



EXPERT REPORT

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LAPAROSCOPIC FORMS OF HYSTERECTOMY USING
A BIPOLAR VESSEL SEALING SYSTEM

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1. FOREWORD

St. Marienstift Magdeburg Hospital GmbH numbers among Magdeburg's most prestigious institutions. The general hospital is a member of the Elisabeth Vizenz network, which operates Catholic hospitals and other health care and social institutions across the country.

Its five clinics and five wards cover a broad range of medical disciplines and provide care to a total of 14,000 patients annually.

The 50-bed Clinic of Gynecology and Obstetrics performs around 1,800 gynecological operations every year, most of them endoscopic procedures; laparoscopic hysterectomies alone account for over 150 of these operations.

Three of the hospital's chief physicians are personally certified in minimally invasive surgery (two Level II certifications, one Level III) in accordance with the training concept established by the German Society of Gynecology and Obstetrics's Gynecological Endoscopy Consortium.

The hospital offers nearly the entire spectrum of gynecological and obstetrics services. Its Breast Health Center is certified according to DIN EN ISO 9001:2008, German Cancer Society, German Senological Society, and European Society of Breast Cancer Specialists (EUSOMA) guidelines; and its Continence and Pelvic Floor Center is certified by the German Continence Society.

2. HYSTERECTOMIES

Hysterectomies are one of the most commonly performed gynecological procedures. According to the German Federal Statistical Office's statistics on flat-rate per-case hospital reimbursements (DRG statistics), a total of 133,222 hysterectomies were performed in Germany in the year 2012.¹ Overall operation rates

have been declining slightly for several years now, with fewer total hysterectomies and more partial hysterectomies being performed.² Today, most of the indications for hysterectomy are benign conditions such as myomas, therapy-resistant bleeding disorders, endometriosis, or uterine prolapse.² Only around 10% of hysterectomies are indicated due to a malignancy.³

The first successful vaginal and abdominal hysterectomies were performed in the first half of the 19th century.

Following preliminary work by Kurt Semm, Harry Reich performed the first laparoscopic removal of a uterus in Pennsylvania in 1988.⁴ In 1993, Jacques Donnez (Belgium) published a report on laparoscopic supracervical hysterectomy (LASH), which is in widespread use today and, in some cases, can now even be performed as an outpatient procedure.^{5,6,7} Laparoscopic approaches are becoming a more common choice with malignant and pre-malignant findings as well.⁸

In 2009, a review published by the Cochrane Collaboration recommended the vaginal approach for benign illnesses, saying that it provided the best outcomes. The vaginal approach, they said, resulted in fewer post-operative infections and subfebrile temperatures compared to abdominal hysterectomies, and allowed patients to resume normal activities more quickly following shorter hospital stays.

Laparoscopic hysterectomies were also associated with a quicker return to normal activities, shorter hospital stays, less blood loss, fewer infections and fewer cases of elevated temperature than abdominal hysterectomies. However, the review concluded, they involved lengthier operations and carried a higher risk of lesions to the bladder or ureter.

They did not find any advantages of the laparoscopic

surgical method over vaginal hysterectomy. The laparoscopic procedures took longer, and heavy bleeding occurred more frequently.

In cases where vaginal hysterectomies were not possible, however, the review concluded that laparoscopic procedures should be given preference over abdominal approaches.⁹ Laparoscopic methods also represent a good alternative to laparotomies in cases involving additional adnexal pathologies, endometriosis, or suspected adhesions.

The introduction of laparoscopic supracervical hysterectomy represented a further improvement on laparoscopic technique, although a 2012 review by the Cochrane Collaboration saw no advantages of partial hysterectomy over total removal of the organ in terms of improving sex life or bladder or bowel function.^{6,10}

3. FORMS OF LAPAROSCOPIC HYSTERECTOMY

The various forms of laparoscopic hysterectomy are differentiated based on the scope of the endoscopic procedure and the extent of the procedure. These forms include: laparoscopically assisted vaginal hysterectomy (LAVH), laparoscopic hysterectomy (LH), total laparoscopic hysterectomy (TLH) and laparoscopic

supracervical hysterectomy (LASH). Laparoscopically assisted vaginal radical hysterectomy (LAVRH) and laparoscopic radical hysterectomy (LRH) are also becoming increasingly more common in treating malignancies. As yet, however, these last two procedures are only available at a few centers, so they will not be included in the scope of this article.

In LAVH, laparoscopic dissection is performed up to the A. uterina. In LH, this is also coagulated and dissected laparoscopically. The remaining resections, the extraction of the uterus, and the peritoneal and vaginal closures are then performed vaginally.

In TLH, the entire procedure is performed endoscopically: the entire uterus is dissected up to the vagina, then resected from the vagina and extracted either vaginally or through a trocar (following appropriate morcellation), after which the vagina and peritoneum are closed laparoscopically.

In LASH, if the Cervix uteri is to be preserved, dissection is performed up to the cervix, after which the Corpus uteri is resected and the endometrium coagulated in the cervical canal; if necessary, the peritoneum is then adapted via the cervical stump. In such instances, the Corpus uteri is always morcellated and recovered using a trocar.

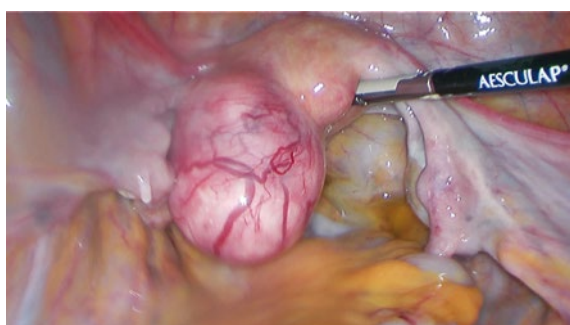


Fig. 1 Laparoscopic overview in context of a hysterectomy

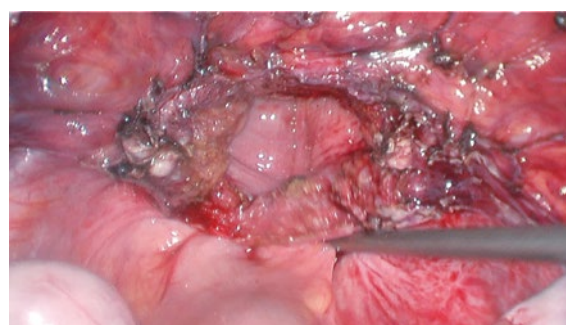


Fig. 2 Opened vagina following extraction of the uterus in TLH

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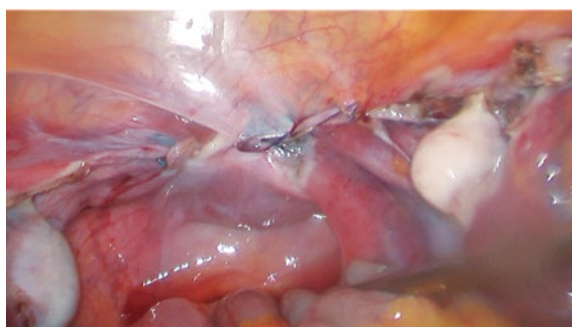


Fig. 3 Closed vagina with adapted peritoneum



Fig. 4 Cervical stump after resection of the Corpus uteri (LASH)

Which of these forms of laparoscopic hysterectomy are used depends on a variety of factors, such as the indication, the size and mobility of the uterus, the breadth of the vagina, and the patient's tolerance for mild vaginal bleeding (as with LASH).

The currently ongoing heated discussion regarding morcellation and its risk of conveying tumor cells must be factored into the decision as well.¹¹

If the patient wishes to have the cervix left in place, if it can be expected that she will continue regular early cancer detection screenings, and if there are no other contraindications to preserving the cervix, we consider LASH justified.

If the patient prefers to have the uterus removed completely, our choice of procedure depends on the other factors already mentioned.

We prefer to use TLH if vaginal surgical steps are difficult or impossible due to a narrow vagina; otherwise, we tend to use LAVH, as morcellation is necessary less often than with TLH.

The disadvantages of LAVH, on the other hand, are that it requires repositioning, and that it generates in-

creased material costs due to its use of both vaginal and laparoscopic instruments.

4. LAPAROSCOPIC PROCEDURE

Generally speaking, three trocars are used in laparoscopic hysterectomies: one optical trocar in the umbilical region, plus two (or perhaps three) operative trocars in the lower abdomen. A few authors recommend always using a uterine manipulator; in our view, it should at least always be used in TLH procedures, as it makes the cervix and the vagina far easier to distinguish.

The patient is placed into the lithotomy position, or supine for LASH, with her head low (Trendelenburg position) so that the bowel loops shift in the cranial direction.

Following exposure of the uterus and adnexa and trans-peritoneal orientation along the ureter, the usual procedure is to start by sealing and cutting the Ligamenta rotunda.

If the adnexa are to be removed as well, it seems logical to resect these from the Ligg. susp. ovarii beforehand.

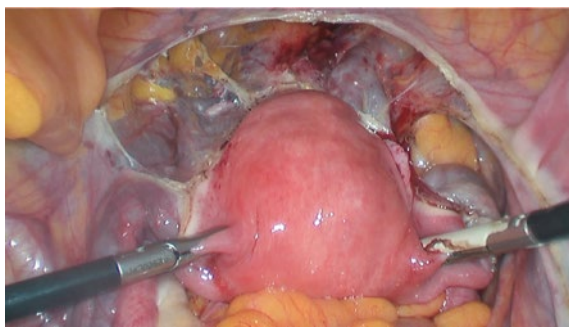


Fig. 5 Exposure of the uterus after opening of the bladder reflection

If a prophylactic salpingectomy is planned, the tubes are resected from the meso close to the tubes in order to prevent insufficient perfusion of the remaining ovaries.

After that, the Ligg. ovarii propr. are severed. The two peritoneal leaves of the Ligg. lata are easy to separate, so the uterine vessels can be exposed well. The vesico-uterine reflection is opened, and then the uterus is resected caudally.

Ultimately, these surgical steps (up to the A. uterina) are identical in all forms of laparoscopic hysterectomy.

They are performed by doing bipolar sealing and then cutting the tissue.

Once these steps have been completed, the individual procedures differ from one another as outlined above.

Laparoscopic hysterectomy was initially performed using only conventional bipolar forceps and scissors; since the various vessel sealing systems were introduced, they have been used as well.

Although almost all of these products are disposable, using them does indeed make sense, even nowadays

under the DRG system of flat-rate per-case reimbursement.

Various studies have shown that having reliable coagulation and not needing to switch instruments can result in shorter operation times, along with shorter hospital stays due to faster convalescence.

Moreover, these disposable instruments also offer patients additional safety, as they eliminate the hygiene issues associated with preparing more complex instruments, and also reduce the risk of secondary injuries resulting from frequent instrument switching.

5. Our own experiences

For more than ten years now, St. Marienstift Magdeburg's Clinic for Gynecology and Obstetrics has been performing primarily laparoscopic vaginal or laparoscopically assisted vaginal hysterectomies, though some procedures are done completely laparoscopically. The proportion of supracervical hysterectomies has increased significantly in recent years. The Aesculap® Caiman® 5 system with a working length of 36 cm has been part of our standard instrumentarium for laparoscopic hysterectomies for more than a year. The instrument's ergonomically shaped handle fits well into the surgeon's hand. The activation button on the back of the handle reduces the risk of accidentally triggering the instrument when closing it.

When opened, it can be rotated by 360°.

The tip features a mechanical floating hinge that ensures uniform compression of the tissue being sealed. Tip first closure ensures that structures can be gripped and dissected securely, and prevents them from unintentionally slipping away when grasped. The

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instrument can securely seal vessels of up to 7 mm in diameter, with a sealing length of 26.5 mm and a cutting length of 23.5 mm, which allows surgeons to work quickly and safely.

At less than 1 mm, thermal spread is extremely low, and the device itself heats up only slightly even with repeated activation, which contributes significantly to protecting neighboring structures against thermal lesions.

In our experience, all laparoscopic surgical steps of a hysterectomy can be performed securely and quickly using the Caiman® 5. It eliminates the need to switch instruments regularly. Vessels and vascular bundles were always sealed securely.

No instances of subsequent bleeding or thermal damage to neighboring organs have occurred in the entire period we have used the instrument.

It is important to note, however, that rotation is only possible with the hinged jaw open. In our point of view, this is one aspect of the system for which there is still room for improvement.

6. CONCLUSION

Bipolar vessel sealing systems, such as the Caiman® 5, lend themselves well to use in all forms of laparoscopic hysterectomy. In comparison to conventional bipolar coagulation followed by severing the tissue with Metzenbaum scissors, using bipolar vessel sealing systems shortens operating times. They also allow less frequent instrument switching, thereby preventing the injuries such switching can cause. The sealing footprint is significantly narrower than with conventional bipolar forceps, which also benefits patient safety. In our view, the cost of these disposable instruments is offset by the advantages they provide and the shorter operation time.

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