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## The Ten-Step Vaginal Hysterectomy

Vaginal hysterectomies were already being performed in the 19th century, the first by Langenbeck in 1813.<sup>1,2</sup> Since then, many modifications and variations have been reported. Most methods in use today, like the Porges,<sup>3</sup> Falk,<sup>4</sup> von Theobald,<sup>5</sup> Heaney,<sup>6</sup> Joel-Cohen<sup>7</sup> and the Chicago<sup>8</sup> methods, are carried out with defined sequences. These sequences result from personal interpretations of the pelvic anatomy and the individual experience of the authors.

Innovative procedures such as focused ultrasound<sup>9</sup> and cryomyolysis to reduce the size of fibroids<sup>35</sup> or endometrial resection and microwave treatment for endometrial ablation in uncontrolled vaginal bleedings<sup>10</sup> have reduced the number of all kinds of hysterectomies. These days, hysterectomies are often performed as laparoscopically assisted vaginal hysterectomies (LAVH), even for big uteri.<sup>11</sup> In a prospective, randomised study, no difference between vaginal hysterectomy and LAVH was found with respect to estimated blood loss, complications, hospital stay and period of convalescence. The costs of LAVH were, however, considerably higher.<sup>12</sup>

Even today, with hundreds of publications about laparoscopically assisted vaginal hysterectomy available, the vaginal route should always be considered when hysterectomy is indicated, because of the quick recovery, the lack of abdominal scar and the short hospital stay.<sup>6,13</sup> It seems that laparoscopically

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assisted vaginal hysterectomy should not replace the vaginal but rather the abdominal hysterectomy when there are relative contra-indications for vaginal hysterectomy.<sup>14</sup> There are less and less contra-indications for vaginal hysterectomy,<sup>15</sup> and the operation can be performed with nulliparity<sup>16</sup> and with enlarged uterus.<sup>17</sup> Even uteri up to 982 g have been successfully removed vaginally.<sup>18</sup>

Therefore, in order to find out whether vaginal hysterectomies can still be optimised and simplified after so many years of practice and accumulated experience, a re-evaluation of the six mentioned methods was initiated. First, the steps common to all these methods were defined and analysed, then the steps were re-assessed and excluded if considered unnecessary. Thereafter, the ways of performing the essential steps were critically compared. As a result, only the re-evaluated and absolutely irreplaceable steps remained, sometimes with modifications. Finally, their logical sequence was defined and described.

The result is the so-called 'Ten-Step Vaginal Hysterectomy'. This method is logical, easy to learn, to perform and to teach.

## METHOD DESCRIPTION

The operation steps, their alternatives, the underlying logic and the optimal way of performance will be described. The instruments and suture material needed for each step will be listed.

Vaginal hysterectomies have been recommended for treatment of endometrial cancer in elderly women,<sup>19</sup> but they are mostly performed for benign conditions. Therefore, endometrial malignancy should be excluded before starting the operation; if a diagnostic curettage was not performed before, a hysteroscopy should be done before starting the operation.

### 1. INCISION OF THE VAGINAL WALL

The way in which the incision of the vaginal wall should be performed depends entirely on the individual anatomical conditions. Traditionally, most described methods start, where prolapse exists, with a circular incision around the cervix, extension towards the orificium urethrae externum and separation of the vaginal wall laterally, away from the bladder. This approach has already been challenged by Joel-Cohen.<sup>7</sup> He did the separation the other way around, starting it under the orificium urethrae externum continuing around the external os. We found this approach easy and logical, mainly in multiparae where one often finds adhesions around the external os; therefore, entering the right cleavage is easier upwards.

#### *In a patient with a prolapsed uterus*

The cervix is grasped with two single-toothed tenaculi. In a patient with a prolapsed uterus, the traditional incision around the cervix with a perpendicular extension and the separation of the vaginal wall from the midline to the side, as described above, has been changed into a drop-like



**Fig. 1** A drop like incision around the cervix (Step 1).

incision of the vaginal wall starting under the urethra, continuing laterally and down, encircling the uterine cervix from behind and returning back to the starting point from the other side (Fig. 1). If the depth of the initial incision is correct and the right cleavage is reached, the vaginal wall will be easily separated laterally to the side of the uterus and downwards below the cervix by a gentle use of surgical forceps. This should be nearly bloodless and easier than separating the vaginal wall in the described traditional way. Doing so, the vaginal wall is already ready for the anterior wall colporrhaphy.

After this, the tip of the 'drop' still covering the bladder is pulled down, separating the vaginal wall from the bladder. Being in the right cleavage will also prevent unnecessary bleeding. This procedure, besides being logical, is performed in three main movements compared to six in all other methods.

#### INSTRUMENTS

Speculum, two single-toothed tenaculi, scalpel, surgical forceps.

#### *In a patient without prolapse*

The cervix is grasped with two single-toothed tenaculi. When no prolapse or just a minimal prolapse exists, the first step is a circular incision around the cervix about 5 mm above the external os, and then, being in the right cleavage, the vaginal wall should be separated from the cervix using surgical forceps; more vaginal retractors are sometimes needed in order to allow the surgeon to perform this manipulation under good vision.

## 2. DETACHING BLADDER FROM THE UTERUS

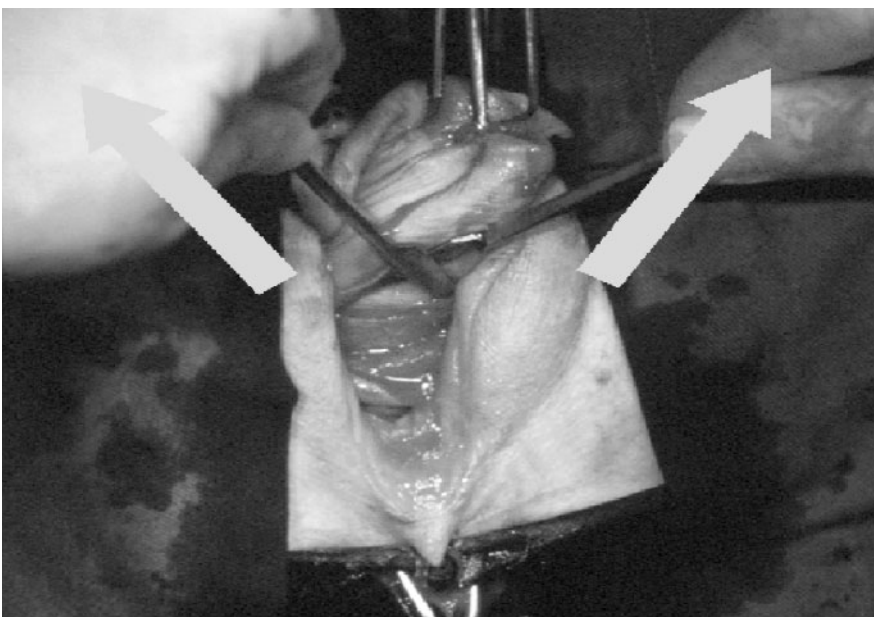
The border between the anterior wall of the uterus and the bladder must be identified (curved scissors are sometimes needed). Then, by pushing the bladder up close to the uterus using a swab, it will separate from the uterus until the anterior peritoneum is exposed. No effort should be made to open the peritoneum. Opening the anterior peritoneum at this stage is not necessary and not recommended because it disturbs the dynamics of the operation and interrupts its continuity. It might cause damage to the bladder whenever the inter-anatomical relations between it and the peritoneum are not clear. Haemostasis should be done carefully. After the bladder has been pushed up, the swab stays between the anterior peritoneum and the bladder and should, therefore, be marked. Previous caesarean sections are not now considered a contra-indication for vaginal hysterectomy.<sup>15</sup>

### INSTRUMENTS

Swab, Allis clamp, scalpel, optionally scissors

## 3. OPENING POSTERIOR PERITONEUM

To open the posterior peritoneum, the tenaculi holding the uterus should be pulled up by the assistant and the peritoneum should be grasped with surgical forceps while being cut and opened with scissors. The scissors are then



**Fig. 2** Opening the post-peritoneum (Step 3).

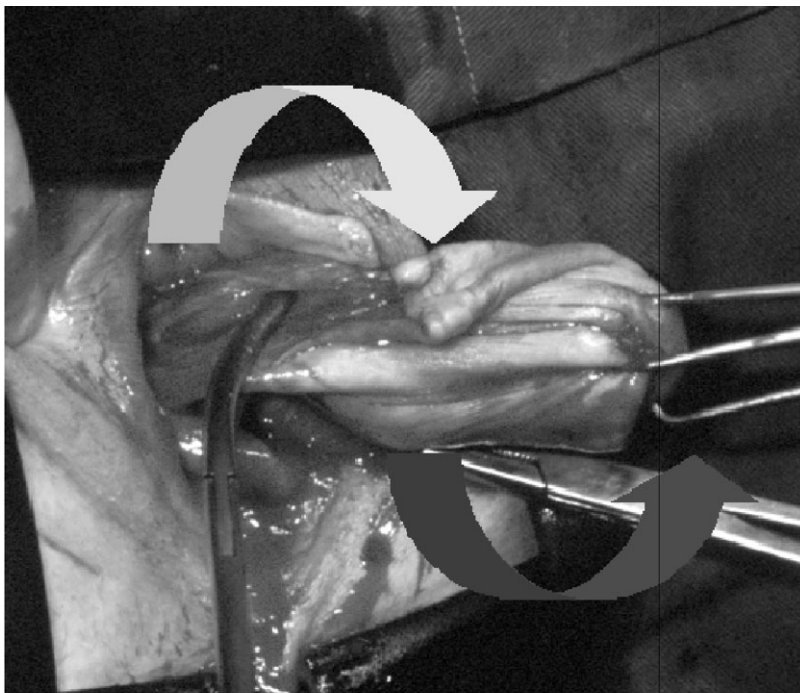
introduced into the Douglas cavity and, holding each blade with one hand, pulled out while they remain open, so that the back sides of the blades expose the insertions of the sacro-uterine ligaments (Fig. 2).<sup>20,21</sup>

#### INSTRUMENTS

Surgical forceps, scissors

### 4. DISSECTION OF THE LOWER PART OF THE UTERUS

In contradiction to the time-honoured, traditional anatomical approach which dealt with each anatomical structure separately, the sacro-uterine ligaments and the paracervical tissues, which are anatomically in different planes and directions, are clamped together. This is done by a designed manoeuvre: one blade of an open clamp is placed under the insertion of the sacro-uterine ligament, the instrument rotates towards the uterus while the uterus is being contrarotated (Fig. 3). Both anatomical structures are included between the blades of the instrument while it is being closed. Both structures, the relatively bloodless sacro-uterine ligament and the paracervical tissues, are cut and ligated leaving the suture material in its full length. This is repeated on the contralateral side. These steps are safe and, if correctly done, bloodless,



**Fig. 3** The sacro-uterine ligaments and the paracervical tissues are grasped with one instrument (Step 4).

dynamically correct and time-saving. In most of the traditional surgical methods for vaginal hysterectomy, both elements will anyway be sutured to each other at the end of the operation (there are exceptions, some surgeons perform vaginal hysterectomies without ligating the cervical ligaments).<sup>20</sup>

When done in a patient without prolapse, this manoeuvre will instantly produce a significant descensus, and with a slight traction, the uterine arteries will be exposed.

#### INSTRUMENTS

Wertheim or Heaney clamp, needle holder, surgical forceps, scissors, two sutures

### 5. CUTTING AND LIGATING THE UTERINE ARTERIES

Both uterine arteries are clamped, cut and ligated.

#### INSTRUMENTS

Wertheim or Heaney clamp, needle holder, scissors, two sutures

### 6. OPENING THE ANTERIOR PERITONEUM

After both uterine arteries have been cut and ligated, the uterus is pulled down and two fingers are introduced behind the fundus to lift the anterior peritoneum which can be opened under vision with scissors. This will ensure the safety of the bladder, as its anatomical relations with the anterior peritoneum are not always clear, in particular after previous caesarean sections.

Access to the fundus in a myomatous uterus is sometimes difficult. In such a case, the surgeon should hold both tenaculi with the left hand while continuously and slowly pulling them down with rotating movements. Usually, the uterus is amenable and will descend until it is possible to insert the right index and middle fingers beyond the fundus and lift the anterior peritoneum. Occasionally, additional steps are necessary to separate the parametrium from the uterus. There is no risk of damaging the ovarian arteries with this rotating and pulling manoeuvre because the larger the uterus, the longer they are. It is amazing to realise how one can descend a large uterus with such a manoeuvre. The decision about the size of uterus that can be removed vaginally depends solely on the experience of the individual surgeon and should be taken before starting the operation. Morcellation of the uterus, which is safe and facilitates the removal of enlarged and well-supported uteri, may be performed where needed.<sup>18</sup> With increasing experience of this rotating manoeuvre, the less often morcellation becomes necessary. In experienced hands, a big uterus should not be a contra-indication for vaginal hysterectomy.<sup>22,23</sup>

INSTRUMENTS: scissors

## 7. DISSECTION OF THE UPPER PART OF THE UTERUS (AND APPENDAGES)

The round and ovarian ligaments and the blood vessels are clamped together and ligated. The ligature should be placed as lateral as possible away from the clamp, leaving the ovarian ligaments as long as possible. The uterus is cut away with scissors medial to the instrument. A transfexion suture is placed between the clamp and the ligature keeping the full length of the suture material. The ligature, which is placed before and lateral to the transfexion, will prevent bleeding, should this transfexion suture slip away or tear by traction. The same procedure should be done on the contralateral side.

INSTRUMENTS

Wertheim or Heaney clamp, scissors, needle holder, surgical forceps, four sutures

## 8. THE 'NON-STAGE' – LEAVING THE PERITONEUM OPEN

In 1980, Harold Ellis showed that closing the peritoneum at the end of abdominal surgery is not necessary.<sup>24</sup> The thin peritoneum, unlike skin, can not be adapted by placing its ends together. Vascular bridges over peritoneal sutures are a focus for ischaemia and adhesions. When peritoneum is left open, the coelom cells will produce a new peritoneum. Indeed, leaving peritoneum open in a caesarean section proved to cause less adhesions than when it was closed.<sup>25</sup> It was also shown that the peritoneal closure is not necessary for vaginal hysterectomy.<sup>26,27</sup> The British Royal College of Obstetrics and Gynaecology recommended in its guideline No. 15 in July 2002 to leave peritoneum open with evidence level Ib.<sup>28</sup>

The pelvic parietal peritoneum is attached to the pelvic ligaments. The ligation of the ligaments to each other (Step 9) will create a peritoneal sac between the ligaments and a closed peritoneum, with all consequences involved.

Another advantage of leaving peritoneum open is, therefore, the free drainage into the peritoneal cavity where blood can be absorbed by the peritoneum and lymph channels.

If an enterocele has to be prevented or repaired, it should be done before continuing the operation.<sup>29</sup>

## 9. RECONSTRUCTION OF THE PELVIC FLOOR

The left and right sacro-uterine ligaments with the paracervical tissues as well as the ovarian ligaments are ligated to each other respectively. An extra suture may be placed to join the sacro-uterine ligaments. The decision should be taken according to the individual anatomical relationships.

### INSTRUMENTS

Scissors, needle holder, surgical forceps, optionally one suture

## 10. CLOSING THE VAGINAL WALL

The vaginal wall is sutured continuously. It is recommended in sexually active women to close the vagina transversely. This will prevent dyspareunia as the suturing line will be on the upper side of the anterior wall.

### INSTRUMENTS

Allis clamp, needle holder, surgical forceps, scissors, one suture.

## COMPARATIVE RESULTS

In a study in two hospitals, 96 women with prolapse II or III underwent vaginal hysterectomy, 52 with the Heaney method and 44 with Ten-Step

**Table 1** Prospective, randomised comparison of vaginal hysterectomies performed by the Heaney and the Ten-Step Vaginal Hysterectomy methods.

	Heaney method <i>n</i> = 52 Median (25th–75th percentile)	Ten-Step Vaginal Hysterectomy <i>n</i> = 44 Median (25th–75th percentile)
Age (years)	61.6 (46–75.9)	66.2 (53–77)
Operation time (min)	52.3 (23.3–90)	34.1 (20.5–50)*
Pain killers needed (h)	48.7 (19–86)	29.6 (8–75)*
Average hospital stay (range)	5.8 (4–8)	5.9 (4–8)

\*Statistically significant difference ( $P < 0.05$ ).

The data were stored in a database. The evaluation was done using SPSS for Windows. Frequencies and standard differences were calculated as mean variations.

Chi square analysis was used.

Vaginal Hysterectomy. There was no significant difference in both groups for age and parity. The women undergoing the Ten-Step Vaginal Hysterectomy had a significantly shorter operation time and shorter requirement of analgesics (Table 1).

## DISCUSSION

As much as tradition is a benefit in cultural life, it might prevent new thinking and surgical developments if procedures are not constantly subjected to re-evaluation. No step of any operation should be a taboo. Each should always be examined in the light of new understanding of the pathology and physiology.

A surgical procedure should be evaluated by examining not only every single step but also their combinations and sequences. The necessity of each step and its exact way of performance should be critically assessed by comparing it to alternatives.

Each surgical procedure is composed of hundreds of movements. Each should have a defined purpose and a precise way of performance. Surgical steps and sequences often result from traditions and personal preference and are not necessarily based on randomised comparative and prospective studies.

Clinical studies concerning surgical procedures should take into account the early (febrile morbidity, analgesics needed, mobility) and late outcomes (adhesions, organ dysfunctions, chronic pains and life quality, next to the costs).

Many studies have compared the outcome of vaginal hysterectomy to abdominal or laparoscopically assisted vaginal hysterectomy. Campbell *et al.*<sup>30</sup> compared the three methods in 33,792 operations, analysing the duration of the hospital stay and the involved costs and concluded that 'vaginal hysterectomy provides the best patient outcomes, with the shortest hospital stays and lowest complication rates at the lowest cost'. The laparoscopically assisted vaginal hysterectomy is considered an alternative to abdominal hysterectomy.<sup>31</sup> Shorter hospital stay and less need of analgesia was reported in the laparoscopically assisted vaginal hysterectomy, but at the same time there was a higher rate of bladder injuries and a longer operation time when compared to vaginal hysterectomy.<sup>32</sup>

Only a few studies relate variations of single operative steps to the outcomes of vaginal hysterectomy. Leaving the parametrium unsutured resulted in a shorter operation time with no significant differences in other examined parameters.<sup>20</sup> Some advantages were reported where mass closure of the vaginal cuff was performed,<sup>33</sup> or when morcellation was practised.<sup>23</sup>

The vaginal route should always be considered when hysterectomy is indicated, because of a quicker recovery, lack of abdominal scar and shorter hospital stay. There is no justification for LAVH in the presence of significant uterine descent.<sup>34</sup>

The Ten-Step Vaginal Hysterectomy, which results from analyses of surgical steps used in different methods, is based, besides anatomical considerations, on up-to-date sound physiological principles. The result is a rational and simple operation which avoids unnecessary movements and follows rules of aesthetics and functional minimalism. Only ten instruments and ten sutures are needed and it was shown that this operation reduces the operation time

and the use of pain killers. More randomised, prospective studies will be needed to evaluate the late outcome of this method.

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