REVIEW

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Retrograde Hysterectomy Approaches in Difficult Gynaecology Surgery

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ABSTRACT

Hysterectomy remains one of the most frequently performed gynecological surgeries worldwide. While extra-fascial hysterectomy is the standard abdominal approach, complex cases involving large fibroids, severe endometriosis, adhesions, or malignancy often require alternative techniques such as the Aldridge method or retrograde hysterectomy. These challenging situations are associated with distorted pelvic anatomy, fibrosis, and adhesions, increasing the risk of complications, including injury to adjacent organs. This article reviews strategies and operative steps in managing complex abdominal hysterectomies, with emphasis on retrograde hysterectomy as a valuable approach when the cervicovaginal junction cannot be clearly identified or when extensive adhesions are present. The surgical technique is described step by step, supported by imaging and intraoperative findings, and highlights methods such as hydrodissection and careful dissection around critical structures to minimize morbidity. Preoperative imaging, intraoperative decision-making, and technical modifications are emphasized as key factors for optimizing patient outcomes. Although this study provides a detailed description of techniques under challenging hysterectomies, its limitation lies in the reliance on schematic illustrations rather than comprehensive intraoperative photographic documentation.

Keywords: *Complex gynecological surgery, Pelvic adhesions, Retrograde hysterectomy, Surgical technique*.
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INTRODUCTION

Hysterectomy ranks as one of the most often carried out major gynaecological surgeries in the world.[1] In the USA, abdominal surgery accounts for 60% of the 6,000,00 hysterectomies performed each year. Nowadays, laparoscopic or robotic methods are being used to perform hysterectomies more and more often. There is a declining trend in vaginal hysterectomy because of declining motivation in recent gynaecology graduates to perform this procedure.[2,3]

Extra-fascial hysterectomy is the fundamental technique used in abdominal hysterectomy, whereas interfacial hysterectomy (also known as the Aldridge operation) and retrograde hysterectomy are applicable surgical techniques.[4] The Aldridge procedure and retrograde hysterectomy are carried out when significant adhesion surrounds the uterus. When the cervicovaginal junction cannot be felt clearly by palpation, such as when uterine rupture follows a vaginal birth or when a sizable tumour mass is present in the vagina, retrograde hysterectomy is also beneficial.[5,6]

Given the increasing prevalence of complex pelvic surgeries and the critical role of retrograde techniques in ensuring surgical safety and efficacy, a comprehensive review of their applications is warranted. This article aims to explore retrograde hysterectomy approaches in difficult gynaecological surgeries, emphasising their indications, technical considerations, and potential advantages in improving surgical outcomes.

Difficult Gynaecological Surgery

Large fibroids, severe endometriosis, postoperative adhesions, and morbid obesity modify pelvic architecture, making surgery challenging. Patients who have major surgery for cancer, particularly cervical cancer, after undergoing initial radiation can exhibit substantial pelvic organ fibrosis and adhesions that distort and occasionally hide the anatomy. In these situations, the surgeon must frequently stop or shorten the process by performing a debulking operation or a subtotal hysterectomy. A difficult hysterectomy might occasionally result in harm to the surrounding organs. On rare occasions, these structures may sustain vascular damage that causes fistula development postoperatively. Hydronephrosis may result from ureteral blockage in specific circumstances. An expert hand is important to prevent all of these. Prerequisites include a thorough knowledge of the pelvic anatomy and anticipated pathological changes in the affected organs. A complete assessment of the patient and their illness is necessary to determine the extent of the illness and any potential involvement of the surrounding viscera.[3,6,7]

Efforts have been made worldwide

to provide standardized methods for performing such challenging hysterectomies. To achieve the optimum outcome while maintaining safety, T. Lee and his team created these approaches and followed specific guidelines. They employed varied strategies for various conditions, including a lateral strategy for endometriosis and a posterior strategy for adhesions and large fibroids.[6,8] This article aims to standardize by synthesizing existing information within the literature regarding challenging cases of hysterectomies.

Difficult abdominal hysterectomy

When undergoing radical hysterectomy and post-radiation therapy, patients with cancer of the cervix may arrive with a frozen pelvis and nearly total obliteration of the pelvic cavity, hiding the uterus and appendages. It requires an extensive dissection with accurate vision and palpation of the structures. Always approach in the most straightforward possible manner, preferably by going around the uterus or ovaries when ureteral mobilization is challenging in individuals with parametrial infiltrate. It is possible to separate the ureter and reimplant it into the bladder. A ureteric catheter with infrared lighting or a uroglow catheter can be left in place before the surgery to prevent ureteric damage where it is predicted. It will aid in dissection while protecting the urethra.[6,9]

In case of facing a big uterine myoma, the following facts are helpful:

1. When there is an anterior myoma, the uterus is lifted with the use of a myoma screw to keep it away from the bladder.
2. If the myoma blocks the structures that need to be cut or clamped, a myomectomy may be performed as the initial step, followed by the clamping of the pedicles.

Urinary bladder adhesions from post-c-section scars can be challenging at times. In this instance, a lateral approach from the sides will be helpful when using the Foley catheter in the bladder.[10] A procedure such as retrograde hysterectomy (the author's idea) is more suited for treating extensive endometriosis adhesions. In this technique, since it is impossible to see the pedicles from above, we locate a clear area close to the vault, usually anterior and occasionally one lateral aspect, and work our way outwards from there, starting with the vault and moving on to the parametrium and uterosacral ligaments, uterine vessels, the infundibulopelvic ligament, and then the round ligaments. One must avoid the neighbouring important structures and pick a continuous region.

Adhesiolysis in difficult situations

It might be challenging to deal with adhesions with nearby viscera and arteries in endometriosis and malignant infiltration.[11] The main idea is to keep focus on the uterus, cut directly into it, and use sharp dissection whenever feasible. However, it can be quite harmful in some sensitive situations when the intestines are connected tightly or a lymph node is joined to a significant arterial. The author has employed his creative, cost-effective hydro dissection method in several instances. Because the pressure at the location of the adhesions softens the attached tissue when normal saline is applied, the adhered tissue may then be readily detached with minimal effort without harming the critical structures.[7,8]

Selection of Operation Method

Following a preoperative internal examination and diagnostic imaging, the final surgical approach is chosen under the results of the laparotomy as follows:

- Extra-fascial hysterectomy in the absence of uterine adhesion
- Intra-fascial hysterectomy (Aldridge technique), retrograde hysterectomy for adhesion surrounding the uterus, but no malignancy in the Douglas pouch
- Douglas pouch tumour with significant adhesion: retrograde hysterectomy
- Vaginal mass with retrograde hysterectomy
- Immediately following a vaginal birth, if the cervicovaginal junction cannot be felt, a retrograde hysterectomy should be performed.

Retrograde Hysterectomy

Typically, when removing a uterine or ovarian tumour with strong adhesions, it is necessary to approach the operation from a site with weak adhesion, avoid approaching only from the same direction, use a procedure with a low complication rate, and pretreat to stop bleeding before beginning the operation.[12]

The following four guiding concepts form the foundation of the retrograde hysterectomy method. Place a curved Pean forceps at the upper end of the vaginal cavity and use it as a guide to cut the anterior vaginal wall once the vaginal cavity has been opened at the safest location. In order to prevent uterine harm, the posterior vaginal wall should be cut, and the uterus should be removed. The ligaments in touch with the cervix should be clamped under direct eyesight.

The uterus can be removed without harming the ureter or rectum by securely cutting the vaginal wall at the upper end of the vagina.[5,7,9,13]

Indications for Retrograde Hysterectomy

- The typical surgical procedure cannot be used because of the severe adhesion surrounding the uterus.
  - o An external endometriosis cyst, a chocolate cyst
  - o In the Douglas pouch, an ovarian tumour with strong adherence
  - o Various surgical procedures have been performed in the past
  - o After peritonitis
- Palpation during a laparotomy is ineffective for locating the uterine vaginalis portio.
  - o Atonic haemorrhage, uterine rupture, uterine inversion, and other conditions that require hysterectomy following vaginal birth.
  - o Myoma delivery, endometrial stromal sarcoma, and portion vaginalis tumour are all present as a large tumour mass in the vagina.

Preoperative Preparation

When adhesions surrounding the uterus are thought to exist, internal and external examination, computed tomography, and magnetic resonance imaging should be performed.[14,15] In these circumstances, intravenous pyelography should also be carried out to determine whether adhesions with the surrounding organs exist and where the ureter is located.[16]

Suppose uterine rupture leads to a retroperitoneal hematoma; a ureteral

stent should be placed. The stent allows the ureter to be easily located, preventing ureteral injury during pelvic hematoma removal.[17]

Additionally, autologous or conserved blood should be ready since this operation is carried out on patients with severe adhesions or in an emergency following delivery. Based on the aforementioned findings, informed permission for the surgery procedure is required, and precautions should be taken for any potential consequences. In addition to significant bleeding, problems can harm the ureter, bladder, and digestive system.[18,19]

Surgical Technique

This article uses an example of an operation to cure an ovarian tumour that had spread to Douglas's pouch and left the pelvis frozen, as shown in Figure 1. Figure 1A shows the MRI findings, where bilateral ovarian tumours adhering to the posterior surface of the uterus were found. This has created a frozen pelvis, with a clinical photo shown in Figure 1B.

1. **Cutting of the Round Ligament**
   1.5 to 2.0 cm distant from the uterus, an absorbable suture (No. 1-0) is applied to the round ligament. The ligament is then pinched with Kocher forceps on its uterine side and severed as s, as shown in Figure 2. The anterior leaf of the broad ligament is then severed across the vesicouterine peritoneal reflection after the incision has been gently enlarged upward and downward.[5,7]
2. **Clamping, Cutting, and Ligation of the Fallopian Tube and Ovarian Ligament (or Infundibulopelvic Ligament)**
   When conserving the ovary, Heaney and Kocher's forceps are used to cut the gap between the ovarian ligament and the Fallopian tube. Then, a ligature is inserted in place of each forceps. The infundibulopelvic ligament is clamped, sliced, and ligated after ovary removal. A Kocher forceps holds the double-ligamented ligament on its pelvic side.[20] When the infundibulopelvic ligament is clamped and severed, the ureter may sustain injury if the ovarian tumour is attached to the pelvic floor. As a result, the surgeon must ensure by direct

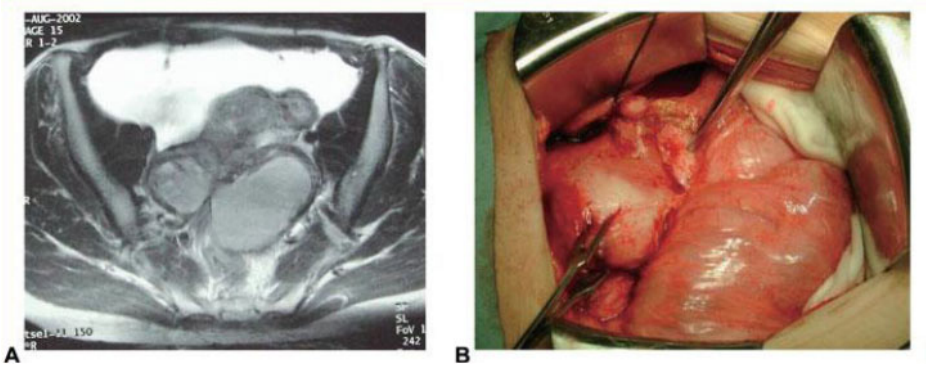

Figure 1. Magnetic resonance imaging (MRI) and the abdominal findings: MRI revealed bilateral ovarian tumours adhering to the posterior surface of the uterus (A). The abdominal findings showed that the intestinal tract and ovarian tumours adhered to the uterus and became frozen pelvis (B).[7]

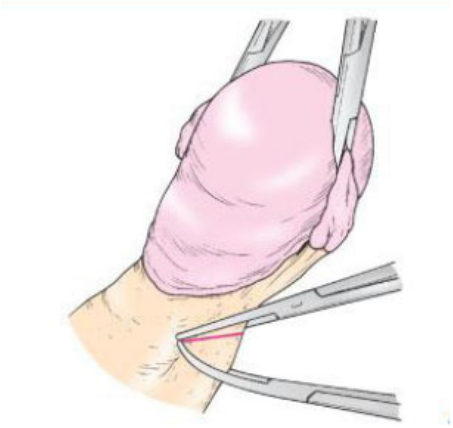

Figure 2. Cutting of uterine vessels and upper part of cardinal ligament: The uterine vessels and cardinal ligament are clamped slightly below the internal os of the uterus with a Heaney forceps, and the uterus side is clamped with a Kocher forceps to control back-bleeding from the uterine side.[7]

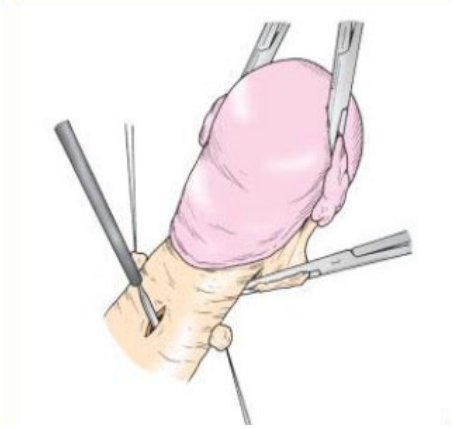

Figure 3. Incision of the anterior vaginal wall: In case the boundary between the portio vaginalis uteri and the vagina cannot be recognized, a longitudinal incision of 3 to 4 cm is made from the anterior wall of the uterine cervix to the vagina.[7]

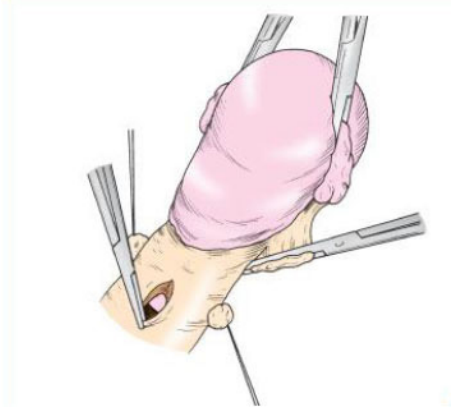

Figure 4. Opening of the vaginal cavity: The vaginal cavity can be found at the lower end of the incision, and its boundary with the portio vaginalis uteri can be recognized.[7]

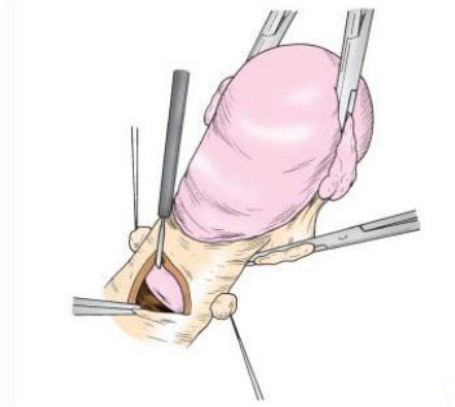

Figure 5. Cutting the anterior vaginal wall: Cut the anterior vaginal wall at the cervicovaginal junction to the vesicouterine ligament attachment. Curved pean forceps are useful as a guide for cutting the anterior wall.[7]

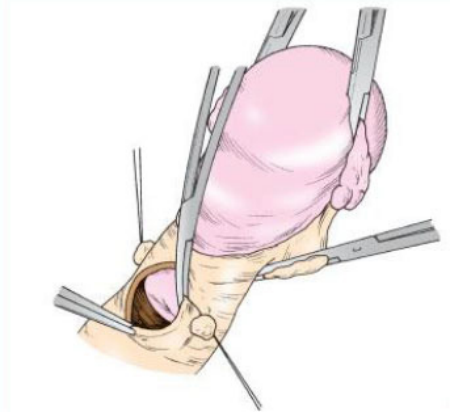

Figure 6. Cutting the bilateral vesicouterine ligaments: A single leaf of the Heaney forceps is inserted into the vagina, and then the vesicouterine ligament and the anterior of the cardinal ligament are clamped in contact with the portion vaginalis uteri and divided.[7]

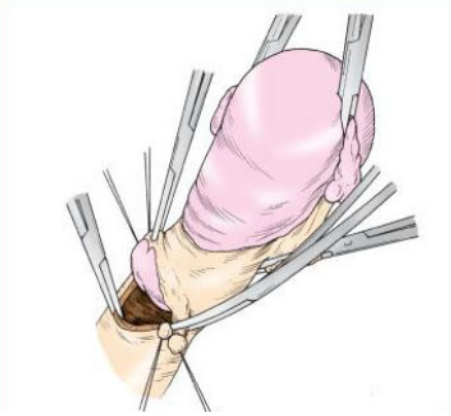

Figure 7. Cutting the bilateral sacrouterine ligaments: A single leaf of the Heaney forceps leaf is inserted into the vagina so that it is placed in contact with the portio vaginalis uteri, and the posterior part of the cardinal ligament and sacrouterine ligament are clamped.[7]

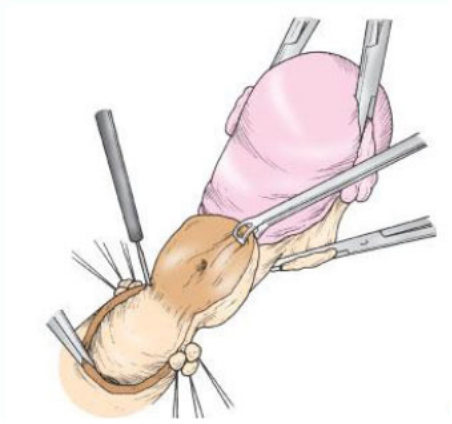

Figure 8. Incision of the posterior vaginal wall: The uterus is connected only by the posterior vaginal wall. Cut the posterior vaginal wall carefully.[7]

Figure 9. In case of ovarian tumour of Douglas pouch with severe adhesion: When the posterior vaginal wall is cut, and the uterine cervix is liberated, it is possible to peel the tumour of Douglas pouch from the lower side and even remove a tumour with severe adhesions. The uterus and the ovarian tumour can be removed as one mass without peeling the adhesion between the posterior uterine wall and the tumour.[7]

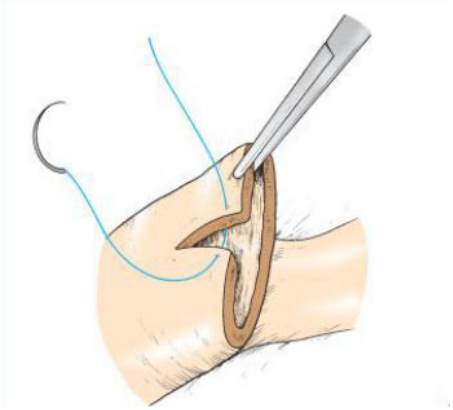

Figure 10. Closing of the vaginal vault: After the uterus has been removed, the inside of the vagina is disinfected, and the vaginal canal is closed.[7]

inspection or palpation that the ureter is not present in the operative field.[7]

3. **Mobilization of the Bladder**
   Similar to an extrafascial abdominal hysterectomy, the bladder is mobilized. To stop bleeding, it is crucial to begin mobilizing the bladder at the midline of the cervix. The vesicouterine ligament is then exposed with lateral blunt dissection using Cooper's scissors.[21]
   The bladder should be peeled off until it reaches 1.5 to 2.0 cm below the cervicovaginal junction, when the portio vaginalis uteri cannot be felt by palpation. The vesicouterine pouch often has weaker adhesions than the pouch of Douglas, and mobility of the bladder is still feasible even when endometriosis or ovarian cancer is the reason.[7,9]
4. **Cutting of Uterine Vessels and Upper Part of Cardinal Ligament**
   The posterior lobe of the broad ligament is severed near the sacrouterine ligament as the uterus is moved to the opposite side. The uterine artery flowing above the cardinal ligament is made apparent by gently dissecting and removing the loose connective tissue around it.[22] With Heaney forceps and Kocher forceps, the uterine arteries and cardinal ligament are then pinched at a location just below the internal os of the uterus to stop back bleeding from the uterine side. These structures are then split as s, shown in Figure 2. An absorbable suture (No. 1-0) is used for ligation. Kocher forceps are used to grasp and draw the ligature. The uterine artery's cut end has to be double-ligated.
   The gauze is applied to this cut end, and the uterus is firmly pulled upward as the gauze is squeezed between the second and third fingers. The cardinal ligament and cut end of the uterine arteries are then gently and carefully pulled down to the level of the sacrouterine and vesicouterine ligaments.[5,7,19]
   Steps 1-4 of these procedures resemble extra extra-fascial hysterectomy.
5. **Incision of the Anterior Vaginal Wall and Opening of the Vaginal Cavity**
   The sacrouterine ligament and vesicouterine ligament are separated during an extrafascial hysterectomy, and the vaginal wall is subsequently severed. To access the vaginal cavity, a longitudinal incision of 3 to 4 cm is made from the anterior wall of the cervix to the vagina in retrograde hysterectomy, which is performed immediately after Step 4, as shown in Figure 3. This is done either because it is uncertain where the portion vaginalis

uteri is located or because it is difficult to move the rectum due to the pouch of Douglas strong adherence.

At this point, the lower end of the incision will reveal the vaginal cavity, and its border with the uterine vaginalis portio will be apparent as shown in Figure 4. After that, a curved Pean forceps is inserted at the point where the vaginal wall and the portio vaginalis uteri meet. Using these forceps as a guide, an electric knife is utilized to cut the anterior vaginal wall to the vesicouterine ligament connection, as shown in Figure 5. The second side receives the same incision, and the vagina's inside is cleaned and sterilized.

When the border between the uterine vaginalis portio and vagina cannot be felt by palpation, the method just described is used. A transverse incision at the portio vaginalis uteri border rather than a longitudinal incision in the middle of the cervix facilitates future procedures if this boundary can be felt by touch.[7,23]

6. **Clamping, Cutting, and Ligation of the Bilateral Vesicouterine Ligaments**

The vesicouterine ligament and the anterior part of the cardinal ligament are then clamped in contact with the portio vaginalis uteri and separated using a single leaf of the Heaney forceps that is introduced into the vagina, as shown in Figure 6. After that, a 1-0 absorbable suture replaces the forceps.

It is crucial to hold the Heaney forceps with their convex surface pointing diagonally toward the uterus or, more specifically, in the direction the vesicouterine ligament is connected.

Since the ureter cannot be immediately seen during this procedure, it is crucial to utilize the Heaney forceps correctly. The next two measures must be taken to prevent ureteral injury and guarantee that the uterine ligaments are severed along the round aspect of the uterine cervix. The portio vaginalis uteri and vaginal wall are separated from one another by a single leaf of the Heaney forceps, which is first introduced into the vagina. Second, the uterus is clamped with the Heaney forceps' convex surface pointed obliquely in front of it. It is crucial that the forceps are pointed in this way and pressed on the portio vaginalis uteri.[5,7,9]

7. **Clamping, Cutting, and Ligation of the Bilateral Sacrouterine Ligaments**

The posterior portions of the sacrouterine ligament and cardinal ligament are constricted when the Heaney forceps leaf is introduced into the vagina and brought into touch with the portio vaginalis uteri. In order to clamp the ligaments in the correct orientation and prevent ureteral injury, the Heaney forceps should now face diagonally left and rearward of the uterus when cutting the left side. With 1-0 absorbable suture, the ligaments are divided and ligated, as shown in Figure 7.[7,13]

8. **Incision of the Posterior Vaginal Wall**

If the aforementioned procedure is similarly carried out on the opposite side, the uterus is only joined by the posterior vaginal wall. At this time, the location of the uterine cervix makes it simple to cut the posterior vaginal wall and prevent rectal damage, even in the presence of severe adhesions in Douglas's pouch, as shown in Figure 8.

The posterior vaginal wall should be gently incised if an ovarian tumour is present in the pouch of Douglas to prevent rupturing the tumour, as shown in Figure 9. It is feasible to peel the tumour from the lower side and even remove a tumour with significant adhesions when the posterior vaginal wall is sliced and the uterine cervix is released. Without removing the adhesive between the posterior uterine wall and the tumour, the uterus and ovarian tumour can be removed as a single mass.[5,7]

9. **Closing of the Vaginal Vault**

The vaginal interior is cleaned, and the vaginal canal is sealed after the uterus has been removed. The anterior vaginal wall's longitudinal incision is first healed, then the bilateral ends of the vagina are tied with sutures. The vaginal cuff is then stitched together with continuous stitches, such as shown in Figure 10.[5,7]

10. **Hemostasis and Closure of the Abdominal Wall**

An information drain should be introduced if there is a large adhesion release surface and the surgeon is worried about postoperative bleeding. After performing a gauze count, the abdominal wall is then stitched up.[7]

While this study did report the steps required to perform a challenging hysterectomy, it is limited due to the lack of clinical photos describing every step taken, and therefore must resort to the use of drawn images.

CONCLUSION

A skilled surgeon should always anticipate a challenging hysterectomy beforehand, plan methodically, and perform beforehand. Both vaginal and abdominal hysterectomies should adhere to particular surgical guidelines. Retrograde hysterectomy is a helpful procedure when ovarian pedicles and uterine arteries are entirely covered with adhesions. This article's description of the hydro dissection technique makes it a practical, affordable, and risk-free method.

DISCLOSURES

Conflict of Interest

All authors have no conflicts of interest.

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Ethical Statement

Not applicable.

Author Contribution

All authors contributed equally to this study.

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