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Comparison of Outcome of Various Routes of Hysterectomy

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ABSTRACT: Background: Hysterectomy is one of the staples among gynecological surgeries, indicated in conditions such as abnormal uterine bleeding (AUB), utero-vaginal prolapse (UVP) and fibroid uterus (FU). Different types of surgeries are used for hysterectomy, varying in their outcome and complications, such as blood loss, duration of surgery and hospital stay, along with infection and other complications.

Objective: To compare the morbidity and outcome of vaginal (VH), total abdominal (TAH) and laparoscopic (LH) hysterectomy.

Materials and Methods: A two-year prospective study was conducted, consisting of 164 females who required hysterectomy. Patients who underwent hysterectomy, with indication of AUB, UVP, FU were included, and patients with malignancies were excluded. Data were collected from patient's medical records and analyzed using R v 3.6.0. Chi square and Kruskal–Wallis tests were used to find association and compare means in patient population. Proportion test was used to find the difference in patient population.

Results: The route of surgery was significantly associated uterus weight (P value >0.05). Majority of patients who underwent LAVH needed lower days of hospital stay (3.76±0.98 vs. 4.94±1.19days, P value: <0.05), but similar to VH (3.90±0.75). However, laparoscopic surgery had highest mean duration of time (126 ± 46.8 min) compared to VH (77.65±23.9 min). Insignificant difference was observed for intra-operative blood loss based on the type of surgery.

Conclusions: LAVH and VH have better surgical outcome in terms of recovery time, hospital stay, pain and complications compared to TAH. Hence, LAVH and VH can be preferred over the abdominal route for hysterectomy.

KEYWORDS: Gynecologic Surgical Procedures, Hysterectomy, Uterine Hemorrhage, Vaginal, Laparoscopy, Infections

I. INTRODUCTION

Hysterectomy is a crucial and debatable issue in healthcare and medical ethics due to varied epidemiological patterns in India. Abdominal hysterectomy is the most frequently used surgical procedure for uterus removal among females. The most frequent indications for hysterectomy include abnormal uterine bleeding (AUB), utero-vaginal prolapse (UVP) and fibroid uterus (FU).[1]

Nearly one-fifth of gynecological visits and one-third of hysterectomies are due to fibroids or leiomyomas, which annually account for healthcare costs of $ 5.9–34.3 billion in the United States.[2,3] During 2000-2004, around 90% of hysterectomies were performed to treat benign diseases (FU, AUB and UVP) in US and the only 10% were for malignant diseases (uterine, ovarian and cervical cancers).[4] Nearly 0.6 million hysterectomies are done per year in USA alone and 20% of women in UK undergo hysterectomy before 60 years of age.[4,5] However, prevalence of hysterectomy varies widely across India. A higher proportion of hysterectomy incidences are in Telangana (47%) and Andhra Pradesh (42%), with minimal incidence in Lakshadweep (2%),[6] and about one-third of the women undergoing hysterectomy are below 40 years of age.[7] Researchers have also reported that nearly 6% of Indian women, aged between 30-49 years are currently undergoing hysterectomy.[8]

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Hysterectomy can be performed through the abdomen, vagina or using laparoscopy. Among these, vaginal hysterectomy (VH) is minimally invasive, compared to TAH.[6] Patients experience lesser post-operative pain, more rapid recovery and lesser number of days in the hospital.[9] However, laparoscopically assisted vaginal hysterectomy (LAVH) results in minor blood loss, compared to both VH and TAH.[10] This study was undertaken to compare the morbidity and outcome of TAH, VH and LAVH with respect to blood loss, pain and duration of hospital stay along with other complications.

II. MATERIAL AND METHODS

A two-year prospective study was conducted at the obstetrics and gynecology department of a tertiary care hospital. The study comprised of 164 female patients who underwent hysterectomy from June 2016 to June 2018. Ethical clearance was obtained from local institutional committee and written informed consent was procured from all patients. Symptomatic patients who were diagnosed with benign uterine diseases including uterine fibroids, adenomyosis, endometrial atypical hyperplasia, cervical intraepithelial neoplasia and dysplasia were included. Patients with malignancies were excluded from the study. Data with respect to age, diagnosis indications, comorbidity, hysterectomy route, duration of surgery and hospital stay, intra-operative blood loss, size of uterus and complication during and after surgeries were collected from medical records. Pain was measured using the visual analog scales (VAS), which indicated 0 –no pain, 1-3– mild pain, 4-6– moderate pain, 7-10–severe pain.[11,12] All patients had been followed up for one year to note any post-operative complications. Cefotaxime was used as the prophylactic antibiotic prior to surgery and all surgeries were performed under general anesthesia.

Data was analyzed using R v 3.6.0 and represented as frequency distribution, percentages or mean ± standard deviation (SD). Chi-square and Kruskal–Wallis tests were used to find association and compare means of the various variables, respectively. A proportion test was done to assess the number of days required for hospital stay depending upon type of surgery. A P value of <0.05 was judged statistically significant.

III. RESULTS

Majority of patients underwent vaginal hysterectomy (N=90), followed by abdominal (N=52) and laparoscopic hysterectomy (N=22), as shown in Table 1. The mean age and intra-operative blood loss were noted to be 46.05±7.8 years and 91.37±35.25 ml respectively. Most patients belonged to the age group of 40-49 years (N=97/164) and had a common diagnostic indication of AUB–leiomyoma (38.41%). However, prolapse, as an indication was exclusively for VH and all 13 patients with prolapse underwent VH in our study. Totally, 41/164 (25%) patients had comorbidities and the many patients undergoing LAVH both major (N=8/22, 36.36%) whereas many patients undergoing VH had minor comorbidities (N=12/90; 13.33%), as presented in Table 2.

Table 1: Demographics of patient population

PATIENTS' CHARACTERISTICS		TYPES OF SURGERY N (%)			TOTAL
		ABDOMINAL	LAPAROSCOPIC	VAGINAL	
Surgery type		52 (32%)	22 (13%)	90 (55%)	164
Age	30-39	9 (17.31)	1 (4.55)	15 (16.67)	25
	40-49	29 (55.77)	17 (77.27)	51 (56.67)	97
	50-59	11 (21.15)	2 (9.09)	17 (18.89)	30
	60-69	3 (5.77)	2 (9.09)	5 (5.56)	10
	70-79	0	0	1 (1.11)	1
	80-90	0	0	1 (1.11)	1
Diagnosis	AUB	46 (88.46)	22 (100)	73 (81.11)	141

International Journal Dental and Medical Sciences Research
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Indication	CIN	1 (1.92)	0	4 (4.44)	5
	Prolapse	0	0	13 (14.44)	13
	Abdominopelvic	5 (9.62)	0	0	5

Note: AUB: Abnormal Uterine Bleeding; CIN: Cervical Intraepithelial Neoplasia
AUB comprised of AUB–Leiomyoma, AUB–Endometrial, AUB–Ovulatory disorders, AUB–Adenomyosis and AUB–Polyp, Endometriosis and Postmenopausal Bleed
CIN consists of High-grade Squamous Intraepithelial Lesion, Low-grade Squamous Intraepithelial Lesion and Atypical Squamous Cells of Undetermined Significance
Abdominopelvic comprised of Pelvic Pain and Right Ovarian Cyst

Table 2: Patients' distribution based on comorbidity

COMORBIDITY	TYPES OF SURGERY N (%)		
	ABDOMINAL (N=52)	LAPAROSCOPIC (N=22)	VAGINAL (N=90)
Absent	39 (75.00)	13 (59.09)	63 (70.00)
Major Comorbidity	9 (17.31)	8 (36.36)	15 (16.67)
Minor Comorbidity	4 (7.69)	1 (4.55)	12 (13.33)

represents patients having more than one complication.
Major complications consist of Hemorrhoids, Rheumatoid Heart Disease, Previous lower segment caesarean section, Arteriovenous Malformation, Diabetes Mellitus, Hypertension, Hematological Disorders and Kidney Disease.
Minor complications consist of Previous Craniotomy, Thyroid Disease, Infectious disease (Tuberculosis/ Hepatitis B), Vitiligo, Mallory Weiss Syndrome, Epilepsy, Septal Aneurysm,

A significant difference was noted in the duration of surgery and hospital stay varies significantly based on the type of surgery (P value: <0.0001), as presented in Table 3. A significant association was seen between type of surgery and size of uterus (P value: 0.0001). Although, majority of patients had uterus size of ≤ 14 weeks (N=79/164), many patients with uterus size of 14-22 Weeks had undergone for TAH (N=24/52; 46.15%) and patients with uterus size of ≤14 had undergone for LAVH (N=13/22; 59.09%) and VH (N=51/90; 56.67%). The results indicated that uterus size, duration of surgery and hospital stay depend upon the type of surgery chosen. Laparoscopic surgery had significantly higher surgery time (126.0 ± 46.8 min) compared to TAH (101.0 ±33.7 min) and VH (77.6 ± 23.9). However, duration of hospital stay was more in TAH (4.94±1.19 days) compared to LAVH (3.90±0.75) and VH (3.76±0.98). A significant number of patients had hospital stay of >5 days in abdominal surgery as compared to laparoscopic surgery (P value: 0.025). However, the difference in hospital stay was insignificant on comparing vaginal and laparoscopic surgeries (P value: 0.714). An insignificant difference was noted for the mean intra-operative blood based on the type of surgery (P value: 0.248). However, a total of seven patients received blood transfusion post-operatively, out of whom four patients underwent VH and three underwent TAH.

Table 3: Association between various parameters and types of surgery

PARAMETERS	TYPES OF SURGERY			P VALUE
	ABDOMINAL (N=52)	LAPAROSCOPIC (N=22)	VAGINAL (N=90)	
Duration of Surgery (minutes)¥	101.0 ±33.7	126.0 ± 46.8	77.6 ± 23.9	<0.0001***
Duration of Hospital Stay (Days)¥	4.94±1.19	3.76±0.98	3.90±0.75	<0.0001***

International Journal Dental and Medical Sciences Research
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Intra-operative Blood Loss (ml)[¥]		232.0±126.0	216.0±134.0	192.0±98.3	0.248
Size of Uterus[#]	Normal	4 (7.67)	5 (22.73)	12 (13.33)	0.001**
	≤14 Weeks	15 (28.85)	13 (59.09)	51 (56.67)	
	14-22Weeks	24 (46.15)	4 (18.18)	17 (18.89)	
	22-30Weeks	5 (9.62)	0	0	
	>30 Weeks	1 (1.92)	0	0	
	Atrophic	3 (5.77)	0	10 (11.11)	

Note: ** and *** indicates statistically significant values of P values <0.01 and <0.0001, respectively.
[¥] Data is presented as Mean ± SD
[#] Data was presented as frequency (%)

Complications noted were categorized as intra-operative, immediate– and late–post operative complications as presented in Table 4. Only one patient (4.55%) who underwent LAVH had intra-operative complications (bladder injury). A total of 70 and 44 patients had immediate and late post–operative complications, respectively. Of the 70 patients with immediate post-operative complications, many suffered from pain (43/70). Majority of the 44 patients with late post–operative complications suffered from backache or pain (24/44). Two patients who underwent VH required readmission, of whom one patient came with complaints of per vaginal bleeding two weeks post-surgery and required vault re-suturing and the other was found to have cystocele and vault prolapse one-year post hysterectomy and needed surgery for the same. One patient who underwent LAVH in view of AUB came with complaints of fever and abdominal pain after four months of surgery, a pelvic abscess was seen during ultrasonography for which the patient underwent laparotomy. Another patient who underwent TAH came with complaints of fever and abdominal pain three months post-surgery, the patients was found to have bilateral pyosalpinx and laparotomy was performed. However, two patients (1 (1.92%) TAH and 1 (1.11%) VH) were lost to follow-up during the late post-operative period.

Table 4: Status of complications based on surgery type

COMPLICATIONS	TYPES OF SURGERY N (%)		
	ABDOMINAL (N=52)	LAPAROSCOPIC (N=22)	VAGINAL (N=90)
Intra-operative Complications			
Bladder Injury	0	1 (4.55)	0
Immediate Post-operative Complication			
Anemia	2 (3.70)	0	1 (1.10)
Pain	20 (37.04)	2 (9.09)	21 (23.08)
Bleed per vaginal	0	0	3 (3.30)
Dyschezia	0	0	1 (1.10)
Fever	3 (5.56)	1 (4.55)	1 (1.10)
Foul smelling/ White discharge per vagina	0	0	6 (6.58)

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Post–operative Bleed	1 (1.85)	0	1 (1.10)
Urge Incontinence	0	1 (4.55)	0
Urinary tract infection	0	0	2 (2.22)
Wound Infection	4 (7.41)	0	0
Late Post-operative Complications			
Backache/Pain	13 (25)	1 (4.35)	10 (11.11)
Dysuria	0	0	1 (1.11)
Per Vaginal Bleed	0	0	1 (1.11)
Constipation/Dyschezia	0	0	2 (2.22)
White Discharge Per Vagina	3 (5.77)	2 (8.70)	1 (1.11)
Pelvic Mass/Abscess	1 (1.92)	1 (4.35)	0
Vault Prolapse	0	0	1 (1.11)
Omental Adhesions	4 (7.69)	3 (13.64)	0

IV. DISCUSSION

Researchers have debated over the use of laparoscopic surgeries for long, due to various factors such as prolonged surgery duration, lesser duration of hospital stay and minimum post-operative pain as compared to other surgeries.[13-15] TAH is usually associated with higher complication of infections and overall morbidity of 17.1–42.8%.[10,16] However, some researchers have also reported that VH and LAVH have a higher morbidity rate as compared to TAH.[10] Hence, this study was carried out to evaluate morbidity and outcome associated with TAH, VH and LAVH, in order to find the most preferable route of hysterectomy for women suffering from different gynecological conditions.

Researchers have previously compared the outcome of different hysterectomy surgeries based on the intra-operative blood loss, surgery time and duration of hospital stay with uterus weight.[9,10,17-19] We compared the duration of hospital stays, surgery time along with intra-operative blood loss based on the types of surgery. The findings indicated that the above are significantly different based on the type of surgery (P value <0.05) except intra-operative bleeding. An association between the type of surgery and size of the uterus was also studied that was noted to be significant (P value <0.05). Makinen et al.[10] compared intra-operative blood loss, surgery time and duration of hospital stay with uterus weight and reported minimal intra-operative blood loss (261.9±270.9 ml) and duration of hospital of stay (3.4±2.0) for LAVH compared to TAH (intra-operative blood loss: 305.1±312.6 ml and hospital stay: 6.0±2.2) and VH (intra-operative blood loss: 342.3±352.9 ml and hospital stay: 5.9±2.7). Similar results were noted by the present study except for intra-operative blood loss (P value >0.05). Furthermore, our results also showed that patients with higher and lower uterine size underwent TAH and LAVH respectively and were partially in accordance with Makinen et al.[10] who reported that patients with a higher uterine weight underwent TAH, while patients with lower uterine weight underwent VH. The variation in the results may be due to the method adopted for measuring uterine size. This indicates that uterus weight may also considerably contribute towards the type of preferred surgery.

The present study also noted that patients who underwent VH had 3.76±0.98 days of hospital stay compared to 4.94±1.19 days among TAH patients and were in accordance with results of Reddy et al.[9] who reported two, three and five days of hospital stay for LAVH, VH and TAH respectively. Conversely, Malzoni et al.[18] and Warren et al.[19] reported slightly lower hospital stay in case of LAVH, i.e. 2.5 and 1.6 days respectively. Warren et al.[19] also reported a decreased hospital stay for VH and TAH, i.e. 2.2 and 4 days respectively, and compared the surgical outcomes for only VH and TAH. The present study highlights that LAVH may well be preferred over the other types, namely VH and TAH, for hysterectomy.

However, VH is associated with a lower surgery time. Hence, both LAVH and VH can be preferred over TAH for hysterectomies.

In terms of comorbidities and complications, patients who underwent LAVH were noted to have a higher number of comorbidities (40.91%), followed by those who underwent VH (30 %) and TAH (25%). Most patients had minor complications of pain or backache in the immediate and late post-operative stages among all types of surgery. However, TAH patients had other complications, such as wound infection, in the immediate post-operative stage, similar to findings reported by Makinen et al.[10]

The limitations of the present study include the uneven distribution of patients for each surgery type. Socioeconomic status and general habits along with details of other concomitant surgeries were not analyzed. These factors can potentially create some bias. Therefore, a multicentric study with an even distribution of patients and other parameters in all groups can be explored for further consolidation of the study findings.

In this study, a conclusion can be drawn that LAVH and VH result in lesser blood loss, faster recovery time, reduced hospital stays, minimal pain and lesser complications as compared to TAH. However, the choice of surgery ultimately depends upon the patients' baseline condition.

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