



# EXPERT REPORT

## AESCULAP<sup>®</sup> Caiman<sup>®</sup>

PUTTING TECHNOLOGY TO THE TEST: BIPOLAR VESSEL SEALING TECHNOLOGY  
USING THE EXAMPLE OF TOTAL LAPAROSCOPIC HYSTERECTOMY (TLH)

Dr. med. Sebastian Hentsch

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### 1. FOREWORD

The Solingen Municipal Hospital GmbH's Clinic of Gynecology and Obstetrics has a bed capacity of 60, and provides care for almost all benign and malignant disorders of the genital organs. Around 2,900 patients received treatment there in 2013, of which 1,300 underwent surgery.

The Senology department is certified as a Breast Health Center by the Medical Association of Westphalia-Lippe. The Department of Obstetrics helps bring around 1,000 children into the world each year. Together with the hospital's Pediatric Clinic, a Level II Perinatal Center, it can also help with deliveries involving complicated pregnancies and premature deliveries starting at the 29+0 week of pregnancy.

The vast majority of the abdominal surgeries performed here are minimally invasive. Hysterectomy plays a significant role in this regard.

### 2. HYSTERECTOMIES

Removal of the uterus has now become one of the most common gynecological operations in many countries. The Robert Koch Institute's health monitoring data from the year 2013 shows that 17.5% (n = 689) of the women interviewed (ages 18 to 79) had had hysterectomies. Most of these women (49.1%) were between the ages of 40 and 49 when undergoing the operation. Uterine or ovarian cancer was specified as the reason for the operation in 6.1% of the hysterectomy patients. Oophorectomies were performed simultaneously in 19.7% of cases.<sup>1</sup>

Indications for hysterectomies are many and varied. Benign reasons can include, for example, symptomatic myomas, conservative therapy-resistant bleeding disorders, pain, endometriosis or pelvic floor insufficiency. Such operations are also necessary in treating most

gynecological malignancies.

Before the first laparoscopic hysterectomy was performed in 1989<sup>2</sup>, vaginal and abdominal procedures were the options available. Since that time, operative gynecology has shifted to using primarily minimally invasive procedures.

Most hysterectomies performed at our hospital are done laparoscopically as well: with benign indications, 65% are performed laparoscopically, 30% vaginally, and only around 5% are still done as laparotomies. We perform total laparoscopic hysterectomies (TLH) most frequently, laparoscopic supracervical hysterectomies (LASH) less so. This article will provide a brief outline of the TLH procedure as performed in our hospital.

The operation is performed with the patient under general anesthesia and in Trendelenburg position, with her legs slightly spread and positioned at an angle. We administer a single-shot antibiotics as a prophylactic against wound infections. After the abdominal wall, the vulva and the vagina have been disinfected, the operating area is covered with sterile drapes. The HOHL manipulator is secured within the uterus and cervix transvaginally. Its ceramic bell cups around the portio and ensures good intraoperative exposure of the vaginal resection border, while also shifting the ureters caudally and laterally out of the resection zone.<sup>3</sup> The operation is performed by one surgeon and one or two assistants. The surgeon stands to the patient's left facing in the caudal direction, towards a surgical monitor. The first assistant is on the patient's right, facing in the same direction. His or her primary responsibility is running the camera. If a second assistant is involved, that person sits between the patient's legs, facing a second monitor placed cranially. The second assistant holds the HOHL manipulator in his or her hand and uses it to move the uterus during the operation. After pneumoperitoneum has been estab-

lished by the usual method, with the help of a Veress needle, a 5 mm working trocar is inserted through an incision in the umbilical fossa for the camera (5 mm optics). Working trocars are pierced in on either side (right 5 mm, left 10 mm) in camera view—usually at the level of the line between the Spinae iliacae anteriores superiores (“Lenzmann line”), depending on the size of the uterus—so that the surgical instruments can be guided in. We use atraumatic instruments (Overholt or intestinal forceps), and have also been using the Aesculap® Caiman® blood vessel sealing instrument since October 2013. If a simultaneous adnexectomy is to be performed as well, the adnexus is distanced from the pelvic wall, after which the Lig. suspensorium ovarii and the blood vessels it contains (A. and V. ovarica) are sealed and cut using the Caiman®. After that, the adnexus can gradually be separated from the pelvic wall by the same method, and mobilized as far as the Lig. ovarii proprium. Even if the ovaries are to remain in situ, we still always perform a salpingectomy if possible, putting the resection line within the tube meso, between the tube and the ovary or the pelvic wall, and using the Caiman® to seal and cut the Lig. ovarii proprium. The Lig. teres uteri is then sealed and cut. Each of the dissection steps described here is performed on both sides. The area now visible around the vesico-uterine reflection is now suitable for blunt dissection, wherein the vesico-uterine pouch can be distanced from the uterus and finally severed laterally from the lower uterine segment. This allows the urinary bladder to be mobilized and shifted caudally on the cervix. The uterine vascular supply is now visible in the parametria on either side of the uterus. These vessels are sealed and cut using the Caiman®. This dissection is performed in the caudal direction, along the edge of the cervix, up to the entrance of the cervix into the vagina. It is important to maintain sufficient distance to the ureters and the urinary bladder. The peritoneum behind the cervix can now be opened laterally; this often requires severing the recto-uterine liga-

ments, so that the cervix can be sufficiently mobilized and the posterior vaginal fornix exposed. All of this dissection work is performed using the Caiman®. Only very rarely is additional bipolar coagulation necessary to achieve hemostasis.

The vaginal fornix can now be incised using a monopolar needle electrode in order to resect the uterus completely. The dissected tissue is retrieved through the vagina and sent off for histological examination. Larger uteri can be morcellated within the abdomen and retrieved in sections. The vagina is then closed using laparoscopic single interrupted stitches or Z-stitches.

### 3. EVALUATION OF THE AESCULAP® CAIMAN®

Several methods are available for sealing blood vessels and cutting tissue laparoscopically. Probably the most common of these is to do bipolar coagulation of the tissue and then use dissecting scissors to cut it. These surgical steps can also be performed using devices that use ultrasonic energy to seal and/or cut tissue and vessels.

Other modern blood vessel sealing instruments secure the tissue within a clamp, compress it using more- or less-defined pressure, then perform bipolar tissue coagulation while simultaneously measuring changes in tissue impedance (in order to end coagulation automatically once tissue denaturing is assured), and finally cut through the coagulated region using an integrated blade. This results in comparatively short operating times and minimizes surgical blood loss.

This group of instruments also includes the Aesculap® Caiman®, which we have been using since October 2013. We have employed the instrument in 70 total laparoscopic hysterectomies, with and without adnex-

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ectomies, with and without additional pelvic and para-aortal lymphonodectomies (for endometrial carcinoma). We also use the device in performing laparoscopic omentectomies. After performing comparison operations using other instruments, we selected this provider based on several features:

- The instrument is infinitely rotatable (by 360°). The same manufacturer also produces seal and cut instruments featuring a articulating tip, though we have not yet used them.
- The tip of the instrument closes distally, ensuring uniform tissue compression. The jaws close with a click at a defined pressure point. They hold the tissue in place very securely—tissue very seldom slips out of their grasp, even during difficult dissections. Closing the jaws requires some force, but one quickly grows accustomed to this.
- The tapered shape of the tip makes it possible to use the instrument in "blunt" dissection as well. Even so, we find it is often slightly too thick to use in dissecting perivascular fatty tissue in lymphonodectomies.
- The time involved in sealing and cutting seems shorter to us than with the alternative instruments we tested. Generally speaking, it saves significant amounts of time compared to operating without a sealing instrument. We have not, however, performed objective testing to confirm our impressions.
- Finally, the price per use specified in the offers we received is another strong argument in favor of the Caiman®. In principle, however, it must be noted that cost advantages over conventional methods involving bipolar coagulation and dissection scissors can only be achieved through intelligent surgery management, so that the shorter oper-

ating times can be translated into a larger number of operations being performed within the same period.

- During a few (complicated) dissection processes, after the instrument had been in use for a longer period, we found that it began aborting sealing and returning automatic error messages prompting us to clean the jaws.
- One always has a sense of reliable sealing. None of the patients we operated on using the instrument experienced post-operative bleeding that would have required a follow-up operation. Subsequent procedures were required in two cases to revise insufficient vaginal sutures, but these can likely be attributed to monopolar vaginal incisions impairing wound healing.<sup>4</sup>

### 4. CONCLUSION

The Aesculap® Caiman® is a safe and convenient blood vessel sealing instrument that we gladly employ in laparoscopic hysterectomies; it is available to us at a comparatively low price and helps significantly shorten our operating times. However, representing its usage costs within the DRG system of compensation remains problematic.

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