures. The BiClamp instrument is operated using the BiClamp mode of the VIO 300 D electrosurgical unit.

The BiClamp Kelly LAP forceps feature a specially curved jaw. As well as sealing vessels of up to 7 mm diameter*, they are also suitable for coagulation at selected locations and mechanical exposure.

They are suitable for the exposure of lymphatic tissue along the vessels and for blunt exposure or sealing of smaller vessels.

* individual models, depending on the specification
BICISION® 03

Vessel sealing and dissection are the two primary functions of this instrument. In addition, the BiCision can also be used to expose, coagulate and grip tissue. The shell-shaped jaw offers a larger sealing zone than other instruments with a 5 mm shaft that feature a comparable jaw geometry. As a result of the low thermal capacity and the minimal coagulation seam, adjacent structures (for example nerves) are protected. The cutting length of 18.5 mm allows work to be carried out quickly, for example to expose organs. The BiCision is operated using the BiClamp mode of VIO 300 D.

BIPOLAR LAP FORCEPS 05

Tissue is held firmly thanks to the grooved gripping surface. In addition to the precise electro-surgical coagulation of vessels and structures, the Bipolar LAP forceps are also suitable for blunt exposure. The twin mechanism opens the jaws evenly and grips the tissue with even contact pressure.

BIPOLAR BISECT SCISSORS 04

The bipolar scissors support a variety of applications in open surgery. During mechanical cutting, the tissue is electrosurgically coagulated at the same time. The appropriate form of current with VIO 300 D is BIPOLAR SOFT COAG mode, for example for full exposure of the kidneys.

BIPOLAR METZENBAUM LAP SCISSORS 06

This bipolar cutting instrument with a 5 mm shaft and a shaft length of 340 mm results in superior mechanical cutting. In combination with BIPOLAR SOFT COAG, gentle coagulation is achieved and the jaws of the instrument are protected. This instrument is also available with an ERGO handle that reduces operator fatigue during surgery.

MONOPOLAR SCISSORS

This monopolar cutting instrument is primarily used for resection in sensitive structures with low vascularity. The monopolar scissors can, for example, be used for ureteroneocystostomy.

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Instruments

**HOOK ELECTRODE  07**

The monopolar hook electrode is used in urology, for example for adhesiolysis of tissue structures as well as for general exposure.

**NEEDLE ELECTRODE  08**

With this instrument, the tip of the needle can be extended in 4 stages, allowing the cutting depth to be regulated. Adjustments are performed using the handle. The bipolar needle electrode is available in two shaft lengths, for standard laparoscopy with 320 mm and for bariatric surgery with a length of 480 mm.

**APC APPLICATOR  09**

With the open-surgery APC applicator, resection surfaces are safely and evenly coagulated, for example following partial kidney resection.

**APC-APPLICATOR  10**

The laparoscopic APC applicator is used in urology primarily for coagulation of large resection surfaces, for example following partial kidney resection. The advantages are comparable with open-surgery applications: even and safe coagulation, also of larger surfaces. The APC is applied contact-free, meaning there is no risk of coagulated tissue being torn open again.
APPLICATOR, CURVED TIP

The curved distal end of the waterjet applicator is particularly suited for the exposure of the prostate. Laparoscopic waterjet applicators are also available for laparoscopic prostatectomy (no illustrations).

APPLICATOR, STRAIGHT WITH MONOPOLAR ELECTROSURGICAL FUNCTION

This applicator features an integrated electrosurgical and waterjet function. During selective dissection, for example of kidney parenchyma, the fully exposed blood vessels are coagulated and separated using COAG current. Both functions can be used simultaneously or alternately.

HYBRIDKNIFE®

HybridKnife is used in urology for the resection of bladder tumors. Electro surgery and waterjet functions are integrated in the instrument. All 4 steps, marking of the bladder carcinoma, mucosa elevation, incision / dissection as well as hemostasis are performed using just one instrument.

RESECTOSCOPE

Monopolar and bipolar resectoscopes are available for transurethral resection in the prostate or bladder.
Open surgical access

The skin incision can be made electrosurgically using a needle electrode and AUTO CUT mode. In order to locate the renal bed, the individual muscle layers are separated. A spatula or knife electrode and the AUTO CUT cutting mode are suitable for this with hemostasis to protect tissue. The reduction in carbonization has a positive impact on post operative wound healing.

In the case of highly vascular and less sensitive tissue, DRY CUT can also be used to achieve greater hemostasis. Any subsequent bleeding is directly coagulated using the spatula or knife electrode with FORCED COAG or SWIFT COAG – smaller bleeding vessels are treated with the bipolar forceps.

Once the renal fascia has been opened, the kidney, adrenal gland and adjacent structures can be fully exposed and mobilized using BiClamp 280 and BiSect bipolar scissors. Due to effective thermofusion, ligature and clip are not generally required.

In these procedures, the target organ is then removed:

- Nephrectomy
- Nephroureterectomy
- Adrenalectomy

Additional steps in

PARTIAL NEPHRECTOMY 01, 02

Once the organ has been exposed, the renal capsule can be opened using the bipolar needle electrode (Fig. 01). The advantage is that the cutting depth can be set on the instrument and thus regulated. The waterjet function of the straight monopolar applicator is used for selective dissection of the kidney parenchyma. Where required, the exposed vessels are coagulated and separated using the electrosurgical function of the applicator (with SWIFT COAG). Due to the low levels of blood loss, ischemia, or temporary clamping of the renal vessels, is often not required. The resulting advantages: surgery time is reduced as exposure of the renal hilum is not required. By avoiding ischemia, healthy residual kidney tissue is protected.

Contact coagulation can be performed either at individual locations of the resection bed using the ball electrode (SOFT COAG mode), or the surface can be treated using argon plasma coagulation (FORCED APC). The APC is a non-contact instrument, which is why there is no risk of previously coagulated tissue tearing open again. APC coagulation is homogenous and the procedure can be carried out without pauses.
Laparoscopic access

Using the trocars, the organ is exposed and mobilized using BiCision, or alternatively using a BiClamp LAP forceps or a bipolar LAP forceps. The thermofusion instruments also facilitate effective mechanical exposure. BiCision offers effective vessel sealing with an integrated cutting function as well as optimum staunching of bleeding (Fig. 02). Alternatively, the bipolar Metzenbaum LAP scissors can be used to perform exposure. They offer a mechanical cutting function, combined with bipolar coagulation.

The organ can then be mobilized and resected using the laparoscopic hook electrode and the SWIFT COAG or AUTO CUT modes.

ADRENALECTOMY

Using the mechanical function of the BiCision instrument, the adrenal gland is fully exposed. Alternatively, a bipolar LAP forceps and a monopolar scissors can be used. The enlarged blood vessels of the tumor can also be quickly and reliably sealed using BiCision. The minimal coagulation seam of the BiCision jaw is an advantage, particularly when sealing near vulnerable structures.

In laparoscopic approaches, the VIO system supports robot-assisted surgery with DaVinci.

PYELOPLASTY/URETERONEOCYSTOSTOMY

Following incision and blunt mobilization of the colon, the renal pelvis and sensitive polar vessels are exposed. As hemostasis is of primary importance, we recommend using the SWIFT COAG mode in combination with monopolar scissors.

AUTO CUT is the mode best suited for exposure of the ureter, as it reduces the risk of thermal necrosis and perforations, and as a result, of subsequent stenoses in the ureter.

The anatomically-shaped jaw of the BiClamp Kelly LAP forceps simplifies the exposure of vessels. Smaller vessels can be exposed bluntly, larger vessels sealed.
Open-surgery prostatectomy

Open approach

The skin incision can be made electrosurgically using a needle electrode and the AUTO CUT mode. In order to locate the operative site, the individual muscle layers are separated. A spatula or knife electrode with the AUTO CUT cutting mode are suitable for this, in particular as hemostasis is tissue-sparing. The reduced in carbonization has a positive impact on post operative wound healing.

In highly vascular and less sensitive tissue, DRY CUT can also be used to achieve greater hemostasis. Any subsequent bleeding is directly coagulated using the spatula or knife electrode with FORCED COAG or SWIFT COAG — smaller bleeding vessels can be treated with the bipolar forceps.

Following exposure, the target organ can be fully exposed and mobilized using BiClamp 280 and BiSect bipolar scissors (Fig. 04). Thanks to effective vessel sealing, ligatures and clips are not generally required.

Applications in the lower urinary tract

Prostate, bladder and urethra
**PROSTATECTOMY 05**

Using the hydrosurgery applicator, the anatomical structures can be detached from one another using gentle mechanical pressure.

Once the capsule has been opened, the glandular tissue is bluntly separated and the exposed vessels are effectively sealed using BiClamp 280. Due to the length of the instrument and the anatomically-adapted shape of the jaws, sealing can be performed close to the capsule.

**CYSTECTOMY 06**

BiClamp 280 allows uterovesical ligaments to be quickly and effectively resected. Once the bladder has been removed, the section of small intestine used for the urinary diversion can be quickly exposed with minimal bleeding assisted by the anatomically-adapted jaw of the BiClamp 280.
**LYMPHADENECTOMY**

The aim of this procedure is to diagnose the occurrence and extent of any lymphatic metastasis and to additionally remove pathological lymphatic tissue.

**Laparoscopic access**

Using the trocars, the target tissue is exposed and mobilized using BiCision, or alternatively using a BiClamp LAP forceps or a bipolar LAP forceps. The thermofusion instruments also facilitate effective mechanical exposure. BiCision offers reliable vessel sealing with an integrated cutting function as well as optimum staunching of bleeding. Alternatively, the bipolar Metzenbaum LAP scissors or the hook electrode can be used for exposure. They offer a mechanical cutting function, combined with bipolar coagulation.

The VIO electrosurgical system with SWIFT COAG and AUTO CUT supports all laparoscopic electrosurgical instruments when accessing, mobilizing and resecting the organ.

**PROSTATECTOMY**

When exposing the vasa deferentia and the seminal vesicle using the BiClamp LAP forceps, only low levels of aerosols develop. The anatomically-shaped jaw of the BiClamp Kelly LAP forceps simplifies exposure of the vessels and enables vessels to be exposed in a blunt fashion and to be sealed. The fasciae are mechanically separated using the monopolar scissors. In addition, SWIFT COAG can be used to perform fast and effective coagulation with a significant level of hemostasis. This mode also offers the characteristics required for electrosurgical exposure characteristics.

Once the prostate has been fully exposed, the capsule can be opened using the bipolar needle electrode. The cutting depth can be regulated and set using the handle of the instrument.

**PROSTATECTOMY USING THE WATERJET**

Using the waterjet applicator, the capsule can be detached from the prostate gland, and the fully exposed vessels sealed and separated with the BiClamp LAP forceps. Using the waterjet technique, gentle mechanical pressure is applied to the nerves, reducing the risk of postoperative bladder dysfunction and sexual dysfunction.

A further advantage is the good visibility at the operative site, as the waterjet technique results in minimal bleeding and the operative site can be flushed with the saline solution.

If this procedure is carried out using a DaVinci system, the compatible VIO 300 D system offers optimal current forms for the instruments used.
CYSTECTOMY WITH A NEOBLADDER 08

In laparoscopic procedures, a neobladder is created from a piece of the small intestine to act as a reservoir and replace the bladder. A prerequisite for this is that both the urethra and the sphincter (both tumor-free) are retained. When preparing the section of intestine inside the body, the ceramic insulation of the BiCision jaw reduces the risk of thermal injury to adjacent structures. The minimal coagulation seam also created by the BiClamp LAP forceps has a positive impact when incorporating the wall of the small intestine in the newly-formed neobladder.

The section of small intestine for the neobladder can be prepared outside the body using BiClamp 280, saving time and ensuring reliable hemostasis.

LYMPHADENECTOMY 09

BiCision is particularly suited to the exposure of lymphatic tissue along vessels and the sympathetic trunk. Smaller vessels are exposed bluntly, which prevents trauma, and sealed. Sealing the lymph vessels prevents the lymph from leaking. This prevents the development of seromas with the risk of tumor cell metastasis. The instrument also speeds up the steps required as it is multifunctional and offers thermofusion and cutting. The low thermal capacity of the jaws and the minimal coagulation seam reduces the risk of thermal injury to adjacent structures.

LYMPHADENECTOMY USING THE WATERJET

In lymphadenectomy using the waterjet, the applicator can assist in all phases of exposure. The advantages of the waterjet technique: the high-pressure waterjet separates the various tissue structures according to their layers, enabling selective, interfascial exposure. Nerves and vessel structures are protected. The waterjet is particularly suited to separating lymphatic tissue from the aorta, vena cava and sympathetic trunk. The waterjet technique can be used atraumatically, without thermal injury to adjacent structures.
Applications in the lower urinary tract

Bladder and prostate

**TRANSURETHRAL RESECTION OF THE PROSTATE (TUR-P)**
- Transurethral resection of the prostate is a therapy aimed at benign prostatic hyperplasias.

**TRANSURETHRAL RESECTION OF THE BLADDER (TUR-B)**
- TUR-B is used for the diagnosis and therapy of non-muscle-invasive bladder tumors.

**EN Bloc resection of bladder tumors using HybridKnife**
- This procedure is used to treat early stage bladder cancers.

**Endoscopic access**

The resection instrument is inserted into the urethra in the direction of the target organ. The monopolar and bipolar techniques are used.

**MONOPOLAR TUR-P**

In the monopolar technique, the urinary tract is flushed with non-conductive fluid using the resectoscope. In electrosurgical cutting with a snare, DRY CUT offers a significant level of hemostasis. This mode prevents irrigation fluid from flooding into the vascular system. The irrigation fluid remains clear for an extended period; blister formation during cutting is kept to a minimum. Both are important criteria in terms of clear visibility of the target operating area. To smooth the prostatic capsule towards the end of the procedure, HIGH CUT offers optimal cutting as well as a precise incision.

The VIO 300 D electrosurgical unit enables the user to switch between both modes using the ReMode function on the footswitch. Any bleeding can be coagulated using FORCED COAG.

**BIPOLAR TUR-P**

With the bipolar technique, the urinary tract is flushed with an isotonic saline solution using the resectoscope. Because of the immediate plasma ignition, BIPOLAR CUT++ mode offers a superior incision with low energy input. A prewarmed saline solution enhances this effect. Any bleeding can be treated with BIPOLAR SOFT COAG++ using contact coagulation with deep hemostasis. The onset of the coagulation effect is slightly delayed with this mode.

Additional instruments for these applications as well as proved user settings are provided in the overview tables from page 29.
Bipolar TUR-P En-bloc resection of tumors of the bladder using HybridKnife

MONOPOLAR TUR-B

In the case of the monopolar technique, the urinary tract is flushed with non-conductive fluid via the resectoscope. In the case of snare resection, the monopolar modes AUTO CUT and HIGH CUT offer effective hemostasis properties. The irrigation fluid remains clear for an extended period, blister formation during cutting is reduced. Both are criteria in terms of clear visibility of the target operating area. HIGH CUT mode supports optimized cutting as well as precise incision. Any bleeding can be coagulated using FORCED COAG.

BIPOLAR TUR-B

In the case of the bipolar technique, the urinary tract is flushed with an isotonic saline solution via the resectoscope. The bipolar technique reduces the risk of neuromuscular stimulation. Thanks to immediate plasma ignition, BIPOLAR CUT++ mode offers a superior incision with low energy input – without applying mechanical pressure to the tissue. A prewarmed saline solution enhances this effect. Any bleeding can be treated with BIPOLAR SOFT COAG++ using contact coagulation with deep hemostasis. The onset of the effect of coagulation is slightly delayed in this case.

EN BLOCK RESECTION OF BLADDER TUMORS USING HYBRIDKNIFE

In selected cases, en bloc resection of early stage bladder cancers can be performed using the multifunctional HybridKnife instrument. For this, the urinary tract is flushed with non-conductive fluid as is the case in conventional TUR-B procedures.7,8 The bladder tumor is first marked using the HybridKnife mode “FORCED COAG”. The mucosa where the tumor is located is then elevated using the waterjet function. Once the mucosa has been elevated, an incision is made around the tumor, which is then resected. The fluid accumulates in the submucosa, creating a protective cushion that reduces the risk of perforation. This is particularly beneficial in the case of older patients with a thin bladder wall. The DRY CUT mode offers cutting with optimal hemostasis. Repeated elevation results in a defined resection height (beneath the tumors), facilitating the target of R0 resection. Any bleeding can be coagulated using FORCED COAG.

Unlike conventional TUR-B, in this procedure the tumor is not fragmented but can be removed in one piece. This contributes to improving the pathological diagnosis and evaluation of vertical and horizontal resection margins to assess whether tumor tissue has been fully removed.
More minor surgical procedures

CIRCUMCISION
- The foreskin is removed, for example in cases of phimosis.

REMOVAL OF HYDROCELES
- This procedure is carried out to treat the accumulation of fluid in the scrotum.

VARICOCELE THERAPY
- Enlarged varicose veins in the scrotum are treated with varicocele therapy.

VASECTOMY
- This procedure is performed for the purposes of sterilization.

CIRCUMCISION
In this procedure, the foreskin is completely or partially removed. A mechanical incision is made around the foreskin using a scalpel or scissors. Bleeding is coagulated using a bipolar forceps; tissue adhesion can be minimized using PREMIUM forceps. BIPOLAR SOFT COAG mode also minimizes tissue adhesion.

VARICOCELE THERAPY
Therapy is carried out surgically, either by performing sclerotherapy on the afferent vein, or by ligating it.

In both procedures (hydrocele and varicocle therapy), bleeding can be coagulated using the bipolar PREMIUM forceps. These forceps and BIPOLAR SOFT COAG mode prevent tissue from adhering to the gripping surface.

VASECTOMY
Sterilization is achieved by severing the spermatic cords.

The skin is mechanically opened using a scalpel, and the vas deferens is then cut. Bleeding as well as the margins of the vas deferens incision can be coagulated using bipolar PREMIUM forceps.

Additional instruments for these applications as well as proved user settings are provided in the overview tables from page 29.
## Application overview

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<tr>
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<td>FORCED COAG, effect 2, 80 W SWIFT COAG, effect 2 – 3, 80 W</td>
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<td>SWIFT COAG, effect 2 – 3, 80 W FORCED COAG, effect 2, 80 W</td>
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<td>BIPOLAR SOFT COAG, effect 3−4, 60 W</td>
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| **Cystectomy with a neobladder, laparoscopic**  |                              |                                   |       |
| BiClamp 280                                    |                             | BiCLAMP, effect 3                 |       |
| BiCision                                       |                             | BiCLAMP, effect 2−3               |       |
| Bipolar Metzenbaum LAP scissors                 |                             | BIPOLAR SOFT COAG, effect 4−5, 60 W |       |
| BiClamp LAP forceps                             |                             | BiCLAMP, effect 2                 |       |
| Hook electrode, (monopolar)                     | AUTO CUT, effect 3−4, 80 W  | FORCED COAG, effect 2, 80 W       |       |
|                                                |                             | SWIFT COAG, effect 2−3, 80 W      |       |
| Bipolar LAP forceps                             |                             | BIPOLAR SOFT COAG, effect 4−5, 60 W |       |
| Monopolar scissors, laparoscopic                |                             | SWIFT COAG, effect 2−3, 80 W     |       |
|                                                |                             | FORCED COAG, effect 2, 80 W       |       |

| **Lymphadenectomy, open surgery**               |                              |                                   |       |
| Electrode handle with knife or spatula electrode | AUTO CUT, effect 4−5, 180 W  | SWIFT COAG, effect 3−4, 140 W     |       |
|                                                | DRY CUT, effect 3−5, 160 W   | FORCED COAG, effect 2, 80 W       |       |
| BiClamp 280                                    |                             | BiCLAMP, effect 3                 |       |
| Bipolar forceps                                 |                             | BIPOLAR SOFT COAG, effect 4−5, 50 W |       |
| Bipolar BiSect scissors (open surgery)          |                             | BIPOLAR SOFT COAG, effect 3−4, 60 W |       |

| **Lymphadenectomy, laparoscopic**               |                              |                                   |       |
| BiCision                                       |                             | BiClamp, effect 2−3               |       |
| Bipolar Metzenbaum LAP scissors                 |                             | BIPOLAR SOFT COAG, effect 4−5, 60 W |       |
| BiClamp LAP forceps                             |                             | BiClamp, effect 2                 |       |
| Hook electrode, (monopolar)                     | AUTO CUT, effect 3−4, 80 W  | FORCED COAG, effect 2, 80 W       |       |
|                                                |                             | SWIFT COAG, effect 2−3, 80 W      |       |
| Bipolar LAP forceps                             |                             | BIPOLAR SOFT COAG, effect 4−5, 60 W |       |
| Monopolar scissors, laparoscopic                |                             | SWIFT COAG, effect 2−3, 80 W     |       |
|                                                |                             | FORCED COAG, effect 2, 80 W       |       |

| Applicator, curved tip (laparoscopic)           |                             |                                   | Effect 25−35 |
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<td>HIGH CUT, effect 3–5, 150 W</td>
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<td>BIPOLAR CUT++, effect 4–5</td>
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<td><strong>Transurethral resection of the prostate (TUR-P) – monopolar</strong></td>
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<td><strong>Transurethral resection of the prostate (TUR-P) – bipolar</strong></td>
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REFERENCES


ADDITIONAL PUBLICATIONS


LEAFLETS AND BROCHURES

85800-103 Principles of electrosurgery
85800-127 Application brochure of electrosurgery
85800-107 NESSY Q application brochure
85140-120 VIO D product leaflet
85134-100 APC 2 product leaflet
85150-100 ERBEJET 2 product leaflet
85100-100 Instruments and Accessories
85100-185 Vessel sealing product leaflet
85100-183 BiCision product leaflet
85810-101 Information folder for Urology

Additional information:
Up-to-date product and application information is available at www.erbe-med.com and in publications such as our accessories catalog.
Up-to-date user videos are available at www.medical-video.com
Information on the safe use of electrosurgery and APC

General recommendations and rules for electrosurgery and APC

When used properly, electrosurgery poses virtually no risk to the patient or to surgical staff. The purpose of this checklist is to make the user aware of potential risks in order to eliminate them.

GENERAL NOTES

- Familiarize yourself with system features and learn how to operate the system properly before using it (see Germany’s Medical Devices Operator Ordinance, or MPBetreibV). In addition to Instructions for Use, Erbe also offers training and accompanying literature.
- Because the electrosurgical unit, instruments and accessories are designed to work together, use either recommended accessories or equipment that has, as far as possible, been obtained from a single manufacturer. See Erbe Instructions for Use for additional information.
- Inspect the electrosurgical unit, instrument and accessories before use to ensure they are in proper working condition and free of damage.

PATIENT POSITIONING

- The patient must be dry and insulated when positioned. OR table overlays or cloth covers that are wet must be replaced during surgery.
- Place a urinary catheter if the procedure can be expected to take some time.
- The patient must not touch any electrically conductive objects, such as drip stands or the metal parts of the OR table.
- Avoid skin-to-skin contact points with the patient (e.g., hand / thigh)
- Do not install connecting cables on top of other cables or in places in the OR where they could cause someone to trip.
- Place instruments on the instrument table and not on or next to the patient.
- Be careful with disinfectants: electrical sparks can ignite the alcohol in these agents. For this reason, disinfectants must always be dried off completely.

OPERATIONS ON PATIENTS WITH PACEMAKERS

- Follow the pacemaker manufacturer’s recommendations.
- Avoid allowing current to flow across the pacemaker, probe or cardiac muscle.
- The return electrode should be positioned as close as possible to the operating field but at least 15 cm from the pacemaker.
- Bipolar application is preferable to monopolar application.
- Select low settings.
- If possible, deactivate the pacemaker or ICD before electrosurgical application.
- Monitor the pacemaker before, during and after surgery for any potential malfunction.
- Brief activation bursts should be avoided. The pacemaker could interpret these as cardiac arrhythmias and generate stimulus signals in response.
With today’s state-of-the-art technology, the risks incurred during monopolar electrosurgery are very low. Use of the return electrode does, however, give rise to questions and issues that we would like to clarify in this section.

**Special recommendations for positioning the return electrode**

In addition to carefully positioning the return electrode and ensuring contact across its entire surface, we also recommend observing the following safety rules.

- Check cables and plugs for any damage.
- Do not cut the return electrode.
- Position the return electrode with the long edge facing the operating field.
- The area of application should be dry and smooth with no disinfectant, body hair, skin folds or lesions.
- Avoid air pockets between the skin and return electrode; do not use contact gel.
- Do not place the return electrode on scarred or inflamed areas of skin, on bony structures or near metallic implants that should not lie in the flow of current.
- Conductive muscular tissue with low electrical resistance is preferable to areas with subcutaneous fatty tissue. We recommend the upper arm or thigh (Fig. left page).
- Position the return electrode in such a way that ECG cables and electrodes do not lie in the flow of current.
- If the patient is repositioned, the placement of the electrode and the connection should be rechecked.
- The NESSY return electrode is not designed to be reused and should be replaced each time it is removed (e.g., when correcting its positioning).
- Position the return electrode as close to the operating field as possible (Fig. left page).

- When positioning the return electrode, implants must be taken into consideration. They must not lie in the flow of current.
- Arc flashes may occur during monopolar electrosurgery if uninsulated forceps are activated using a monopolar electrode (improper use!). Because their use is not uncommon in practice, we recommend using insulated forceps.
- ECG interference caused by electrosurgery can be avoided by using monitor-filter systems or accessories compatible with electrosurgery.

**APPLICATION IN CHILDREN**

- If the upper arm and thigh are too thin, the return electrode can also be placed on the patient’s body.
- In infants, the return electrode should always be placed on the body. Whenever possible, work using the bipolar mode or only with low electrosurgical power (below 50 W).
- Return electrodes for children should only be used when a larger return electrode cannot be used. The larger the return electrode, the less the skin will warm up.

**PROCEDURES ON PATIENTS WEARING JEWELRY (PIERCINGS, NECKLACES, RINGS, ETC.)**

- We recommend always removing all jewelry (piercings, necklaces, rings, etc.).
- Performing electrosurgery on patients with piercings that cannot be removed is not contraindicated, however, provided the following rules are observed:
  - Jewelry must not come into direct contact with the active electrode or return electrode.
  - Neither the active electrode nor the return electrode may be used in the direct vicinity of piercings.
  - The piercing must not be located in the flow of current between the active electrode and return electrode.
  - Jewelry must not come into contact with electrically conductive materials.

**AND AFTER THE PROCEDURE ...**

- Carefully peel the return electrode off the skin to prevent injuries to the skin.