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# A Laparovaginal strategy to avoid bladder injury during laparoscopic-assisted vaginal hysterectomy in cases with ventrofixed uterus following previous cesarean section

Ramkrishna Purohit, Jay Gopal Sharma, Devajani Meher, Sanjay Raosaheb Rakh Minal Choudhary

## Background

Laparoscopic hysterectomy for benign indications in cases with ventrofixed uterus following previous cesarean section (CS) increases the surgeon's concern of bladder injury. The present study describes a laparovaginal strategy to avoid bladder injury during laparoscopic-assisted vaginal hysterectomy (LAVH) in cases with ventrofixed uterus following previous CS.

## Methods

In a retrospective study conducted in our private general hospital, we included consecutive cases of laparoscopically confirmed ventrofixed uterus associated with previous CS. These were from the cases who underwent LAVH for benign indications. Cases with uterus size  $\geq 16$  weeks of gestation were excluded. Patients' clinical, intraoperative and postoperative characteristics were studied to evaluate the feasibility of the described laparovaginal strategy to prevent bladder injury during LAVH in cases with ventrofixed uterus.

## Results

A total of 35 cases with ventrofixed uterus underwent LAVH during the study. Six (17.14%) cases had a history of one CS, while 29 (82.86%) cases had a history of previous two or more CSs. A supravescical loose fatty tissue plane (supravescical space) indicating reach to the bladder wall during laparoscopic lysis of the uterus from the

anterior abdominal wall was successfully demonstrated in all the cases. The bladder flap preparation was avoided. Uterovesical adhesions were dissected by posteroanterior approach during vaginal phase of LAVH in all the cases. LAVH was successfully performed in all the cases. None of the cases had bladder injury, laparotomic conversion or other major complications.

Mean operating time for LAVH was  $149.71 \pm 38.36$  minutes (70–200 minutes). Mean uterine specimen weight was  $162.85 \pm 92.57$  g (60–500 g). Mean postoperative hospital stay was  $2.42 \pm 0.73$  days (2–5 days).

## Conclusion

In spite of severe adhesions in cases with a ventrofixed uterus following previous CS, bladder injury can be avoided during LAVH by the described laparovaginal approach in the present study.

## Short synopsis

The described laparovaginal approach may avoid bladder injury during laparoscopic-assisted vaginal hysterectomy in cases with a ventrofixed uterus following previous cesarean section. Keywords: laparoscopic-assisted vaginal hysterectomy, ventrofixed uterus, previous cesarean section, supravescical plane, bladder injury.

## Introduction

Hysterectomy for benign indication in cases associated with severe pelvic adhesions has still been a technical challenge by all routes.

Hysterectomy, in cases associated with ventrofixation of the uterus to anterior abdominal wall scar following previous cesarean section (CS), further adds to the surgeon's concern of a bladder injury. Cases with fixed benign adhesion of the uterine corpus to anterior abdominal wall scar following previous CS are usually associated with obliterated anterior cul-de-sac and dense uterovesical adhesion.<sup>1–3</sup> Fixed uterine corpus to anterior abdominal wall alters the pelvic anatomy,<sup>3,4</sup> pulls up the uterine cervix to a level beyond the accessibility for vaginal hysterectomy and thus contra-indicates a vaginal hysterectomy.<sup>3–5</sup>

Prediction of a difficult surgical dissection through the dense adhesion to find plane between the uterus and bladder and fear of an unexpected visceral injury during laparoscopic-assisted vaginal hysterectomy (LAVH) or total laparoscopic hysterectomy (TLH) often lead a gynecologic surgeon to choose a total abdominal hysterectomy.

Laparoscopic phase of LAVH to avoid laparotomy in such cases can be simplified: if the dissection plane between the

uterus, anterior abdominal wall and bladder is established methodically up to the uterovesical fold to release the uterus and cervix from the anterior abdominal wall. Vaginal phase of LAVH in such cases can be simplified if the uterovesical adhesions are dissected by posteroanterior approach with an aim to avoid a bladder injury.<sup>6</sup>

Therefore, we describe in the following an LAVH strategy for cases associated with ventrofixed uterus following a previous caesarian section with an aim to simplify the surgical procedures and to avoid bladder injury.

## Methods

A retrospective study was conducted in our private general hospital from December 2014 to November 2017. We included consecutive cases of laparoscopically confirmed ventrofixed uterus (Figures 1 and 2) associated with previous CS of the cases who underwent LAVH for benign indications.<sup>3,7</sup> Cases with a uterus size<sup>16</sup> weeks of gestation were excluded. Every patient provided written informed consent for the operation and to review their medical files. Hospital authority permitted to study the medical files. The ethics committee of the Purohit General Hospital approved the study.

Patient's clinical, intraoperative and postoperative characteristics were studied to know the feasibility of the below described laparovaginal approach to avoid a bladder injury in cases with ventrofixed uterus following previous CS.

## Surgical procedure (Purohit laparovaginal approach)

LAVH was started in the standard manner. Under anesthesia, a uterine sound was inserted transcervically into the uterine cavity. The uterus was retroverted by the uterine to observe the point of dimpling of anterior abdominal wall scar (Figure 3) along a line drawn between umbilicus and symphysis pubis (uterine sound retroversion test). This dimpling indicated the



**Fig 1. Laproscopic view of ventrofixed uterus in a case who underwent LAVH**

**Fig 2. Laproscopic view of ventrofixed uterus in another case who underwent LAVH**

point of fixed adhesions between the uterus and the anterior abdominal wall scar. The Palmer's point or a supraumbilical primary laparoscopic port insertion was used for the uterus fixed to the

mid-third and upper-third of a line drawn along the anterior abdominal wall between the umbilicus and the symphysis pubis.<sup>1</sup> An intraumbilical primary port was used for the uterus fixed to the lower-third (suprapubic) of a line on the anterior abdominal wall between umbilicus and symphysis pubis.



**Fig 3. Dimpling seen on the skin on anterior abdominal**

An intrauterine manipulator or a laparoscopic myoma screw was used to retrovert the uterus and stretch the tough adhesion bands between the uterus and anterior abdominal wall during laparoscopic adhesiolysis.<sup>1</sup> The intrauterine manipulator was inserted through the cervix before initiating pneumoperitoneum, because because pneumoperitoneum gradually causes upward and ventral movement of the ventrofixed uterus and elevates the cervix to a higher level beyond the vaginal accessibility.

Laparoscopically, omental adhesions were separated from the anterior abdominal wall, uterus and adnexa.

An incision using a laparoscopic monopolar hook (35–40 watts) or a laparoscopic harmonic shear

was started close to the uterine wall and from the upper and lateral sides of fixed adhesion of the uterus to anterior abdominal wall. Layer-by-layer release of thick adhesion bands from above downward through a cleavage gradually allowed the retroversion of the uterus and ventral movement of the anterior abdominal wall. This exposed the inner bands of fibrosis through the split formed between the uterus and anterior abdominal wall. Open and close dissection by a laparoscopic dissecting forceps through this cleavage in a downward direction gradually defined a plane of loose retroperitoneal fatty tissue above the bladder. This loose supravescical space (Fig- 4) amidst the adhesions was located anterior to the lower part of the uterus above the bladder wall and below the thick fibrosed bands between the corpus of uterus and anterior abdominal wall. The supravescical space (Purohit space) indicated the surgeon's reach on to the underlying bladder wall and the lower limit of anterior dissection. Downward and anterior mobilization of the loose fascia at this stage gently by a laparoscopic forceps revealed the retroperitoneal vascular markings of the uterovesical fold (Figure 5 - arrow). Other lateral adhesion bands above the uterovesical folds (Figure 5 – double arrow) were released from the

uterus using monopolar hook or a harmonic shear close to the uterus, finally to drop the fundus of the uterus further into the pelvis. These manoeuvres increased descend of the uterus to favor a vaginal accessibility during the vaginal phase of LAVH.

Bladder flap was not dissected off the uterus laparoscopically. Dissection below the level of uterovesical fold was carried out vaginally by posteroanterior approach to complete the vaginal phase of LAVH.<sup>6</sup>

Further during the laparoscopic phase, thick scar bands between the uterus and the broad ligament below the level of the round ligament on either side were released. Upper pedicles bilaterally were separated from the uterus up to the uterine artery. Uterine arteries were secured. Then, vaginal phase of LAVH was started using procedures of Purohit technique of vaginal hysterectomy with posteroanterior



**Fig 4. Loose supravescical space (Purohit's Space)**

**Fig 5. Lateral adhesions above the uterovesical folds**

approach to lyse the uterovesical adhesions.<sup>6</sup> Monopolar current (35–40 watts) and bipolar current (45–50 watts) were used during the vaginal phase of LAVH. Cardinal ligaments were separated bilaterally to increase descend of the cervix and

posterior pouch. Then, the posterior pouch was opened. Uterosacrals and uterine arteries bilaterally were separated. No attempt was done to dissect the bladder directly off the anterior wall of uterus to open anterior cul-de-sac at this stage. Using the posteroanterior approach, sub-serosal morcellation was done to reduce the width of the posterior wall of uterus up to the fundus.<sup>6</sup> Then, the laparoscopically freed and vaginally mobilized narrow fundus was brought down through the posterior peritoneal opening. It was excised under direct vision to reduce the cervico-fundal length of the anterior uterine wall. Then, the margin of the incision of the anterior uterine wall was pulled in downward and outward directions by Allis's forceps and kept under tension. At this stage, through the posterior peritoneal opening, the surgeon passes the index finger of his left hand above the incision margin of anterior uterine wall and tries to project his finger tip anteriorly through the uterovesical adhesion close to uterus. Further thinning of the anterior uterine wall was done if the finger tip fell short of its anterior projection. Then, the index finger of the right hand was brought from the anterior aspect and the thickness of uterovesical adhesions was assessed by both hands (Figure 6). The finger tip reflection (Figure 7) of the left index finger at this stage indicated a bladder-free thin area of the uterovesical scar between the firm uterine and fleshy bladder walls.

The surgeon's index finger tip was then replaced by the tip of right angle forceps (RFs) from the posterior aspect (Figure 8).<sup>6</sup> The

tip of the forceps was penetrated under direct vision adjacent to the uterus through the bladder-free area of uterovesical adhesions (Figure 9) to enter anterior cul-de-sac. The prongs of RFs were opened. Then, the anterior wall of uterine cervix was split longitudinally between the prongs of RFs (Figure 10) into two halves. Through this split, the anterior vaginal wall retractor retracted the bladder. Then, each half of anterior wall of uterus was separated under vision from the residual scarred bladder pillars, broad ligament and other adhesions, if any, to complete the hysterectomy. The vault was closed vaginally. Laparoscopic lavage was done finally to complete the procedure.



**Fig 6. Thickness of the uterovesical fold was assessed**



**Fig 7. Finger tip reflection**



**Fig 8. Right angled forcep introduced from the posterior aspect**

**Fig 9. The tip of the forcep was penetrated under direct vision through the bladder free uterovesical fold**



**Fig 10. Anterior wall of the cervix was split longitudinally**

Few of the patients had more than one symptom.

Table 1 lists patient characteristics. Six (17.14%) cases had a history of one previous lower segment CS. In all, 29 (82.86%) cases had a history of previous two or more CSs. Ventrofixed uterus was suspected preoperatively from the following features in all 35 candidates of hysterectomy and was the sole indication of LAVH.

1. In 32 (91.43%) cases, the cervix was seen clinically at a high level and palpated with difficulty by bimanual pelvic examination.<sup>3,5,7</sup> In three (8.57%) cases, the cervix was easily seen on speculum examination and palpated easily on bimanual pelvic examination.

2. Transabdominal ultrasonic demonstration of absence of viscera slide movement on deep inspiration at the site of attachment between the uterus and anterior abdominal wall<sup>8</sup> precisely indicated the upper level of fixed adhesion of the uterus to anterior abdominal wall between umbilicus and symphysis pubis in all 35 cases before laparoscopy.

3. Attempt of retroversion of uterus by the uterine sound under anesthesia (uterine sound retroversion test) before initiating pneumoperitoneum demonstrated dimpling of anterior abdominal wall scar (Figure 3) and indicated the upper level of fixed adhesion of the uterus to anterior abdominal wall before selecting site of the primary port for LAVH in all 35 cases. Dimpling was demonstrated in the upper-third

of a line drawn between umbilicus and symphysis pubis in 8 (22.85%) cases and in mid-third of the line in 11 (31.43%) cases.

Combined, ventrofixation was seen at or above the mid-third of the line in 19 (54.29%) cases, while in 16 (45.71%) cases, it was seen in the lower-third of the line.

Table 1 Patient characteristics

Patient characteristics	n=35	%
Cases associated with previous		
One CS	6	17.14
Two CSs	19	54.29
Three CSs	10	28.57
Associated pelvic endometriosis	0	00
Features indicating ventrofixation of uterus		
1. Cervix high positioned, and felt with		
Difficulty on bimanual pelvic examination	32	91.43
Cervix, easily seen on speculum examination and felt on bimanual pelvic examination	3	8.57
2. Transabdominal ultrasonic visualization of absence of viscera slide movement on deep inspiration		
	35	100
3. Dimpling on anterior abdominal wall demonstrated of by uterine sound under anesthesia		
	35	100
Upper level of fixed adhesion of uterus to anterior abdominal wall along a line between umbilicus and symphysis pubis was seen in		
Upper-third	8	22.85
Mid-third	11	31.43
Lower-third	16	45.71

Abbreviation: CS, cesarean section.

Table 1. Patient characteristics

Table 2 lists intraoperative adhesions and perioperative outcomes.

Laparoscopy found that the anterior cul-de-sac was obliterated by thick and wide fibrosis in all 35 cases. Posterior cul-desac was not obliterated in any of 35 cases. None of the cases had a cul-de-sac obliteration due to endometriosis. None of them had pelvic endometriosis. All patients had dense uterovesical adhesions seen during the vaginal phase of LAVH.

A supravescical loose fatty tissue plane (supravescical space) during laparoscopic lysis of the ventrofixed uterus from the

anterior abdominal wall was demonstrated in all cases during the laparoscopic phase of LAVH.

Laparoscopic lysis of ventrofixed uterus from the anterior abdominal wall increased descent of uterus and cervix and favored vaginal accessibility for the vaginal phase of LAVH in all cases. Vaginal phase of LAVH was completed by posteroanterior approach in all cases.

Table 2 Intraoperative adhesions and perioperative outcomes

Outcomes	n=35	%
Wide thick adhesions of uterine corpus to anterior abdominal wall	35	100
Obliterated anterior cul-de-sac	35	100
Obliterated posterior cul-de-sac	0	00
Dense uterovesical adhesion	35	100
Supravescical loose fatty tissue plane (supravescical space) was demonstrated	35	100
Descensus of uterus cervix increased after laparoscopic lysis	35	100
Vaginal phase of LAVH was completed by posteroanterior approach	35	100
LAVH preformed successfully	35	100
Uterus weight (g)		
60–200	31	88.57
200–300	2	5.71
300–400	1	2.85
400–500	1	2.85
Blood transfusion	1	2.85
Conversion to laparotomy	0	00
Bladder injury	0	00
Postoperative nerve paresthesia	2	5.71
Any other	0	0.00

Abbreviation: LAVH, laparoscopic-assisted vaginal hysterectomy.

Table 2. Operative outcomes

LAVH by the adopted procedure was successfully completed in all cases. None of cases needed laparotomic conversion due to the failed progress of LAVH.

Mean operating time for LAVH was 149.71±38.36 minutes (70–200 minutes). Mean uterine specimen weight was 162.85±92.57 g (60–500 g). However, 31 (88.57%) cases of them had a uterus that weighted 200 g.

Blood transfusion was needed in one case. This case had large fibroid uterus size of 16 weeks of gestation, and specimen uterus

weighted 500 g. None of the cases had bladder or ureteral injury. Two women developed unilateral paresthesia of lower limb, which recovered spontaneously in 5 days. Mean hospital stay after the operation was 2.42±0.73 days (2–5 days).

## Discussion

Vaginal hysterectomy has been the least invasive method of hysterectomy, and it may be practiced in indicated cases associated with previous CS after exclusion of ventrofixed uterus from specific clinical and ultrasonic features.<sup>3, 5–7</sup> Fixed adhesion of the uterus to anterior abdominal wall (ventrofixed uterus) was observed in ~14.9%–17.9% of hysterectomies for benign indication associated with previous CS.<sup>4, 6, 9</sup> It may occur even after one previous CS (Table 1).

Fixed adhesions of the uterus to anterior abdominal wall may be suspected in a case with previous CS from specific clinical features,<sup>3, 5</sup> transvaginal and transabdominal ultrasonographic features,<sup>3, 5</sup> ultrasonic viscera slide<sup>8, 10–12</sup> and MRI examination.<sup>3</sup> An attempt of retroversion of the uterus under anesthesia using a uterine sound as shown in this study reliably demonstrated dimpling of anterior abdominal wall, indicating the upper level of adhesion in all cases. This test can also be done before initiation of vaginal hysterectomy in cases associated with previous CS to exclude ventrofixed uterus and thus the need for laparoscopic hysterectomy.

In three (8.57%) cases of this series, the cervix was easily seen clinically on speculum examination and palpated easily on bimanual pelvic examination. In these clinically unsuspected cases, ventrofixation could be easily missed without the preoperative uterine sound retroversion test. In this small number of clinically unsuspected cases, unexpected appearance of a ventrofixed uterus would occur during vaginal hysterectomy and laparoscopic hysterectomy.

Determination of the upper level of fixed adhesion of the uterus to anterior abdominal wall (Table 1) before laparoscopy by a uterine sound in this study assisted surgeons selecting a safer site for primary port insertion to avoid unintended visceral injury.

Ventrofixed uterus pulls up the uterus and prevents its desired descend into the pelvis during vaginal hysterectomy and may result in failed vaginal hysterectomy and thus, contraindicates vaginal hysterectomy.<sup>3</sup> Ventrofixation of uterus and contracture of broad ligament following previous CS raise the level of cervix beyond the vaginal accessibility for a vaginal hysterectomy. Vaginal hysterectomy in such cases is feasible only after release of uterus into the pelvic from the anterior abdominal wall laparoscopically.

During the release of uterus, blurred anatomy from the level of round ligament up to the uterovesical fold was a cause of concerns to the surgeon. Demonstration of the plane of loose fatty tissue (supravesical space) and retroperitoneal vascular markings during the

laparoscopic phase as the end point of anterior dissection of laparoscopic phase in this series of 35 cases eased to identify the underlying bladder wall amidst the dense adhesion bands between the uterus and anterior abdominal wall and thus avoided unintended bladder injury. This loose supravesical fatty tissue and retroperitoneal vessels remain intact in spite of dense adhesions between uterus and anterior abdominal wall and could be seen in all cases.

Completion of a vaginal phase of LAVH by posteroanterior approach below the level of uterovesical folds eased to identify the bladder clearly from the uterus using tactile feel in a dense uterovesical adhesion<sup>6</sup> and thus avoided bladder injury in all cases of this study. This finding is supported by our previous study where the posteroanterior approach during vaginal hysterectomy demonstrated no bladder injury in the presence of dense uterovesical adhesions in cases with previous CS.<sup>6</sup>

Laparoscopic bladder injury in spite of careful surgery during LAVH and TLH has been frequently reported by many surgeons during laparoscopic uterovesical dissection,<sup>1, 4, 13, 14</sup> anterior colpotomy<sup>4</sup> or vaginal phase of LAVH. This has been attributed to the unclear anatomy during anterior dissection in cases with previous CS.<sup>9, 15, 16</sup> The present technique avoided conventional bladder flap preparation during the laparoscopic phase of LAVH and utilized the posteroanterior approach during the vaginal phase of LAVH to avoid a bladder injury.<sup>6</sup>

The mean operation time of LAVH for cases with ventrofixed uterus is almost twice (149.71±38.36 minutes vs 78.59±33.15 minutes) than that of mean operation of vaginal hysterectomy in cases associated with previous CS without a ventrofixed uterus.<sup>6</sup> However, the operation time in this study is shorter than that of conventional LAVH (149.71 vs 175 minutes) in a similar series reported by a previous study.<sup>9</sup>

Similar to previous observations,<sup>4,9</sup> prolongation of mean operation time in this study was due to additional time consumed by adhesiolysis to separate the uterus from the anterior abdominal wall in the laparoscopic phase and the uterus from the bladder in the vaginal phase of LAVH.

We believe that the adopted approach in this study will simplify many of the challenges faced during laparoscopic and vaginal phases of LAVH in cases associated with ventrofixed uterus following previous CS to avoid bladder injury.

## Conclusion

In spite of dense adhesions in cases with ventrofixed uterus following previous CS, LAVH can be performed safely, and bladder injury can be avoided by the described laparovaginal approach in the present study.

## Disclosure

The authors report no conflicts of interest in this work.

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## NDVH in special situations

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Hysterectomy is one of the most frequently performed surgical procedure worldwide.<sup>1</sup> Hysterectomy may be performed abdominally, vaginally, laparoscopically or with robotic assistance with the route depending upon physician's choice. Factors to be considered in choosing the route of hysterectomy should include safety, cost effectiveness and medical need of patient.

Preferably surgical approach of hysterectomy should be decided by the woman in discussion with surgeon and it is moral responsibility of the surgeon to provide evidence based unbiased opinion.<sup>2</sup>

Most of the literature support that vaginal hysterectomy when feasible is the safest and cost effective procedure for removal of uterus and should be the approach of choice whenever feasible. Evidences demonstrate that it is associated with better outcomes when compared with other approaches to hysterectomy.<sup>3, 4, & 5</sup>

Younger trainees are seeing less vaginal procedures being done and having less confidence to carry out the procedure. The surgeons are steering away from vaginal approach because laparoscopic and robotic approaches are much more appealing and considered to be glamorous.<sup>6, 7</sup>

There are very few contraindications for vaginal hysterectomy. However there are

some factors that may influence the surgeon's choice of a route for hysterectomy like surgeons training, accessibility of uterus, size and shape of uterus, extent of extra uterine disease, need of concurrent procedure like oophorectomy and salpingectomy and the cases with previous caesarean section.

As a gynec surgeon I visualize four situation for which each gynaecologist should master the skills of vaginal hysterectomy. Situation 1 is where because of associated some type of pelvic organ prolapse, vaginal approach is best suited. The situation 2, there are indications of hysterectomy where all three approaches are suitable but Non-descent vaginal hysterectomy (NDVH) is affordable to everybody. The situation 3, it is scar less surgery in low socioeconomic settings. The situation 4, these are the cases where performing NDVH is difficult situation. These are big uterus, irregular uterus, nulliparous uterus, pelvic adhesions, concomitant oophorectomy or salpingectomy, benign adnexal masses, obesity and cases with previous caesarean section. Earlier few of these conditions were said to be relative contraindications for NDVH. But with expertise and experience, these cases can be easily done by NDVH.

Cases of fibroids, adenomyosis, and irregular uterus more than 12 weeks size can be easily done vaginally by expertise (Fig 1& 2).

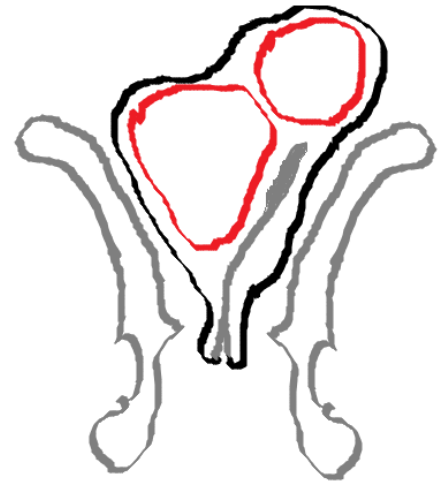


Fig 1. Irregular uterus more than 12 weeks size

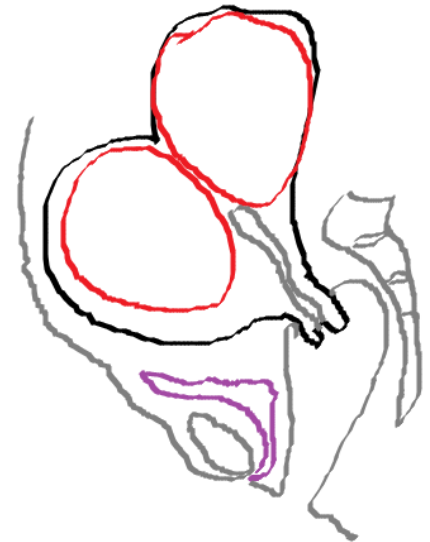


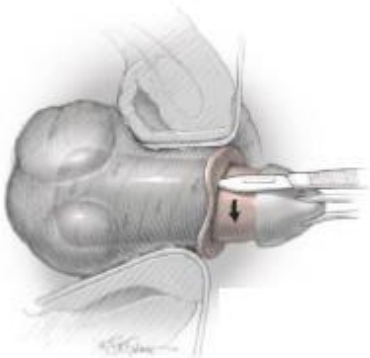
Fig 2. Irregular uterus more than 12 weeks size

BISECTION, CORING, MORCELLATION and ENUCLEATION are the debulking techniques and proved to be gold standard. 200-700 gm of uterus has been successfully removed (Fig 3 & 4, Source: Williams Gynecology Ed 3, Vaginal hysterectomy). Peloci reported 2003 gm uterus removed vaginally. The golden rule of all

debulking technique is that they have to be performed after ligation of uterine vessels. Intramyometrial coring was introduced by Lash in 1941 and reintroduced in 1986 for removal of large uteri. In this technique myometrium can be circumferentially incised with scalpel placed parallel to uterine axis of uterus beneath the serosal covering of uterus. This removes the core inside the uterus without violating the integrity of endometrial cavity, to facilitate the coring strong traction on uterus is necessary. It reduces the width of uterus thereby increasing the length; the effect of coring is- it converts spherical structure into rod like structure. When the uterine width is smaller, bisection or morcellation is preferred over coring.

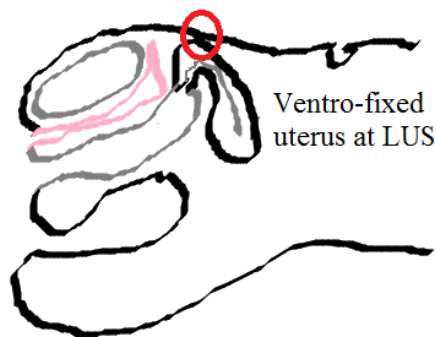


**Fig 3. Bisection**



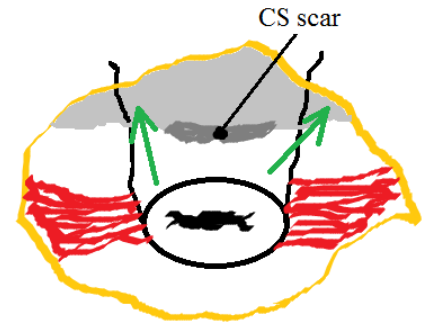
**Fig 4. Coring**

As the number of caesarean section are increasing, in coming days there will be more number of patients undergoing hysterectomy to have caesarean section scar. NDVH can be performed in cases with previous one or more caesarean section. One study found that in 93% cases it was performed successfully without any complications. Only cases with previous caesarean scar having ventrofixed uterus adherent to anterior abdominal wall, are true contraindications for NDVH. These cases can easily diagnosed clinically by vaginally pulling down the cervix and demonstrating the visible abdominal wall retraction (Fig 5).



**Fig 5. Post cesarean section ventro-fixed uterus**

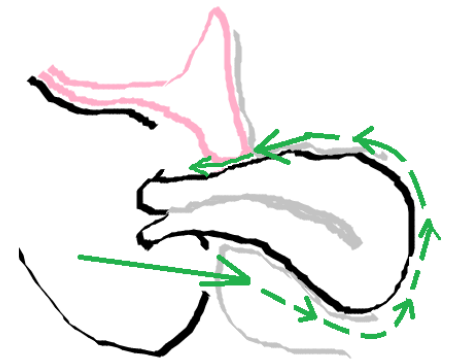
A LSCS scar distorts the anatomy by reducing vesicouterine space between the scar and the urinary bladder. Controlled dissection of caesarean section scar is easier and more directly visible in vagina than from abdomen. Bladder can be dissected and anterior pouch can be approached by various methods. One method suggested by Dr. Shirish Seth is lateral approach which is going lateral to the LSCS scar on both the side through anterior fold of broad ligament (Fig 6).



→ Arrow indicating entry through ant. fold of broad ligament.

**Fig 6. Dr. Shirish Seth's lateral approach**

Another method is going around the uterus after opening of posterior pouch. But this method is easy when uterus is of normal size and mobile (Fig- 7).



**Fig 7. Pouch of Douglas first approach**

The other method is dissection above the scar, performed by identifying the scar, the bladder and the peritoneum as independent structure (Fig- 8).



**Fig 8. Dissecting above the scar or through the scar**

On occasions it is possible to dissect under the scar which keeps

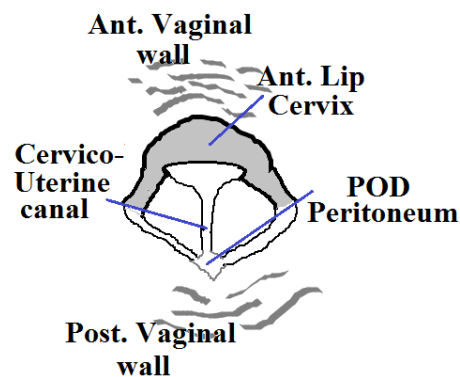
dissection further away from the urinary bladder (Fig- 9).



**Fig 9. Dissecting beneath the scar through perimetrium**

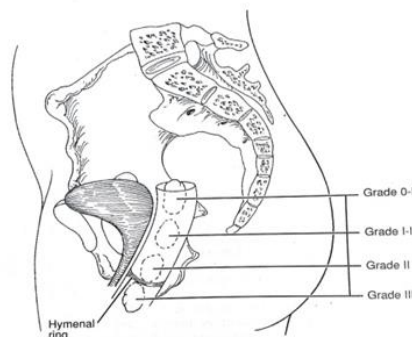
The evidence says that the risk of bladder injury during vaginal hysterectomy does not seem to be increased in women with previous caesarean section.

Other special situation where NDVH is said to be risky for fear of injury to large or small bowel, is adhesions in pouch of Douglas. Adhesions in POD can be easily diagnosed clinically. Puckered or obliterated POD on per speculum examination may give indication for possible adhesions. To avoid injury to bowel posterior lip of cervix and vagina can be cut in vertical direction that exposes peritoneum at higher level at its junction with visceral peritoneum, the perimetrium, so that it can be recognized and entered directly. This is cervicocolpotomy (Fig- 10).



**Fig 10. Cervico-colpotomy**

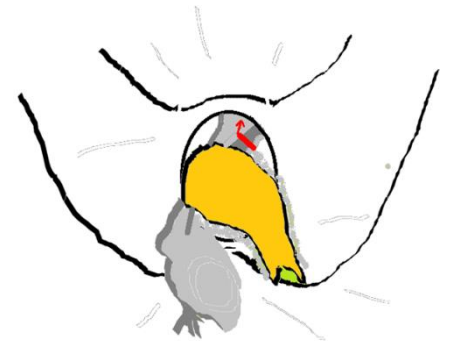
Another special situation is where one has to perform concomitant oophorectomy and /or salpingectomy along with hysterectomy. Inexperienced or untrained gynaec-surgeon is reluctant to perform NDVH in such a situation. It appears that the surgeon thinks the vaginal hysterectomy is more challenging and cumbersome when it needs to be completed with concomitant adnexectomy /salpingectomy. There appears some reluctance to combine vaginal hysterectomy with oophorectomy because vaginal oophorectomy is thought to be risky and difficult procedure. Baden and walker described degrees of ovarian descent 93 % patient had ovarian mobility up to grade2 that is up to midportion of vagina, in 4.6 percent ovaries can be pulled up to hymenal ring. Only 2.5 % patients had little ovarian mobility and 0.1 percent had grade 0 mobility (Fig- 11, Source: Telinde's Text Book of Operative Gynecology Ed 10, Vaginal hysterectomy).



**Fig 11. Baden and walker 's classification of degree of ovarian descent**

Oophorectomy by vaginal route can be easily performed by a technique described by Zimmerman. This technique mimics same manoeuvres that are

used to remove the adnexa abdominally. Round ligament is clamped and cut separately, and an extension of incision into the broad ligament is done to create the window in the infra-tubal area. Clamp is then placed through the infra-tubal window to the ovario-pelvic ligament close to the ovary (Fig- 10).



**Fig 12. Zimmerman technique of oophorectomy**

Salpingectomy during hysterectomy are frequently performed for cancer prevention during TLH or AH. But these are not routinely removed during vaginal hysterectomy with the perception of increased morbidity or difficulty or inadequate training. Salpingectomy should be routinely performed during VH because trade off with cancer prevention is highly favourable. Benign mobile adnexal masses can be easily removed in 95% cases by vaginal route. Skill augmentation for vaginal surgery can avoid need of costly endoscopic surgeries. With increasing confidence and skills that comes from experience, there are very few patients with indications for hysterectomy in whom the procedure cannot be performed vaginally. Vaginal hysterectomy can be performed easily in cases of previous caesarean section and the cases

which need oophorectomy and salpingectomy .Because of little more intraoperative complication rate such special situations should be undertaken after good experience.

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# Hysterectomy which route - Is still a frequently asked question even after nearly 200 years of history

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Abdominal hysterectomy is a surgery. Laparoscopic hysterectomy is a technological surgery.

But vaginal hysterectomy is an art surgery. Vaginal hysterectomies were already being performed since the 19th century. The first one was done by Langenbeck. Since then many modifications and variations have been reported. Most methods in use today like the Porges, Falk, vonTheobald, Heaney, Joel-Cohen and the Chicago methods are carried out with defined sequences. These sequences result from personal interpretations of the pelvic anatomy and the individual experience of the authors. When hysterectomy is indicated, because of the quick recovery, the lack of abdominal scar and the short hospital stay vaginal route should always be considered.

In order to find out whether vaginal hysterectomies can still be optimized and simplified a re-evaluation of the six mentioned methods was done by Michael Stark, Sandro GerliGian Carlo, Di Renzoy. 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. These are

1. INCISION OF THE VAGINAL WALL
2. DETACHING BLADDER FROM THE UTERUS
3. OPENING POSTERIOR PERITONEUM
4. DISSECTION OF THE LOWER PART OF THE UTERUS
5. CUTTING AND LIGATING THE UTERINE ARTERIES
6. OPENING THE ANTERIOR PERITONEUM
7. DISSECTION OF THE UPPER PART OF THE UTERUS
8. THE 'NON-STAGE' – LEAVING THE PERITONEUM OPEN
9. RECONSTRUCTION OF THE PELVIC FLOOR if required
10. CLOSING THE VAGINAL WALL

There are various ways to perform vaginal hysterectomy. And those are

1. Vaginal hysterectomy with use of clamps & ligation of pedicles.
2. Clampless vaginal hysterectomy with ligation of pedicles.
3. Vaginal hysterectomy with use of energy sources.

Advantages of use of energy sources:

Bipolar coagulation is a simplest, easily available and affordable source of energy. Bipolar electrocautery was confirmed to be safe

and useful even for open surgery by reducing the operating time and blood loss without increasing postoperative morbidity. Thus its use would lower the cost of surgery. This beneficial effect was found to be more pronounced in difficult NDVH procedures. Simple bipolar energy source is available at any small nursing home. These are our day to day used cautery machines. Not very high end machines.

Time required for bipolar electrocauterization is less as compared to ligation method. More number of ligatures are required for the routine method. Postoperative pain is very less in bipolar cauterization.

Blood loss is less with bipolar method as compared to ligation method.

Tying the pedicles with ligatures makes the pedicles ischemic with open nerve endings. Suture material produces foreign body reaction.

Prolonged compression over bladder & rectum is avoided as less time required for bipolar hysterectomy.

If we combine ten steps vaginal hysterectomy with bipolar coagulation NDVH is very easy even difficult NDVH cases can be approached by step ladder type hysterectomy.

Pedicles are easily accessible. If required oozing can be controlled by bipolar immediately.

## ADVANTAGES OF BIPOLAR COAGULATION VAGINAL HYSTERECTOMY ARE

1. Good visibility because retrograde bleeding from the uterus is avoided.
2. Shorter operating time.
3. Rapid convalescence and early mobilization for the patient .
4. Avoids ligatures, no subsequent tissue necrosis, therefore less pain .

Highly economical , biclamp is reusable, the procedure saves time and suture material. Combination of TEN STEP HYSTERECTOMY AND BIPOAR COAGULATION has beneficial effect and it was found to be more pronounced in difficult procedures and it lowers the cost of surgery for doctors and patients.

THERE ARE MANY GYNAECOLOGISTS PERFORMING NDVH BY BIPOLAR COAGULATION. IF YOU WANT TO TRY JUST FOLLOW FEW STEPS

Begin with NORMAL SIZE UTERUS for Vaginal hysterectomy All steps for same for any other vaginal procedures. Keep cautery ready. Hold cervix .

With bipolar cautery coagulate cervical lip so that you can judge cautery setting (most of times keep it between 40 to 45 watt). Our aim should be make that area white not black.

Open the pouch of Douglas, and push bladder upward. Instead of clamp or ligatures hold the pedicle with biclamp and cauterize till it become white and bubbles stop coming out. Always stay near to uterus.

Start cauterization and cut the pedicle with scissors.

See for haemostasis if any ooze recauterize.

Step by step move upward by cauterizing and cutting pedicles.

Even uterine pedicles can be cauterized before opening peritoneal spaces.

At the last pedicle of ovarian and cornual structures. Do not give extra traction.

Remove uterus.

Inspect for haemostasis. If any ooze ,use biclamp to stop it.

Vaginal suturing to be done as usual.

BUT NOW ONE QUESTION REMAINS.

WHY THIS BIPOLAR NDVH NOT POPULAR?

Most of the gynaecologist are not accustomed with electrocautery even during post graduate days.

Using cautery for vaginal procedures is difficult for many of us. Many of us use bipolar for laparoscopic surgery but not for vaginal surgery. Most important thing is economics of NDVH.

A BIPOLAR CLAMP IS REUSABLE . Energy source and Biclamp are the only two instrument required for bipolar NDVH.

We all know how many instruments are required for TLH or LAVH. I am sure if you ask any company it prefers TLH or LAVH over NDVH.

Because of only the economics. But if look in to this “bipolar NDVH” from patient and doctor point of view anaesthesia requirement ,cost to patient, running cost of surgery for

doctors, no requirement of suture,

time of surgery ,man power in operation theatre ,skilled assistance in surgery ,post operative pain and recovery, complications rate NDVH by bipolar scores far better than TLH and LAVH.

Even at remote places ,in small operation theatre, under spinal anaesthesia with help of nonskilled assistants ,with routine bipolar energy source (costing Rs. 150000) and a reusable clamp (costing Rs.10,000) one can complete NDVH and can go for bigger size uterus with step ladder technique after gaining experience.

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# Vaginal Hysterectomy : The Art simplified

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There is a general belief that vaginal route for hysterectomy is a difficult task. In fact it is not so. Every procedure has its learning curve. One can achieve expertise with experience, commitment and not succumbing to the failures, on the contrary learning from it.<sup>1</sup>

That vaginal route is the route of choice for hysterectomy, lest it is absolutely contraindicated<sup>2,3,4,5</sup> has been stamped by ACOG<sup>2</sup> and literature in general. It is of utmost importance to select a proper case. Never shy away from the vaginal route for surgery, based on the OPD findings, examination under anaesthesia is mandatory.<sup>5,6,7</sup>

Once it is decided to take the vaginal route for hysterectomy, it is important to give consideration to a few points:<sup>8-12</sup>

- 1) Begin with the mindset of doing it vaginally
- 2) As a rule uterus descends to some extent under anaesthesia
- 3) Smaller and thinner instruments, avoid cluttering of the instruments
- 4) Understand ones experience and limitations.

There are certain technical modifications which I would suggest:

- 1) Hydrodissection: I personally infiltrate about 150 to 200 ml

of normal saline with 2-3 drops of adrenaline, all around the cervix with a no 16 or 18 gauge needle, just under the vaginal mucosa. This serves as a tourniquet, so that the blood loss during the surgery is minimized and also the planes are easy to get.

- 2) Avoid going after the anterior pouch (except in cases with previous LSCS). It opens up on its own as we keep on taking the pedicles.
- 3) The bladder and the rectum should be well secured under the respective retractors.
- 4) Use debulking techniques like bisection, transection, morcellation, coring, to deliver a big size uterus. Thin myoma screws are very handy to get a good grip to deliver the big size uterus or the one which does not descend.<sup>13-16</sup>

## Specific tips for vaginal hysterectomy in various scenarios

### A) Adenomyosis<sup>15,16</sup>

- 1) Adenomyotic uteri do not yield easily. So one has to use myoma screws for applying traction as tenaculum or vulsellum do not grip the adenomyotic tissue properly .
- 2) Bisecting vertically, transecting transversely or giving releasing incisions on the bulkiest part of the specimen helps.

### B) Fibroids

- 1) Principle is to enucleate the fibroid after getting a good grip. Very often the entire uterus delivers out after the myoma is partially enucleated.
- 2) Important to learn the debulking and morcellation techniques
- 3) The bladder and the rectum need to be protected under the retractors at all times.
- 4) Between the anterior and the posterior wall fibroid, posterior is easy to remove.
- 5) Myoma screws (small and multiple) help to get a good grip of the fibroid for enucleation and morcellation.
- 6) Fundal or inapproachable fibroids need a proper evaluation and alternative route, depending upon ones experience.<sup>20</sup>

### C) Previous LSCS :

- 1) Preop clinical and USG assessment, examination under anaesthesia is recommended. Look for Sheth's sign (traction on the cervix will cause puckering on the lower abdomen, suggesting that there are some adhesions between the uterus and the parietal wall. Laparoscopic help can be taken in such cases)
- 2) Sharp dissection of the bladder fold should be done in the area of scar, flush to the surface of the uterus



- Utilize the lateral uterovesical window (Sheths space) to approach the A pouch. <sup>18,19</sup>

#### D) Obesity

Exaggerated lithotomy position is of utmost importance, as it abducts the hip. Labial sutures make the vaginal approach simpler. Otherwise rest of the surgery is the same.<sup>24</sup>

#### Complications of Vaginal Hysterectomy

##### 1) Bladder injury

Bladder can get injured whenever it adherent to the uterus, forming a scar, like in previous LSCS or endometriosis. Adopting the principle of sharp dissection in proper plane and flush to the uterus can prevent such injuries. It is advisable to make it a habit to rule out bladder injury on table, either by catheterizing and watching for blood in the urine, or a gush of fluid. Filling up the bladder by methylene blue can confirm the injury if any. The injury needs to be sutured in two layers using 3-0 Vicryl.<sup>21,22</sup>

##### 2) Bowel injury

Rectum adherent to the uterus is liable for injury at times. However, surgeons help need to be sought in such cases.<sup>23</sup>

##### 3) Ureteric injury

It is difficult to injure the ureter, except if the anatomy is distorted, or energy source is used close to the site where ureter is in close approximation. Again in such cases urologists help is needed.

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