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Total Laparoscopic Hysterectomy versus Vaginal Hysterectomy of Non-Prolapsed Uterus with Benign Uterine Lesions

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Abstract:

Background and Objective: Hysterectomy may be done for benign gynecological causes as uterine fibroids and abnormal uterine bleeding (AUB), pelvic organ prolapses, adenomyosis, endometriosis, cervical dysplasia, endometrial hyperplasia, or malignancy of genital tract. This work was aimed at comparing Total Laparoscopic Hysterectomy (TLH) with vaginal hysterectomy (VH) as the most effective approach for hysterectomy among women having benign uterine lesion with mobile non-prolapsed uterus of size not exceeding twelve weeks.

Methods: our randomized controlled study involved 50 female cases whose ages were older than forty yrs, body mass index (BMI) 18.5-29.9 kgm2 suffering from benign uterine lesions requiring hysterectomy like fibroid uterus, adenomyosis or AUB, mobile non prolapsed uterus and uterine size not more than 12 weeks.

Results: The mean operative time exhibited significantly lower values within VH group as opposed to TLH one (P=0.001). No statistically significant variation was documented regarding mean operative time as well as intraoperative blood loss amount among cases of TLH and VH group who had salpingo-oophorectomy and patients of TLH and VH group in whom salpingo oophorectomy was not done. Return to daily activity showed a significant difference between both groups as (P= 0.001).

Conclusion: VH and TLH are feasible approaches for removal of mobile non prolapsed uterus with benign lesions. VH has the advantage of shorter operative time over TLH. Both should be used as alternative approaches for hysterectomy.

Keywords: Benign Uterine Lesions, Non-Prolapsed Uterus, Total Laparoscopic Hysterectomy, Vaginal Hysterectomy

1. Introduction

Hysterectomy represents a surgical procedure that involves removing the uterus, which is deemed to be a predominant gynecological operations globally [1, 2].

Hysterectomy may be done for benign gynecological causes as uterine fibroids as well as abnormal uterine bleeding (AUB), pelvic organ prolapses, adenomyosis, endometriosis, cervical dysplasia, endometrial hyperplasia, or malignancy of genital tract [3]. Routes for hysterectomy are vaginal, abdominal, laparoscopic, or robotic [4].

Since the 20th century, most hysterectomies have been conducted by making an incision in the abdomen, known as laparotomy. Nevertheless, evidence addresses that vaginal hysterectomy (VH) should be the favored approach for removing the uterus among cases having benign conditions. Laparoscopic hysterectomy is employed only if vaginal route is unfeasible [5].

The hysterectomy route is influenced by several anatomical factors, involving the uterus' size, shape, as well as lateral extent; uterine support; suspected pelvic adhesion; the pubic arch angle; along with the degree of pathology. The decision could also be redirected by medical conditions that might be worsened by increased pressure inside the abdomen occurring as a result of insufflation or a steep Trendelenburg position [3].

VH shows many benefits in comparison with abdominal hysterectomy involving lowe morbidity rates, shorter hospitalization stays, as well as improved patients' experience. Obstacles to the vaginal route involve often attributed to the absence of pelvic relaxation, prior pelvic surgeries, nulliparity, as well as a large uterine size. [6].

Total Laparoscopic Hysterectomy (TLH) is a modern concept in which a hysterectomy is entirely carried out through laparoscopy, that involves vaginal vault suturing [7]. The procedure is linked to some difficulties, requiring advanced special laparoscopic tools, so it could be expensive for patients as opposed to VH. However, it has become popular due to its minimum invasiveness along with the ability to perform dissection under direct laparoscopic vision [8].

This work was aimed at comparing TLH with VH as the most effective approach for hysterectomy among women having benign uterine lesion with mobile non-prolapsed uterus of size not exceeding twelve weeks.

2. Methods

Our randomized controlled study involved 50 female cases whose age are older than forty yrs, body mass index (BMI) 18.5-29.9 kgm2 suffering from benign uterine lesions requiring hysterectomy like fibroid uterus, adenomyosis or AUB, mobile non prolapsed uterus and uterine size not more than 12 weeks. It commenced two years following the Ethical Committee Tanta University Hospitals' approval, Tanta, Egypt. All participants were asked to fill an informed consent.

Cases within one group were subjected to TLH and those in the other were subjected to VH.

Exclusion criteria were virgins, patients with adnexal mass-large ovarian cyst, pelvic inflammatory disease (PID) or endometriosis, genital tract malignancy, previous gynecologic or pelvic surgery

like endometriosis or myomectomy, medical problems who are not fit for anesthesia or laparoscopy, blood disease affecting coagulation profile like leukemia and thrombocytopenia and patients on anti-coagulant drugs or antiplatelet drugs.

All patients went through a comprehensive medical history, clinical assessment, pelvic examination, ultrasonography, laboratory testing [complete blood count (CBC), liver and renal function tests, coagulation profile (bleeding time (BT), clotting time (CT), prothrombin time (PT) and international normalized ratio (INR), hepatitis C virus (HCV) antibodies, hepatitis B virus (HBV) surface antigen and thyroid profile] and 2D echocardiography.

One surgical team has carried out all surgical procedures. Under general anesthesia, all participants were administered prophylactic I.V antibiotics with an anesthetic induction of 1 g ceftriaxone along with 500 mg metronidazole. They were positioned in dorsal lithotomy position, cleaned with betadine solution and then draped. Examination after anesthesia was carried out to ensure uterine size and mobility along with excluding adnexal lesion.

Technique of total laparoscopic hysterectomy

After placing an intrauterine manipulator, an insufflation needle was introduced via the umbilicus with closed pneumoperitoneum reaching 15 was employed. A 10-mm trocar was placed via the umbilicus to introduce the laparoscope. Inserting the second as well as third 5-mm trocars was accomplished within the left lower abdominal quadrant lateral to rectus sheath. Placing the second was carried out at two cm above and medial to left anterior superior iliac spine while inserting the third was accomplished at five cm above the second one. Additionally, placing a fourth 5-mm trocar was carried out within the right lower abdominal quadrant lateral to rectus sheath. To remove ovaries, the infundibulopelvic pelvic ligament went through coagulation as well as division but this step was done later after completion of hysterectomy. The sane procudures were accomplished on the opposite side, after which the peritoneum of the vesicouterine pouch was detached and dissected to expose uterine pedicles. The peritoneum of the posterior leaf of broad ligaments pouch went through detachment as well as dissection till uterosacral ligament to displace ureters away lateral so decrease its injury. Uterine Pedicles was coagulated using bipolar grasper and sectioned using laparoscopic scissors followed by Para cervical tissues then the cervico-vaginal junction. The colpotomy was done over vaginal cup using hook then removing the uterus was accomplished through vagina. The vaginal vault was sutured laparoscopically, and adequate hemostasis ensured. Figure 1

Technique of Non prolapsed vaginal hysterectomy

After cleaning and draping, both anterior along with posterior lips of cervix were held utilizing volsellum. Saline adrenaline infiltration circumferentially into the proper planes of the cervicovaginal junction was employed within all participants. A circular incision was performed around the cervix, along with severing the pubo-vesico-cervical ligament, Additionally, mobilizing the bladder upward was accomplished. The anterior as well as posterior pouches were consecutively opened. The uterosacral and cardinal ligaments went through clamping, severing, as well as ligation. Bilateral clamping of the uterine vessels was performed. The last clamp was placed on the uterine cornu, which includes the round ligament, ovarian ligament, as well as the fallopian tube medial part. For removing ovaries, the round ligament was clamped individually, and then the infundibulopelvic ligament was also clamped when feasible. After delivery of the uterus, hemostasis was assured, the vaginal walls were suspended to uterosacral pedicles then

sutured to close vaginal vault. Following the surgical procedure, all participants were administered the same antibiotics course, including (1 g ceftriaxone within six 6 and eighteen hours postoperatively). Additionally, measuring postoperative hemoglobin was carried out within twenty-four hours following the surgical procedure. Both groups were compared as regards intraoperative parameter such hours postoperative blood loss, surgical duration), intraoperative injury)and post-operative parameters such as (ambulation time, febrile illness ,urine retention after catheter removal ,postoperative hemorrhage requiring laparotomy, postoperative blood transfusion, morbidities within postoperative period; pain perception within 12 hours post-operative day and 36 hours post-operative day , wound infection, other infections, hospitalization duration. Follow up in outpatient clinic was done after two weeks then after one month to observe and assess the progress, duration of post-operative recovery necessary to resume regular daily activities, the rectal or vaginal fistula occurrence, adverse events related to the vaginal vault involving vault prolapse, along with urinary complications like incontinence. Figure 2

Sample Size Calculation

Sample size was measured utilizing Epi info 7 software developed by Centre for Disease Control and Prevention "CDC" in Atlanta, Georgia. The study included two groups. The Calculated number was 25 patients per group based on the following: [Two-sided significance level 95%, power 90% and ratio of cases to control 1:1]. Expected outcome (operating time) among patients VH group is 72.35 ± 11.53 min compared to LH groups 84.98 ± 19.18 min [9].

Statistical analysis:

Data went through a statistical analysis utilizing SPSS v26 (IBM Inc., Chicago, IL, USA). Quantitative variables were displayed as mean as well as SD then went through a comparison among both groups utilizing unpaired Student's t-test. Qualitative variables were displayed as frequency as well as percentage (%) then went through analysis utilzing the Chi-square or Fisher's exact test when appropriate. A two-tailed P value of less than 0.05 was deemed to show a statistical significance.

3. Results

Demographic data, previous deliveries' modes, preoperative uterine size, post-operative uterine weight, and rate of oophorectomy did not show statistically significant variation among the two groups. The salpingectomy rate showed a statistically significant difference between both groups (P= 0.004). **Table 1**

Regarding patients' complaints in TLH group, 15(60.0%) complained from AUB, 7(28.0%) from PMB and 3(12.0%) from pelvic pain, while in VH group, 18(72.0%) complain from AUB, 4(16.0%) from PMB and 3(12.0%) from pelvic pain. Regarding pathological diagnosis in TLH group, it was fibroid in 6(24.0%) patients, adenomyosis was among 7(28.0%) cases, endometrial polyp was among 3(12.0%) cases, DUB was among 7(28.0%) cases and cervical dysplasia among 2(8.0%) cases, while in VH group, it was fibroid among 8(32.0%) cases, adenomyosis was among 7(28.0%) cases, endometrial polyp was among 3(12.0%) cases, DUB was among 5(20.0%) cases and cervical dysplasia among 2(8.0%) cases. **Table 2**

A statistically significant variation was documented among the two groups regarding the mean operative time with shorter operative time among VH group (P= 0.001). while no statistically

significant variation was doumented among the two groups regarding the mean of the amount of intraoperative blood and intraoperative injuries. **Table 3**

No statistically significant variation was documented as regards mean operative time between patients of TLH and VH group who had salpingo-oophorectomy and patients of TLH and VH group in whom salpingo oophorectomy was not done. This means that doing oophorectomy did not affect the length of operative time. No statistically significant variation was documented as regards the intraoperative blood loss amount among cases of TLH and VH group who had salpingo-oophorectomy and patients of TLH and VH group in whom salpingo oophorectomy was not done. This means that doing oophorectomy did not effect of amount blood loss. **Table 4**

No statistically significant variation was documented amog the two groups as regards post-operative pain using VAS, ambulation time as well as hospital stay duration and post-operative complications. A statistically significant variation was documented among the two groups as return to daily activity (P= 0.001). **Table 5**.

Table 1: Demographic data, mode of deliveries, uterine size (preoperative), uterine weight (post-operative), salpingectomy and oophorectomy rate of both groups

	TLH (n=25)	VH (n=25)	P
Age (years)	49.72±5.15	49.28±4.37	0.746
BMI (kg/m2)	24.59±2.70	24.59±2.70	1.000
Parity	3.24±0.88	3.24±0.88	1.000
Vaginal delivery	19(76.0%)	17(68.0%)	0.529
CS delivery	6(24.0%)	8(32.0%)	
Uterine size (weeks)	8.64±2.14	8.72±2.13	0.895
Uterine weight (grams)	153±79.97	160.8±83.75	0.738
Salpingectomy	25(100.0%)	18(72.0%)	0.004*
Oophorectomy	10(40.0%)	7(28.0%)	0.370

*Data are displayed as mean ± SD or frequency (%). * Significant p <0.05, TLH: Total laparoscopic hysterectomy, VH: Vaginal hysterectomy, BMI: Body mass index, CS: Cesarean section.*

Table 2: The presenting complaint in patients and pathological diagnosis of both groups

	TLH (n=25)	VH (n=25)
AUB	15(60.0%)	18(72.0%)
PMB	7(28.0%)	4(16.0%)
Pelvic Pain	3(12.0%)	3(12.0%)
Pathological diagnosis		
Fibroid	6(24.0%)	8(32.0%)
Adenomyosis	7(28.0%)	7(28.0%)
Endometrial polyp	3(12.0%)	3(12.0%)
DUB	7(28.0%)	5(20.0%)
Cervical Dysplasia	2(8.0%)	2(8.0%)

Data are presented as frequency (%). TLH: Total laparoscopic hysterectomy, VH: Vaginal hysterectomy, PMB: Post-menopausal bleeding, AUB: Abnormal uterine bleeding, DUB: dysfunctional uterine bleeding.

Table 3: Intraoperative parameters (operative time –amount of blood loss) of both groups and intraoperative injuries

	TLH (n=25)	VH (n=25)	P
Operative time (min)	92.24±12.22	61.0 ±5.77	0.001*
Amount of blood loss(ml)	159 ±34.48	183.6±48.1	0.085
Intraoperative injuries			
Urinary Bladder injuries	2(8.0%)	0(0.0%)	0.149
Ureteric injuries	0(0.0%)	0(0.0%)	--
Intestinal injuries	0(0.0%)	0(0.0%)	--
Vascular injuries	0(0.0%)	0(0.0%)	--

*Data are displayed as mean ± SD. * Significant p <0.05, TLH: Total laparoscopic hysterectomy, VH: Vaginal hysterectomy.*

Table 4: Intraoperative parameters (operative time –amount of blood loss) of TLH and VH group with and without oophorectomy

	With oophorectomy	Without oophorectomy	P
TLH group			
Operative time (min)	95.83 ± 18.28	91.11 ± 10.03	0.420
Amount of blood loss(ml)	167± 43.22	154± 27.66	0.367
VH group			
Operative time (min)	64.29± 6.01	59.72 ± 5.80	0.075
Amount of blood loss(ml)	205.71 ± 59.	175.00 ±41.73	0.156

Data are displayed as mean ± SD. TLH: Total laparoscopic hysterectomy, VH: Vaginal hysterectomy.

Table 5: Post- operative pain in both groups using VAS, recovery and complications

	TLH (n=25)	VH (n=25)	P
1st day (12 hours post-operative)	5.60±0.65	5.88±0.78	0.173
2nd day (36 hours post-operative)	2.36±0.64	2.48±0.65	0.514
Ambulation time(hours)	6.76 ± 1.27	7.44 ± 1.19	0.057
Duration of hospital stay(hours)	43.24 ±8.41	42.68 ± 4.71	0.773
Return normal daily activities (days)	10.92 ±1.32	12.40 ± 1.44	0.001*
Complications			
Fever	3(12.0%)	4(16.0%)	0.684
Urine retention	2(8.0%)	0(0.0%)	0.149
Blood transfusion	0(0.0%)	0(0.0%)	--
Bleeding needing laparotomy	0(0.0%)	0(0.0%)	--
Vault hematoma	3(12.0%)	2(8.0%)	0.637
Wound infection	0(0.0%)	0(0.0%)	--
Rectal or urinary fistula	0(0.0%)	0(0.0%)	--
Vault prolapses	0(0.0%)	0(0.0%)	--

*Data are displayed as mean ± SD or frequency (%). * Significant p <0.05, TLH: Total laparoscopic hysterectomy, VH: Vaginal hysterectomy, VAS: visual analogue scale.*

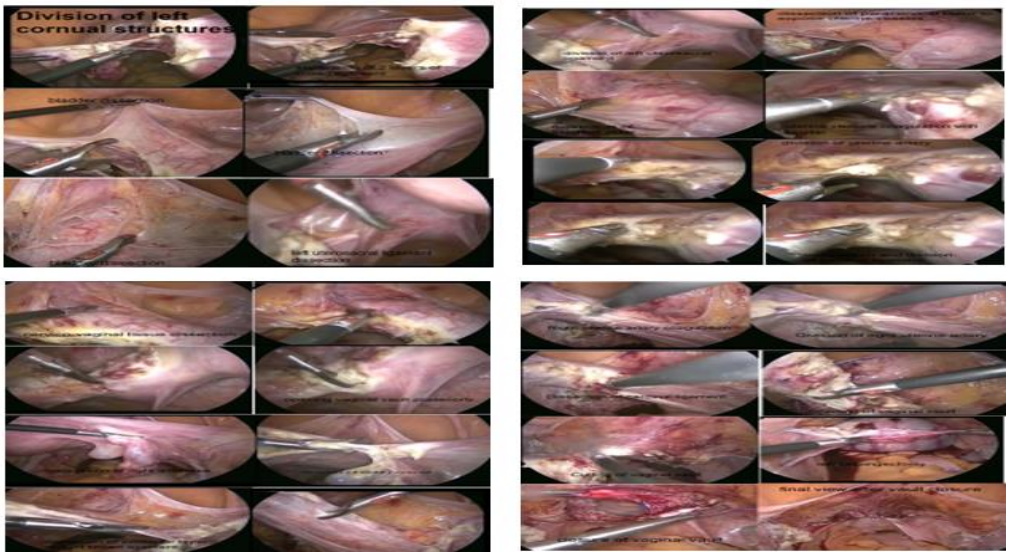

Figure 1: Total laparoscopic hysterectomy (TLH) (case presentation operative steps)

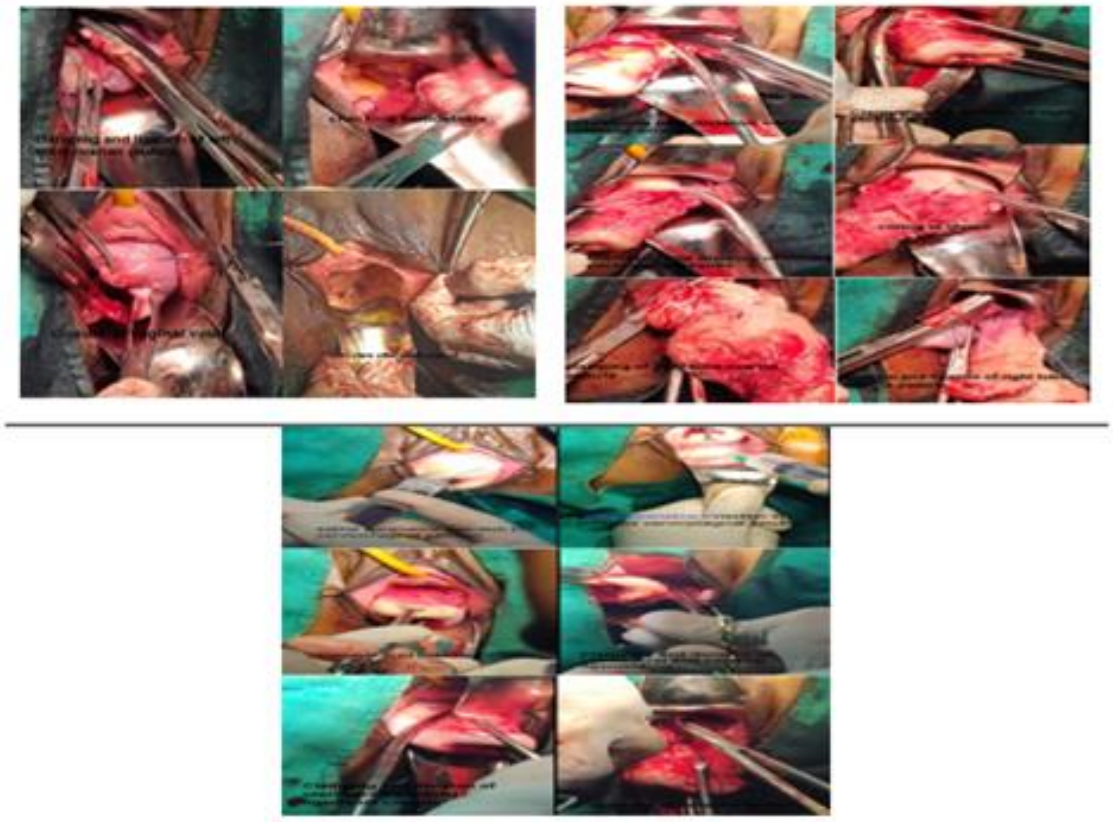

Figure 2: Vaginal hysterectomy (VH) (case presentation- operative steps)

4. Discussion

Hysterectomy represents a predominent gynecological surgical procedure because of different indications of benign and malignant conditions. It can be performed by different routes like vaginal, abdominal, and laparoscopic or robotic [10].

Regarding prospective study by Chattopadhyay S et al. [11] The study's duration was only one year. The operative time in VH group was around 94.76 min while 99.24 min for the TLH, possessing no statistical significance. Ambulation time within VH reached 24.12 h while 19.32 h for the TLH, indicating a statistical significance. Additionally, it was relatively longer than in this study. The adverse events occurring postoperatively were slightly more observed within VH as opposed to TLH, addressing no statistically significant variation.

In another hospital based observational study conducted by Bemat IF et al. [12] the patients shared the same selection criteria and pre-operative clinical diagnosis. The intraoperative and post-operative complications within TLH group were prevalent within VH group, addressing no statistical significance. Three cases developing bladder injuries as well as a one exhibiting hemorrhage were observed as adverse events intraoperatively within TLH group in comparison with one case developing hemorrhage within VH group. Six (four developing fever along with two hematuria) cases within TLH group while four (three developing fever along with one hematuria) cases within VH group were observed postoperatively. As opposed to current study, the operative time was statistically significant between both groups but longer than current study it was in hours 1.9±0.52 in VH group and 1.48±0.86 in TLH group. Also, the amount of intraoperative blood loss was statistically significant between both groups but more than current study it was 296.25±61.25 in VH group and 215.25±89.12 in TLH group. The mean hospitalization duration within VH group reached 7.32 (SD=1.36) days while TLH showed 5.65 (SD= 1.92) days. Such a longer hospitalization duration within VH exhibited a statistically significant variation and longer than this study. This difference may be related to the difference in facilities and operator experience.

In another comparative study performed at the Department of Obstetrics and Gynaecology, Mahila Chikitsalaya Hospital, SMS Medical College and Hospital, Jaipur. Hysterectomy0 patients with benign lesions of mobile non prolapsed uterus of size up to 16 weeks who required hysterectomy were chosen from the Outpatient Department. In agreement with this study, different pathologies are the same with adenomyosis (46.67%) and fibroid (33.33%) are the most common. AUB was the most common presenting complaint (63%). All patients of TLH group had salpingectomy. A statistically significant variation was documented among the two groups regarding operative time. The TLH took ~100.76 min while VH reached 71.57 min which was slightly different from current study. On the other hand, Nagar et al. [13] intraoperative blood loss exhibited significantly lower values within TLH group as opposed to the VH one (86.37 v/s 119.17ml). The mean hospitalization duration was relatively longer than this the average within TLH group, which was significantly less (5.7 days) as opposed to the VH (7.13 days). Four cases out of thirty within TLH group developed UTI symptoms, two cases out of thirty within the VH group developed stitch line discharge. While three cases within VH group presented vault discharge complaint as opposed to no cases within the TLH group developing this complaint.

In another Cross-sectional comparative study at Department of Obstetrics and Gynecology, Pune. A total of 120 patients with benign lesions of mobile non prolapsed uterus of size up to 12 weeks who required hysterectomy were chosen from the Outpatient Department. In agreement with the current study, fibroid was the predominent pathology, then adenomyosis was the second one. A statistically significant variation was documented among the two groups regarding operative time with shorter operative time among VH group with 164.50 ±18.72 min than among TLH group with 185.50±2.38 min but both were longer than current study. Conversely, intraoperative blood loss exhibited significantly lower values within TLH group as opposed to the VH one (304v/s 372 ml) but with statistically significant difference among the two groups. As opposed to current findings, the post-operative hospital stays exhibited significantly lower values within VH group as opposed to TLH one, addressing statistically significant variation among the two groups but longer than current study. In agreement with the current study, Jha et al. [14] the patients shared the selection criteria. Fibroid as well as adenomyosis were the predominent indications. A statistically significant variation was documented among the two groups regarding operative time with shorter operative time among VH group with mean 60 min than among TLH group with mean 100 min. In contrast to current study, Roy et al. [15] there were no cases with previous CS section in TLH group. The mean intraoperative blood loss exhibited significantly lower values within VH group as opposed to the TLH one (200 vs. 250) ml but with statistically significant variation among the two groups. No visceral injuries were observed among both groups.

Limitations: the sample size was relatively modest. The study was in a single center. So, we recommended that VH and TLH should be route of choice for performing hysterectomy for mobile non prolapsed uterus with benign lesions. Both are feasible routes but require more training and surgical skills. Large RCTs should be employed to detect variations as regards VH as well as LH outcomes, involving operation time, postoperative pain, perioperative adverse events, along with cost effectiveness.

5. Conclusion

VH and TLH are feasible approaches for removal of mobile non prolapsed uterus with benign lesions. VH has the advantage of shorter operative time over TLH, but TLH has the advantage of faster recovery and return to normal daily activity over VH. Both should be used as alternative approaches for hysterectomy.

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