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RESEARCH ARTICLE

Study of factors determining the route of hysterectomy and their correlation with decision making factors

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ABSTRACT

Objectives: 1) To outline the factors for the route of the hysterectomy; 2**)** To identify factors which will allow the gynecologists to perform vaginal hysterectomy? **Methods:** The study was conducted in the Department of Obstetrics and Gynecology after approval from the institutional ethics committee. A total of 100 patients requiring hysterectomy were recruited for the study based on inclusion and exclusion criteria. They were divided into two groups, one which would undergo vaginal hysterectomy and one which would undergo abdominal hysterectomies. Their preoperative, intraoperative findings and postoperative parameters were then compared. **Results:** Sixty-six out of a total of 100 patients underwent vaginal hysterectomy. Mean age of the cohort was 46.77 years. Out of all the decision making factors, indications for the surgery (p=0.001), past history of abdominal surgery including caesarean section (p=0.0425), body mass index (p=0.0001), per abdomen findings such as palpable uterus or large ovarian masses (p=0.0001), descent of the uterus (p=0.0001) were amongst the significant factors in determining the route of hysterectomy. **Conclusion:** Performing surgeries vaginally is the hallmark of a gynecologist. Also, there are many advantages, proven time and again that vaginal hysterectomy has over abdominal hysterectomy. Unless contraindicated vaginal hysterectomy should be the first choice for route of hysterectomy. The most important step toward achieving this goal is a thorough clinical examination aided by ultrasonography or laparoscopy whenever it seems necessary to do so.

Keywords: Hysterectomy, vaginal, abdominal.

It is used for both malignant diseases and benign indications. Benign indications include fibroids, adenomyosis, endometriosis, uterine prolapse, endometrial hyperplasia and dysfunctional uterine bleeding. Malignant causes include cervical and endometrial malignancies [3]. Hysterectomy can be performed abdominally, vaginally, laparoscopically or through combined approaches, abdominal hysterectomy (AH) being the most common [4].

Minimally invasive gynecological surgery causes lesser pain postoperatively, patients tend to recover faster, and have a shorter hospital stay [5]. Vaginal hysterectomy (VH) is the best method for removal of the uterus for benign causes [6]. The vaginal route has some advantages over the abdominal procedure, specially for old patients and those who have a small uterus size, such as less complications, shorter hospital stay duration, and quicker recovery [7]. As compared to AH, the benefits of VH also included fewer febrile episodes or lesser unspecified infections, lesser intraoperative blood loss and therefore lesser need for transfusion and fewer wound infections [8]. Due to many factors, specially lack of skill of the surgeon, the trends have shifted to abdominal hysterectomy. Decision making considering the right factors and criteria has been ignored. The art of vaginal hysterectomy is being lost since not many teachers practice it anymore and more over the newer generations aren't being trained adequately to perform the same.

The route of hysterectomy is guided by various factors including indication for hysterectomy, patient's anatomy,

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past cases that support the selected procedure, informed patient preferences, and the surgeon's experience and expertise [8].

About 25% of patients suffer minor complications after a hysterectomy such as postoperative infection, fever, wound hematoma, or wound gapes while 5% to 14% of patients suffer major complications like bowel/bladder injury or ureteric injuries, and risks of blood transfusion [9]. The approximate rate of mortality for AH or VH are 0.1% - 0.2%. Hysterectomies are usually not associated with long-term risk of death; however, some women might suffer from depression, anxiety and psychosexual problems [10]. In this study we have studied various factors that were used to determine the route of hysterectomy for a particular patient and the outcomes of this decision making process. The purpose of this study is to revive the dying art of vaginal hysterectomy by enlisting the factors that favour the vaginal route versus those that don't. This study doesn't include cases that were done laparoscopically because the very purpose of laparoscopy initially was to convert an abdominal case to a vaginal one.

According to a study conducted in Haryana, the incidence of hysterectomy was 7% among women who were married and greater than 15 years of age [11]. Another study from Gujarat, states that 7-8% of rural women and 5% of urban women undergo hysterectomy at a mean age of 37 years [12]. According to a study conducted in KMC institute at Manipal, hysterectomy was performed on 9% of total gynecological admissions. Approximately 60% of major gynecological procedures were hysterectomy, most common surgical approach being abdominal (74.7%), followed by vaginal (17.8%), and least being laparoscopic (6.6%) [13].

Studies from Canada suggest abdominal hysterectomy continues to be the most common route of hysterectomy (abdominal 78%, vaginal 14%, and laparoscopic 5.9%) [14]. In Hong Kong, although abdominal route is the most common, the proportion of laparoscopic was a little higher (abdominal 70.2%, vaginal 15.9%, and laparoscopic 13.8%) [15]. Data from UK, over 10 years, shows the same trend, i.e. abdominal hysterectomies being five to six fold more common than vaginal hysterectomies [16].

Materials and methods

This observational cross-sectional study was conducted in the Department of Obstetrics and gynecology at our hospital. Women undergoing hysterectomy in our department were recruited in the study after taking an informed consent.

Sample size: The sample size is 100. The sample size was calculated with the formula: n= t2 x p (1-p)/ m2. N= required sample size, t = confidence level at 95% (standard value of 1.96), p= estimated prevalence of the problem=7.0%, m= margin of error (standard value of 0.05). Substituting, the value worked out to be 98. For mathematical convenience, 100 were chosen as the sample size.

Inclusion criteria: Women who gave their consent and fulfilled the following inclusion criteria were a part of the study. Women with the following indications - dysfunctional uterine bleeding, adenomyosis, uterovaginal prolapse, endomyometrial hyperplasia, cervical intraepithelial neoplasia, uterine leiomyomas, ovarian tumours, tubo-ovarian masses, endometriosis.

Exclusion criteria: 1) Obstetric cases - atonic postpartum hemorrhage, uterine inversion, placenta accreta, increta and perorate, postabortal sepsis, puerperal sepsis, multiple uterine perforations during 1st trimester pregnancy; 2) Malignancies; 3) Mentally challenged women.

Ethical considerations: Study was approved by institutional human ethics committee. Informed written consent was obtained from all the study participants. The risks and benefits involved in the study and voluntary nature of participation were explained to the participants before obtaining consent. Confidentiality of the study participants was maintained.

Cases were recruited at the time of admission in the ward. Patients were mainly divided into two routes of hysterectomy which are: 1) Abdominal Hysterectomy, 2) Vaginal Hysterectomy.

Patients who were candidates for hysterectomy were divided into the groups based on the past history and clinical findings. The following factors were considered -

- Past history of any abdominal surgeries including previous LSCS
- Mass felt per abdomen
- Uterus felt per abdomen
- Presence of descent on per speculum
- Presence of cystocele
- Presence of rectocele
- Cervix pulled up/ high up
- Mobility of the uterus.
- Presence of scarring or puckering on PV examination

- Nodularity felt on the uterosacrals
- Acute retroversion or anteversion
- Forniceal fullness or masses felt in the adnexa and deep fornices.

Preoperative evaluation - Preoperative factors for eg disease condition, patient profile, previous surgeries, previous obstetric history, whether still menstruating or not were noted. Preoperative D and C / cervical biopsy / endometrial aspirate/ pap smear was done to rule out any uterine or cervical malignancy. General, systemic and local examination including a PV examination of the patients were noted. Patients were evaluated and the following were noted-

•Duration between onset of symptoms and time of seeking medical help.

•All investigations advised for anesthesia fitness e.g. Hb, WBCs, LFTs, RFTs, coagulation profile, urine examination, ECG, blood grouping.

•PAP smear.

•All radiological findings. Ultrasonography was only done when there was any doubt clinically.

•All medical disorders for which specific medical specialty or super- specialty clearance has been taken; and any specific medication which the patient is on.

•Requirement of blood transfusion.

•Specific findings in the preoperative examination.

Intra operative evaluation -

- Type of anesthesia administered.
- Any changes or addition in the type of anesthesia given.
- Duration of surgery.
- Operative route decided; operative route followed. (noting change in the route of hysterectomy, if any; including why the change is required.
- Whether there was difficulty in access vaginally necessitating a further procedure.
- Any specific debulking methods used methods used to complete the procedure: mentioning specific details: whether it was bisection, morcellation, coring, myomectomy, Lash and Lash technique, etc.
- Any complications that occurred during surgery.
- Abandonment of the procedure, alternative procedures if done.
- Total amount of blood loss.
- Any blood transfusion that was done intraoperatively.
- Any specific comments about difficulties encountered in the surgery.

Evaluation of the specimen: The specimen was examined post-surgery for the following -

- Length.
- Breadth.
- Circumference at the widest diameter.
- Weight of the specimen.
- Appearance of the specimen on being bisected- such as presence of fibroids, size of cavity.

All the above details obtained were noted in the case record format.

Statistical methods: Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data were also represented using appropriate diagrams like bar diagram, pie diagram and box plots. Categorical outcomes were compared between study groups using Chi square test. P value < 0.05 was considered statistically significant. IBM SPSS version 20.0 was used for statistical analysis.

Results and observations

The sample size of our study was 100. A total of 66 vaginal hysterectomies and 34 total abdominal hysterectomies were done. The average age of women who underwent total abdominal hysterectomy was 43.85 years and vaginal hysterectomy was 46.77 years. However, this is statistically insignificant (p value = 0.201). The age of the women was therefore not a significant factor in deciding the route of hysterectomy.

Our patients came with chief complaints such as abnormal uterine bleeding (AUB) (39%) which included menorrhagia, polymenorrhea, intermenstrual bleeding, irregular cycles including one patient with complaints of primary amenorrhea; dysmenorrhea (24%); something coming out per vaginum (SCOPV) (34%) and three patients didn't fall under these categories (3%). Two of these three were operated prophylactically as they were on tamoxifen for breast cancer. One of them was a 17-year-old girl, who underwent abdominal hysterectomy in view of primary amenorrhea with cervical agenesis.

The patients with abnormal uterine bleeding were diagnosed with pathologies such as uterine fibroids, adenomyosis, endometrial hyperplasia while in a few patients the cause of AUB remained undiagnosed. The most common chief complaint for which VH was done was something coming out per vaginum, whereas most of the

TAHs were done for abnormal uterine bleeding. One patient who had received tamoxifen therapy for breast cancer underwent a colposcopy prior to hysterectomy and was diagnosed with CIN grade1. She underwent total abdominal hysterectomy with bilateral salpingo-ophorectomy (figure 1).

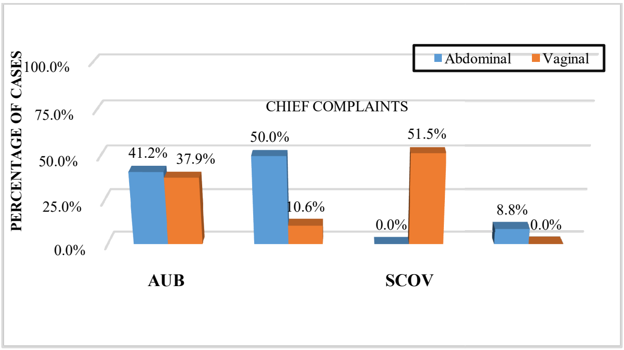

Figure 1: Comparison of chief complaints between procedures

Patients were asked about their past medical history such as hypertension, diabetes mellitus, tuberculosis, asthma, thyroid disorders, heart or kidney diseases etc. There were 32.4% patients who were suffering from some medical comorbidity and 39.4% patients who underwent vaginal hysterectomy and were suffering from some comorbidity. P value being 0.490 we realise that this was not a deciding factor for us while choosing the mode of hysterectomy (figure 2).

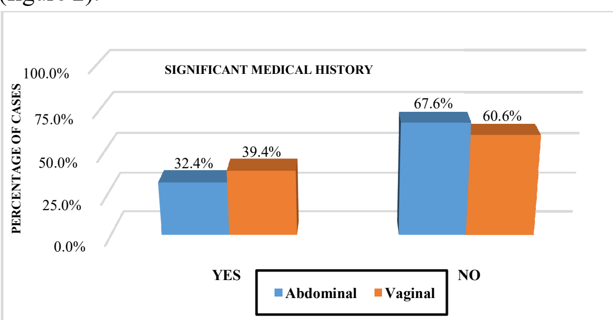

Figure 2: Comparison between significant medical histories

In our study, out of 100 patients, 8 patients had past caesarean section surgery. All of them were operated abdominally. This was statistically significant and had a p value of 0.0001 (figure 3). Hence, past history of LSCS was a decision making factor in our study and favoured the abdominal route. Amongst the 100 patients we recruited, 2 patients had history of an open abdominal history. Both of these patients underwent abdominal hysterectomy.

Body mass index (BMI) was also calculated for the two groups. The average BMI seen for patients that underwent abdominal hysterectomy was 26.59 and that for vaginal was 24.69. This finding was significant (p value=0.025). Hence it can be said that BMI could be an important factor to determine the route of hysterectomy.

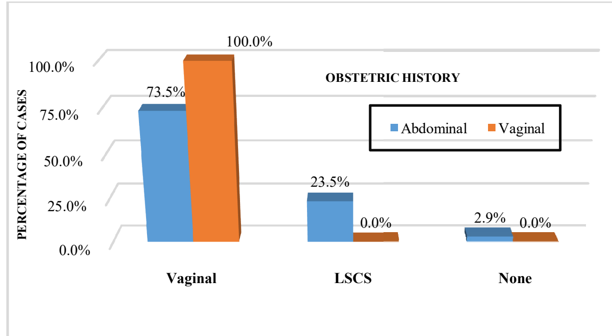

Figure 3: Comparison between obstetric history between groups

Twenty- nine out of 100 women in the menstruating group underwent total abdominal hysterectomy and 46 underwent vaginal hysterectomy. Out of the 24 women in the postmenopausal group, 20 underwent vaginal hysterectomy. However this wasn't of statistical significance.

Table 1: Different parameters of study group

Parameter	Value (n=100)	P value
Age (yrs)		
Abdominal	43.85	0.201
Vaginal	46.77	
Presenting complaints		
Abnormal uterine bleeding (AUB) (%)	39	
Dysmenorrhea (%)	24	
SCOPV (%)	34	
Other (%)	3	
Medical comorbidities		
Abdominal route (%)	32.4	0.490
Vaginal route (%)	39.4	
History of LSCS (n)	8	0.0001
BMI (mean)		
Abdominal route	26.59	0.025
Vaginal route	24.69	
Clinical findings		
Palpable abdominal mass (n)	17	0.0001
Per vaginum (n)	17	0.0001
Dimensions of specimen		
Abdominal route - length (mean)	14.21 cm	0.0001
Vaginal route - length (mean)	10.88 cm	
Abdominal route - breadth (mean)	8.18 cm	0.0001
Vaginal route - breadth (mean)	5.67 cm	
Abdominal route - weight (mean)	266.68 gm	0.0001
Vaginal route - weight (mean)	121.62 gm	
Abdominal route - circumference (mean)	20 cm	0.0001
Vaginal route - circumference (mean)	12.71 cm	

Out of the 100 abdominal hysterectomies, 4 patients were nullipara, out of which 3 underwent abdominal hysterectomy and 1 underwent vaginal. Eleven women had one delivery (vaginal/ LSCS), 4 of which underwent TAH and 7 underwent VH. Twenty-nine women were bi-para, 14 of whom underwent TAH and 15 VH. Besides these 56 women had 3 or more deliveries. However, parity was not a proven significant factor.

The best route for hysterectomy is vaginal owning to the fact that the uterus is a pelvic organ and in its normal size is not palpable per abdomen. In 17 patients of ours a mass was felt per abdomen and all of them underwent TAH (table 1). This was a significant factor in our decision making process with a p value of 0.0001. Out of the remaining 83 patients, 66 underwent vaginal hysterectomy. The per-abdominal findings were further confirmed on per vaginum examination and were significant in our decision making (p value = 0.0001). Seventy three patients had a uterine size less than 12 weeks. Fifty-nine of these underwent vaginal hysterectomy and fourteen of these underwent abdominal hysterectomy. All patients with uterine descent were treated by vaginal hysterectomy irrespective of the size making this finding a significant decision making factor (figure 4).

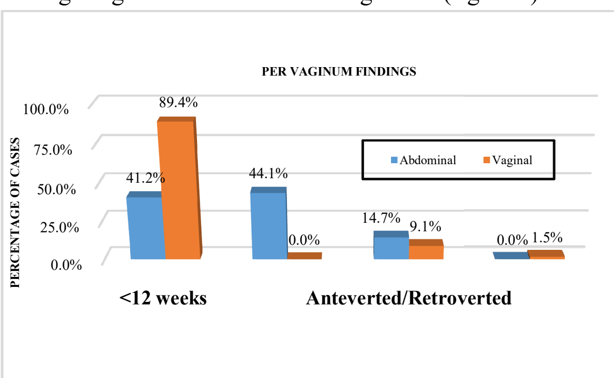

Figure 4: Comparison between per vaginum findings

In order to verify our pre operative findings, the specimen was evaluated postoperatively. The average length of TAH specimens was 14.21cm and that of VH specimens was 10.88 cm. This was of statistical significance with a p value of 0.0001 (table 1). This further enforced that clinical assessment can be easily relied upon while deciding the route of hysterectomy. Similarly, the breadth at the level of the cornua was measured. The average breadth of TAH specimens was 8.18 cm and that of VH specimens was 5.67 cms. This too was statistically significant. The weight of the specimens that were obtained from a total abdominal hysterectomy averaged 266.68 gms which was more than double the average weight of VH specimens (121.62 gms). Hence the clinically estimated weight of the uterus is an important decision making factor in deciding the route of hysterectomy and correlated well with the weight of the specimen with a p value of 0.0001 in our study. The mean circumference of the uteri removed by TAH was 20cm which was significantly more than those operated by VH which was 12.71 (p value=0.0001), thus validating the route of hysterectomy in these patients.

Discussion

The debate between the vaginal and abdominal routes of hysterectomy has been ongoing for a long time. In our study, vaginal hysterectomies were performed by gynecologists at different levels, from first-year residents to the head of the department. Residents performed these surgeries under the guidance and assistance of their professors, as it is considered essential for a skilled gynecologist to have proficiency in performing vaginal operations. It is crucial for current and future generations to learn the art of vaginal hysterectomies.

In our study, a total of 66 vaginal hysterectomies and 34 total abdominal hysterectomies were done. This was an incidental finding, without any initial bias and was found to be in accordance with ACOG guideline which states that the vaginal to abdominal ratio should be 70:30 [17]. Adhering to evidence based guidelines could allow gynecologists to perform 80% of hysterectomies vaginally, thus shifting the current 3:1 abdominal/vaginal ratio to a 3:1 vaginal/abdominal ratio [17].

Uterine size is a critical factor in deciding the route of hysterectomy. The American College of Obstetricians and Gynecologists (ACOG) suggests that vaginal hysterectomy is best for women with mobile uteri weighing no more than 280 grams (approximately 12 weeks' gestational size) [18]. However, in a study conducted by Sir Kovac and colleagues, 94% of patients with uterine weights exceeding 280 grams could be successfully operated vaginally if other factors such as uterine mobility and fornix scarring were properly assessed [18]. In our study, we clinically assessed uterine size through abdominal and vaginal examinations, comparing these findings with postoperative measurements of length, breadth, circumference, and weight of the uterus to validate the chosen route. Uteri weighing less than 280 grams, mobile with no scarring or history of abdominal surgeries, were selected for vaginal hysterectomy. The average weight of uteri removed via vaginal hysterectomy in our study was 121 grams, while those removed via abdominal hysterectomy weighed 266 grams. However, the largest uterus safely removed vaginally in our study weighed 275 grams. In a previous study, the average uterine weights measured postoperatively were 133 grams for the vaginal group and 632 grams for the abdominal route [18]. Thus, the fingers of the gynecologist are essential in determining the appropriate approach.

Alternatively, Sheth et al conducted a study using ultrasonography to estimate uterine volume for deciding the route of hysterectomy. They found that vaginal hysterectomy could be successfully performed for uterine volumes up to 200 cm^3 without difficulty. Volumes between 201 and 300 cm^3 posed some difficulty, while debulking was required for volumes between 301 and 400 cm^3. For volumes exceeding 400 cm^3, patients should be counseled for a trial of vaginal hysterectomy with alternative options such as laparoscopic assistance or laparotomy prepared. Favorable pelvic factors can also impact the overall outcome, reducing uterine volume by 50 to 100 cm^3 or more [19].While ultrasonography is commonly used by gynecologists in preoperative assessments, it has limitations in assessing factors such as uterine mobility, adhesions, fornix scarring, and depth. These aspects require the expertise of an experienced gynecologist. In our study, we did not rely on ultrasonography but instead based our decisions on clinical findings, which proved accurate for most patients. Thus, ultrasonography was not included as a parameter for determining the route in our study.

Apart from uterine size, other factors assessed through bimanual examination are important in determining the appropriate route, such as uterine mobility, fornix scarring, nodularity of uterosacral ligaments, extreme retroversion of the uterus, descent, adnexal masses, and depth of the fornices. These factors suggest pelvic pathologies or adhesions due to previous surgeries, tuberculosis, pelvic inflammatory disease, or endometriosis. Evaluating the ease of reaching and opening the posterior and anterior peritoneal pouches during vaginal examination allows the surgeon to choose between the vaginal or abdominal route. Even in cases of large or irregularly shaped uteri due to fibroids, if the pouches can be reached and opened, it enables the ligation of uterine vessels and subsequent vaginal procedures such as bisection, morcellation, Lash and Lash technique, myomectomy, or wedge resections [20, 21]. These methods reduce the bulk of the uterus, facilitating its removal via the vaginal route.

In a study by Kore et al on vaginal hysterectomies in patients with enlarged and bulky uteri, ranging from 8 to 16 weeks in size, the size and characteristics of the uterus, determine the techniques employed, including bisection, myomectomy, morcellation, and the Lash technique [22]. The successful removal of large uteri weighing over 1000 grams via vaginal hysterectomy has also been reported [23] using strategies like pre-op administration of GnRH agonist which are known to reduce the uterine size by 25-50% [24].

In cases where the posterior and anterior pouches are not initially accessible during non-descent vaginal hysterectomy, certain techniques can be employed. Reflecting the bladder as high as possible and reflecting the posterior vaginal mucosa can allow access to the lateral ligaments, which can be ligated to promote descent and facilitate access to the posterior pouch peritoneum. Difficulty in opening the anterior pouch can be addressed by ligating the uterosacral pedicles, bringing down the uterus and allowing access to the anterior pouch. In some cases, it may be necessary to define the limits of the bladder using a bladder sound.

Prior caesarean section has traditionally been considered a contraindication to vaginal hysterectomy due to concerns about unintentional bladder injury [25]. However, the vaginal approach may be less challenging in cases of scarred vesicovaginal space, as dissection can be made in areas with minimal scarring, which can then be extended towards the area of maximum scar. Bladder injury may be more likely with the transabdominal approach, as dissection starts in areas of maximum scarring, making it more difficult to identify the correct plane.

In our study, patients with a history of caesarean section or abdominal surgery were operated on via the abdominal route due to evidence of adhesions during vaginal examination, including extreme retroversion, increased nodularity on uterosacral ligaments, puckering in the fornices, decreased uterine mobility, shallow fornices, or a high cervix. However, if these factors were not present, vaginal hysterectomy was still feasible. In cases of doubt, diagnostic laparoscopy can be performed prior to vaginal hysterectomy to rule out adhesions or other pelvic pathologies. In a previous study by Kovac et al, preoperative assessments indicated that 25.8% of women had disease possibly extending beyond the uterus. Of these patients, 90.9% had absent or mild extrauterine disease and were operated via traditional vaginal hysterectomy. Adhesions or endometriosis were observed in 2.2% of patients, who were treated with traditional abdominal hysterectomy. Operative laparoscopy was used in 2.2% of cases to remove roadblocks to the vaginal route, allowing successful vaginal hysterectomy [19]. However, we did not include this practice in our study.

Parity is not an absolute contraindication to vaginal hysterectomy, as vaginal access is often not restricted in nulliparous women [18, 24-26]. In our study, nulliparity was not considered a contraindication, and one out of three nulliparous patients underwent vaginal hysterectomy.

Obesity was a significant factor in determining the route of hysterectomy in our study. The average BMI of patients undergoing abdominal hysterectomy was higher than those undergoing vaginal hysterectomy. Obese patients pose challenges in vaginal hysterectomy, including decreased access due to occupying more space with extra fatty tissue, increased intraoperative bleeding due to increased vascularity, difficulty in identifying tissue planes, larger ovaries making oophorectomy difficult, and decreased uterine descent due to better tissue support and a more robust physique. Similarly, abdominal hysterectomy in obese patients presents challenges such as excessive subcutaneous and preperitoneal fat, increased pelvic depth, and difficulties in visualization and hemostasis. Obese patients may also experience more postoperative pain and have a higher risk of wound site infections [26]. Other factors such as age, medical comorbidities, and menstrual status were found to be insignificant and did not influence our decision-making process.

Limitations: A comparison between non descent vaginal hysterectomy and abdominal hysterectomy would be more apt; however, owing to the short period of this study and limited number of candidates for NDVH this was not possible as this would reduce the sample size to a great extent. Small sample size would not have statistical significance.

Conclusion

We therefore conclude that vaginal hysterectomy can be attempted in most patients undergoing hysterectomy after assessing the size, mobility, chances of adhesions/ endometriosis, descent, scarring in the pouches, nodularity on the uterosacrals, acute anteversion or retroversion and presence of adnexal masses. Wherever VH is not possible total abdominal hysterectomy or laparoscopic surgery can be attempted. Performing surgeries with the best interest of the patient in mind and deciding the route after careful evaluation of all factors should be the goal. Whenever in doubt, tools such as ultrasonography and laparoscopy can be put to best use. Nonetheless we should remember that the best route for the removal of a pelvic organ is vaginally and the eyes of a gynecologist are in his/ her fingers.

Conflict of interest: None. **Disclaimer:** Nil.

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