Original Article

A Comparative Analysis of Nondescent Vaginal Hysterectomy, Laparoscopy-Assisted Vaginal Hysterectomy, and Total Laparoscopic Hysterectomy for Benign Uterine Diseases at a Rural Tertiary Care Center

Vaibhav Kanti[1], Vandana Verma[1], Mamta Singh[1], Soniya Vishwakarma[1]*, Nupur Mittal[1], N. P. Singh[2]

Departments of [1]Obstetrics and Gynecology and [2]Community Medicine, Uttar Pradesh University of Medical Sciences, Etawah, Uttar Pradesh, India

Abstract

Objectives: The aim of this study was to compare operative data and postoperative complications among nondescent vaginal hysterectomy (NDVH), laparoscopy-assisted vaginal hysterectomy (LAVH), and total laparoscopic hysterectomy (TLH) at a rural tertiary care center.

Materials and Methods: This is a prospective analytical study, of 145 hysterectomies for benign conditions with or without salpingo-oophorectomy in women from 30 to 60 years, over 3 years from January 2016 to December 2019, with 60 cases of NDVH, 46 cases of LAVH, and 39 cases of TLH. The three groups were compared intraoperatively in terms of blood loss, operating time, and intraoperative complications and postoperative complications and postoperative duration of hospital stay.

Results: There was no significant difference between the three groups in terms of age, parity, body mass index, and indications for hysterectomies. The mean operative time was significantly shorter ($P = 0.000$) in the NDVH group (54.67 ± 15.67 min) as compared to the LAVH (102.45 ± 10.53 min) and TLH (126.79 ± 8.7 min) groups. Intraoperative blood loss was greater ($P = 0.000$) in the TLH group (111.025 mL ± 20.8) as compared to the NDVH (59.50 mL ± 16.7) and LAVH (91.85 mL ± 10.66) groups. The intraoperative complications and postoperative complications were higher in the TLH group as compared to the LAVH and NDVH groups. The duration of hospital stay was almost similar in all the groups.

Conclusion: NDVH may be the preferred approach for experienced surgeons, as it is less time-consuming, has a small amount of blood loss, and is a scarless surgery, whereas LAVH and TLH may be the preferred approaches in the cases of presence of adnexal masses and adhesions or whenever salpingo-oophorectomy is indicated.

Keywords: Fibroid, hysterectomy, laparoscopic hysterectomy, laparoscopy-assisted vaginal hysterectomy, nondescent vaginal hysterectomy, total laparoscopic hysterectomy

INTRODUCTION

Hysterectomy is one of the major gynecological surgeries done worldwide. It can be done either by an abdominal or vaginal route. Laparoscopic removal of the uterus is a preferable alternative to open abdominal hysterectomy in patients in whom a vaginal hysterectomy is not feasible.

The incidence of hysterectomy in India is about 4%–6%, out of which 90% are performed for benign indications.[1,2] Even though abdominal hysterectomy is more invasive, it is still the most common route for hysterectomy, especially in rural areas, because firstly the patients are unaware

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Address for correspondence: Dr. Soniya Vishwakarma,
Flat No. 202, Type 3, G Block, New Campus, Uttar Pradesh
University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India.
E-mail: soniyaramesh17@gmail.com

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of the benefits of laparoscopic hysterectomies, secondly the cost of surgery through abdominal route is less, and thirdly most of the surgeons find it easy and convenient to perform.[3] Minimally invasive surgeries such as nondescent vaginal hysterectomy (NDVH), laparoscopy-assisted vaginal hysterectomy (LAVH), and total laparoscopic hysterectomy (TLH) offer cosmetic benefit, and recovery is faster over the routine abdominal hysterectomy but requires more technical skills.[3]

NDVH though a scarless surgery and least invasive cannot be done easily for bigger uterine mass and in the cases of adhered adnexal masses. LAVH is an alternative to abdominal hysterectomy where the uterus is removed without incisions in the presence of adnexal, pelvic pathology and when hysterectomy is difficult to perform vaginally.[4] Laparoscopic hysterectomies take increased operating time and increased rate of intraoperative complications, so lack of expertise and inexperience has a major impact in choosing the route of surgery.[5] This study was done to compare the feasibility of the different methods of hysterectomies for treatment of benign uterine disease in our rural tertiary care to find out the most effective, safe, feasible method in terms of operative time, amount of blood loss, hospital stay, amount of analgesic required on the 1st postoperative day of surgery, intra- and postoperative complications rate, and postoperative duration of hospital stay.

MATERIALS AND METHODS

It is a prospective analytical study done in the department of obstetrics and gynecology at a rural tertiary care medical institute. The study was conducted from January 2016 to December 2019 for 3 years. During this period, 145 patients were included in this study who were requiring hysterectomies for benign pathology of uterus without uterovaginal prolapse. The study was approved by Ethical Committee of the Uttar Pradesh University of Medical Sciences (approval number: 848/UPUMS/Dean/2019-20/E.C./). All patients were included in the study only after taking written informed consent. Cases were selected after performing a general and systemic examination and were divided into three groups: NDVH, LAVH, and TLH. Cases included in the study were with uterus size of 16 weeks or less and had no contraindications for lithotomy and semi-lithotomy position. Patients with any kind of previous pelvic or abdominal surgeries such as adnexectomy, myomectomy, cystectomy, and laparotomy; those with history of previous lower-segment cesarean sections; cases with a complex adnexal mass; cases with a simple adnexal mass more than 5 cm; or cases with restricted mobility of uterus on examination and cases converted to laparotomy were excluded from the study. All surgeries were done by senior surgeons with good technical skills and with equal surgical caliber.

Surgical procedure

All cases were admitted a day before surgery after anesthesia clearance in a single unit. Informed and written consent was obtained. Bowel preparation was done in all cases. Broad spectrum antibiotics were given for infection prevention1 hr prior to surgery.

Nondescent vaginal hysterectomy

Surgery was performed under spinal anesthesia. For surgery, patients were placed in lithotomy position, and painting and draping was done. A circumferential incision is given on cervicovaginal junction after hydrodissection by injecting about 40–50 mL adrenaline mixed with normal saline in ratio 1:100,000 circumferentially at the cervicovaginal junction. Adrenaline mixed with normal saline was avoided in hypertensive or asthmatic patients. The pubovesicocervical ligament was cut and the bladder was pushed upward. Both anterior and posterior pouches were opened. Uterosacral, cardinal ligament, and uterine vessels were clamped, cut, and ligated. After ligating uterine vessels, if any difficulty in delivery of uterine fundus was found, bisection of the uterus starting from the cervix to the fundus in longitudinal fashion was performed. The round ligament and ovarian ligaments were clamped, cut, and transfixed. The vault was closed with Vicryl number one, and vaginal packing was done for 24 h. We catheterized the patient only after the end of vaginal surgery, so that bladder injury can be identified easily during surgery if it occurs.

TLH and LAVH were performed as follows: general anesthesia was given while performing these surgeries, and pneumoperitoneum was created by carbon dioxide. A 10-mm trocar and two ancillary ports were inserted. The third ancillary 5-mm port was inserted three fingerbreadths above the upper margin of the pubic symphysis. All patients were catheterized and placed in lithotomy positions. Colpotomizer was introduced in all cases to elevate the vaginal walls. Both surgeries were started with the transaction of round ligaments and opening the uterovesical fold of either side with the help of harmonics. Either ovarian ligament or infundibulopelvic ligament was identified, coagulated, and transected in cases when the ovary was to be preserved or when the ovary was to be removed, respectively. The procedure was similar up to bladder dissection in both the groups.

In the case of TLH, further skeletonization of the uterine arteries was done and bilaterally the vessels were coagulated and cut with harmonics. The colpotomizer further was advanced and circumferential colpotomy was done on the rim of the colpotomizer with the help of a monopolar hook. The uterus was removed vaginally and transvaginal cuff was closed laparoscopically.

In the case of LAVH after opening vesicovaginal fold, the rest of the surgery was continued vaginally. The colpotomizer was removed and speculum was placed on the anterior and posterior vaginal walls. Hydrodissection was done and the rest of the

Table 1: Demographic profile of cases

Demographic parameters	NDVH (*n=60)	LAVH† (*n*=46)	TLH‡ (*n*=39)	Total (*n*=145)
Age (years)				
30-40	8 (13.3%)	4 (8.7%)	2((5.1%)	14 (9.6%)
41-50	50 (83.3%)	42 (91.3%)	34 (87.2%)	126 (86.9%)
51-65	2 (3.3%)	0 (0%)	3 (7.7%)	5 (3.45%)
Mean	45±5	44.84±2.7	45.76±3.73	
Parity				
1to 2	9 (15%)	5 (10.9%)	14 (36%)	28 (19.3%)
3-4	42 (70%)	37 (80.4%)	20 (51.3%)	99 (68.3%)
>5	9 (15%)	4 (8.7%)	5 (12.8%)	18 (12.4%)
Mean	3.80±1.64	3.22±0.9	2.92±1.36	
Comorbidities				
Hypertension (HT)	2 (3.3 %)	2 (4.3%)	0 (0%)	4 (2.8%)
Diabetes (DM)	2 (3.3 %)	1 (8.7%)	0 (0%)	3 (2%)
HT+DM	1 (1.7 %)	0 (0%)	0 (0%)	1 (0.7%)
ASTHMA	1 (1.7%)	0 (0%)	0 (0%)	1 (0.7%)
HYPO-THYROIDISM	1 (1.7 %)	0 (0%)	1 (2.6%)	2 (1.4%)
Average BMI§	27.38±2.2	26.2±2.05	25.6±2.2	

*NDVH-Non Descent Vaginal Hysterectomy, †LAVH-Laparoscopic Assisted Vaginal Hysterectomy. ‡TLH-Total Laparoscopic Hysterectomy, §BMI - Basal Metabolic Index, High BMI=BMI >25

Table 2: Indications of hysterectomy and uterine size and weight

Parameters observed	indication/post op. uterine size/ procedure	NDVH (*n*=60)	LAVH (*n*=46)	TLH (*n*=39)	Total (*n*=145)
Indication of hysterectomy	Fibroid	50 (83%)	36 (78%)	32 (82%)	118 (81%)
	Adenomyoma	6 (10%)	5 (11%)	2 (5%)	13 (9%)
	PID	1 (1.7%)	2 (4.3%)	1 (2.6%)	4 (2.75%)
	AUB	3 (5%)	3 (6.5%)	2 (5%)	8 (5.5%)
	Cervical dysplasia	0 0	0 0	2 (5%)	2 (1.4%)
Uterus size (weeks) After hystrectomy	6-9	5 (8%)	11 (24%)	3 (7.7%)	19 (13%)
	10-12	28 (47%)	11 (24%)	28 (72%)	67 (46.2%)
	13-15	22 (37%)	19 (41.3%)	6 (15.4%)	47 (32.4%)
	Up to 16	5 (8%)	5 (11%)	2 (5%)	12 (8.2%)
Salpingo-oophorectomy	Bilateral Salpingo-oophorectomy	1 (1.66%)	8 (17.4%)	10 (25.6%)	19 (13%)
	Unilateral salpingo-oophorectomy	1 (1.66%)	2 (4.34%)	5 (12.8%)	8 (5.5%)
	Total	2 (3.33%)	10 (21.73%)	15 (38.5%)	37 (25.5%)

*NDVH - Non Descent Vaginal Hysterectomy, †LAVH - Laparoscopic Assisted Vaginal Hysterectomy, ‡TLH - Total Laparoscopic Hysterectomy

procedure was performed similar as in the case of NDVH. In the cases of big uterus, bisection of the cervix and uterus was done. The uterus was removed vaginally and transvaginal cuff was closed in all the procedures. Saline irrigation of the abdominal cavity was done and checked for hemostasis followed by skin wound closure in case LAVH and TLH.

The length of operating time in LAVH and TLH was recorded from the first surgical incision for introducing 10-mm port to the time of all wounds dressed. In the case of NDVH, time of surgery was noted from the placement of incision over the cervicovaginal junction to the placement of pack after the end of surgery. Blood loss was estimated by measurement of aspirated blood in case of all the three procedures and weighing the mops used in surgery. The temperature was charted 8 hourly in postoperative period. Injection diclofenac was given to all the

patients on the 1st postoperative day twice (150 mg). Top-up analgesia in the form of injection tramadol in infusion was given on the 1st postoperative day if the pain did not subside with injection diclofenac. The number of patients requiring injection tramadol on day 1 of surgery was recorded in all the groups. The duration of hospital stay was calculated from the day of surgery until the patient was discharged. One-way ANOVA test was used to analyze all the data. For all statistical tests, $P < 0.05$ was considered significant and $P < 0.0001$ as highly significant.

RESULTS

A total of 145 patients were included in our study. Sixty patients underwent NDVH, 46 LAVH, and 39 TLH. Demographic characteristics were comparable in all the three groups. The mean age for hysterectomy was approximately 45 years in all

Table 3: Intra-operative variables in various method of hysterectomy

Intra-operative variables		NDVH (*n*=60)	LAVH (*n*=46)	TLH (*n*=39)	Total (*n*=145)	Statistical analysis
TIME (minutes)	30-60	21 (35%)	0	0	21 (35%)	ANOVA 67379.192
	61-90	39 (65%)	8 (17.4%)	0	47 (32.41%)	Df
	91-120	0	38 (82.6%)	11 (28.2%)	49 (33.79%)	427.917
	>120-150	0	0	28 (71.8%)	28 (71.8%)	*P*=0.000
	Mean time (minutes)	54.67±15.67	102.45±10.53	126.79±8.7		
Uterus weight (grams)	100 to 200	36 (60%)	25 (54.3%)	31 (79.5%)	92 (63.44%)	ANOVA
	201 to 300	19 (31.7%)	16 (35%)	6 (15.4%)	41 (28.2%)	29.43,
	301 to 400	5 (8.3%)	5 (11%)	1 (2.6%)	11 (7.58%)	Df
	>400	0	0	1 (2.6%)	1 (0.68%)	6.35,
	Mean weight	198±59.4	214±66	190.5±67		*P*=0.002
Mean blood loss during surgery in ml	30-60	13 (21.7%)	0	0	13 (21.7%)	ANOVA 67379.192
	61-90	30 (50%)	29 (63%)	9 (23%)	68 (46.89%)	Df
	91-120	17 (17%)	17 (37%)	17 (43.6%)	51 (35.17%)	427.917,
	120-150	0	0	12 (30.8%)	12 (30.8%)	*P*=0.000
	151-180	0	0	1 (2.6%)	1 (2.6%)	
	Mean blood loss (ml)	59.50±16.69	91.84±10.66	111.025±20.28		

*NDVH - Non Descent Vaginal Hysterectomy, †LAVH - Laparoscopic Assisted Vaginal Hysterectomy, ‡TLH-Total Laparoscopic Hysterectomy

Table 4: During operative and post -operative complications in surgeries

Procedure	NDVH (*n*=60)	LAVH (*n*=46)	TLH (*n*=39)
During surgery complications			
Bladder injury	0	1 (2.2%)	0 (0%)
Ureteral injury	0	0	1 (2.6%)
Intra-operative blood transfusion	0	0	1 (2.6%)
Post -operative complications			
Nausea, vomiting	2 (3.3%)	3 (6.5%)	5 (13%)
Fever	0	0	2 (5%)
Vesico-vaginal fistula	0	0	1 (2.6%)
Vaginal-cuff infection	0	1 (2.2%)	1 (2.6%)
Wound infection	0	0	1 (2.6%)
§Top-up analgesia	22 (37%)	15 (32 %)	10 (25%)
Mean of Postoperative hospital stay (days)	3.2	3.88	3.55

ANOVA 0.496, Df 0.718, *P*=0.489. *NDVH-Non Descent Vaginal Hysterectomy, †LAVH - Laparoscopic Assisted Vaginal Hysterectomy, ‡TLH - Total Laparoscopic Hysterectomy, §Number of patients requiring Top up Analgesia- Single dose of injection Tramadol in drip required apart from 150 mg diclofenac on first postoperative day

the three groups. Eighty-seven percent of the patients were in the age group of 41–50 years. Most of the women were multiparous (68.3%). Multiparity was common in the NDVH group whereas para 1–3 were common in the LAVH and TLH groups. Only one woman was nulliparous. The mean body mass index (BMI) was 27.38 in the NDVH group, 26.2 in the LAVH group, and 25.6 in the TLH group. Seven cases in the NDVH group, 2 in the LAVH group, and 11 in the TLH group had comorbidities such as hypertension, diabetes, asthma, and hypothyroidism, as shown in Table 1.

A total of 118 (81%) cases were of fibroid uterus, which was the most common indication in all the three groups followed by adenomyosis in 9%. The other indications for hysterectomy were pelvic inflammatory disease in four patients, abnormal uterine bleeding in eight patients, and cervical dysplasia in two patients. The mean uterus size in all

the groups was 11.72 ± 2.23 weeks. In the NDVH group, it was 11.37 ± 2.13 weeks, in the TLH group 11.18 ± 2.13 weeks, and in the LAVH group 12.65 ± 2.2 weeks. In 67 (46%) cases, surgeries were done for uterus size with 10–12 weeks and only 8% were done for up to 16 weeks, as shown in Table 2.

The mean uterus weight in the study was 201.5 ± 63.86 g. The mean weight of uterus in the NDVH group was 198 ± 59.4 g, LAVH group 214 ± 66 g, and TLH group 190 ± 67 g. There was a significant difference between the mean size of the uterus between the three groups, *P* < 0.002, as evident from Table 3. In 63% cases uterine weight was estimated between 100 to 200 gms postoperatively. Uterus weight up to 400 g was found in only one case of the TLH and LAVH groups each.

Two (3.34%) cases of the NDVH group, 10 (21.70%) of the LAVH group, and 15 (38.5%) of the TLH group had either unilateral or bilateral salpingo-oophorectomy, as shown in Table 2.

The amount of blood loss was significantly minimum in the NDVH group that is 59.50 ± 16.7 mL and highest in the TLH group that is 111.025 ± 20.8 mL and was about 91.85 ± 0.10.66 mL in the LAVH group, as shown in Table 3. Sixty-three percent of the patients in the LAVH group, 72% in the NDVH group, and only 23% in the TLH group had <90 mL blood loss.

The mean operative time was significantly shorter in the NDVH group (54.67 ± 15.67 min) as compared to the LAVH (102.45 ± 10.53 min) and TLH (126.79 ± 8.7 min) groups ($P < 0.000$), as shown in Table 3. The time taken for surgery was 120 to150 minutes in 72% cases of TLH,91 to 120 minute in 83% case of LAVH whereas it was less than 90 minutes in all the cases of NDVH.

Among the intraoperative complications, as shown in Table 4, there was a ureteric injury in 1 case, 1 (2.6%) required a blood transfusion, and 2 (5%) women develop fever in the TLH group. There was 1 (2.2%) bladder injury in the LAVH group. Postoperative complications in the form of wound infection and vaginal fistula formation occurred in the TLH group in only 1 (2.6%) case each. Vaginal cuff infection was seen in 2.2% of the LAVH cases and 2.6% of the TLH cases.

The mean duration of hospital stay in days was 3.2 in the NDVH group, 3.88 in the LAVH group, and 3.55 in the TLH group, which was statistically insignificant, $P = 0.489$, as shown in Table 4. Top-up analgesia in the form of tramadol infusion apart from two doses (150 mg) of injection diclofenac on the 1st day of surgery was given in 37% of the patients in the NDVH group, 33% in the LAVH group, and only 26% in the TLH group [Table 4]. Thus, the number of patients experiencing the 1st-day postoperative pain was more in the NDVH group when compared to the other two groups.

DISCUSSION

The surgical approach of performing hysterectomy is the determining factor for postoperative morbidity in the patient. Many studies done previously have compared the various routes of hysterectomies to reach for a consensus and to decide the best route.[4] Studies have suggested that the benefit of minimally invasive surgeries over abdominal hysterectomy is in terms of acceptability and less duration of hospital stay and early resumption of work, but these surgeries need special skills that can be developed with time.[4,5] NDVH has the advantage of being scarless as compared to TLH and LAVH whereas it is not suitable for removing large size uterus.[6] LAVH and TLH have an advantage over NDVH because significantly large-size uterus can be removed without a large abdominal incision in the presence of pelvic pathology, adnexal mass, adhesions, and endometriosis by a skilled surgeon.[7,8] Ours being tertiary

care rural setup, we try for best possible treatment in available resources for rural females.

This study was done from January 2016 to December 2019. A total of 145 patients aged between 35 and 60 years undergoing hysterectomy were included and divided into three groups. Sixty underwent NDVH, 46 LAVH, and 39 TLH. In our study, 87% of the patients were in the age group of 41–50 years and the mean age was 45 years and it is very similar to the other studies.[8,9] 68.3% were multiparous in our study. The mean parity was 3 in the NDVH and LAVH groups and 3.80 in the TLH group, which is similar to the study of Sarda *et al*.[8] The mean BMI was highest in the NDVH group being 27.38, 26 in the LAVH group, and 25 in the TLH group. Patients with comorbidities were more in numbers in the NDVH group (11.7%) when compared to the other two groups. This suggests that NDVH can be safely done in cases with high BMI along with comorbidities.

The indication of surgery was mostly fibroid in all the groups, comprising 36 (78.26%), 32 (82.05%), and 50 (83.33%) in LAVH, TLH, and NDVH, respectively. The same indication was also common in other studies done.[7,8,10] The mean uterus weight of all cases in the current study was 201.5 ± 6386 g. The weight of uterus was significantly larger in the LAVH group (214 ± 66 g), which was greater than the TLH (190 ± 67) and NDVH (198 ± 59.4) groups ($P = 0.002$). Thus, LAVH was more feasible for large uterus; this could be attributed to selection criteria for the operating procedure by the surgeon. Our finding is consistent with the finding of Shin *et al*.[11] where LAVH was found to be feasible for larger uterus. Ten out of 46 (21.7%) cases in the LAVH group and 15/39 (38.5%) in the TLH group had either unilateral or bilateral salpingo-oophorectomy. Many prospective studies[4,12] supported that 65%–97.5% of the adnexa can be removed vaginally, but in our study, only 3.34% of the cases in the NDVH group had salpingo-oophorectomy vaginally. This may be due to the selection criteria for patients.

The mean operating time was significantly shorter in the NDVH group (54.67 ± 15.67 min) as compared to the LAVH (102.45 ± 10.53 min) and TLH (126.79 ± 8.7 min) groups ($P = 0.000$). The intraoperative blood loss was significantly greater in the TLH group that is 111.025 ± 20.8 mL than during LAVH and NDVH. The amount of blood loss was minimum in the NDVH group that is 59.50 ± 16.7 mL. It was about 91.84 ± 0.10.66 mL in the LAVH group ($P = 0.000$). Improving skills, using endoscopic stapler, may reduce time and blood loss for TLH. Similar studies done by Sarada[8], Christian Schindlbeck,[9] and Roy *et al*.[13,14] supported that NDVH took less operative time and blood loss was minimal in comparison to TLH and LAVH.

There were two cases of urinary tract injuries: 1 (2.6%) ureteric injury in the TLH group and 1 (2.2%) bladder injury in the LAVH group. Injury to bladder occurred during vaginal entry into the peritoneum which was diagnosed per-operatively and repaired. The reported incidence of ureteral injuries is 0%–2%[11] and the risk of bladder injuries ranges from 0.8%–2%[15] and it corresponds well with the present study. Shin[11] reported a 0.6% bladder injury in his study. The rate of bladder injuries was 1% in a study done on 1501 procedures by Marie-Christine Lafay Pillet.[15]

There was a requirement of intraoperative blood transfusion in 2.6% of the cases of the TLH group. Postoperative complications such as fever and wound infection were higher in the TLH group. One (2.6%) patient in the TLH group had vaginal fistula formation diagnosed on 7 postoperative days which may be attributed due to thermal injury during colpotomy that makes the vaginal cuff vulnerable to delayed healing and dehiscence. The intra- and postoperative complications were almost absent in the NDVH group.

The number of patients requiring the top-up analgesia in the form of injection tramadol in infusion apart from 150-mg injection diclofenac was more in the cases undergoing NDVH (37%) and lesser in LAVH cases (32%) and fewer in TLH (25%) cases. Other studies by Chattopadhyay *et al.*[2] also confirmed that patients undergoing TLH have less 1st-day postoperative pain when compared to NDVH.

The mean of posthospital stay was 3.2 days in the NDVH group, 3.88 days in the LAVH group, and 3.55 days in the TLH group. The duration of stay was shortest for NDVH. There was no significant difference between the groups in terms of duration of hospital stay, *P* < 0.489. This may be because women come from far-off rural villages and they did not want to get discharged early. Other studies[8,11,16] also mentioned the duration of hospital stay of about 3–7 days.

However, limitations in the present study include:
1. This is a hospital-based study (tertiary care center) and cannot be correlated with the general population
2. The number of included subjects in the three routes of surgeries was not equal.

Conclusions

NDVH was the fastest operative technique with smaller blood loss and less intraoperative complications as compared to LAVH and TLH but depends on skill of surgeons and resource availability. Therefore, NDVH should be considered as the preferred approach in patients with benign uterine disease and with high BMI. However, there were technical problems with salpingo-oophorectomy from the vaginal approach, hence when NDVH is not feasible and salpingo-oophorectomy is required, LAVH and TLH can be considered as alternatives. LAVH had an acceptable operating time, low complications, and lack of severe postoperative complications.

LAVH has the advantage of both laparoscopic and vaginal approaches and therefore can be preferred in cases where oophorectomy or adnexectomy is required and at the beginning of the learning curve of laparoscopic surgeons. TLH did not appear to offer any significant benefit over the other two methods and should be done where neither NDVH nor LAVH is feasible and has to be performed by very experienced surgeons.

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Conflicts of interest
There are no conflicts of interest.

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