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A Comparison of Vaginal and Laparoscopic Routes of Vault Closure in Patients Undergoing Total Laparoscopic Hysterectomy: A Single Centre Experience

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KEYWORDS

Vaginal and Laparoscopic, Patients Undergoing

ABSTRACT:

Introduction: Hystrectomy is the most common gynaecological procedure performed**.** There exists limited and heterogeneous data comparing the two methods of vault closure post-TLH, with inconsistencies in suture type, technique, and surgeon experience. This study was therefore designed to evaluate postoperative outcomes, including complications and vaginal length, between laparoscopic and vaginal vault closure techniques. To minimize confounding factors, we standardized the surgical technique, used the same suture material (Polygalactin 910 No.1), and ensured all surgeries were performed by a single surgeon.

Objectives: To compare the differences in outcomes in relation to immediate (<48 hrs) and late (48 hrs- 4 weeks) post operative complications and post operative vaginal length between laparoscopic route and vaginal route for vault closure in total laparoscopic hysterectomy

Methods: A prospective observational study was undertaken in the Department of Obstetrics and Gynecology at AIIMS, Raipur, from February to July 2022, with follow-up till August 2022. Women aged above 35 years, scheduled for TLH for benign conditions, and meeting the inclusion criteria were enrolled. Thirty patients were enrolled through consecutive purposive sampling based on departmental TLH rates (4–5/month). Data was managed using MS Excel and analyzed with SPSS v23. Primary outcomes included: Total operative time, Vault closure time, Immediate and delayed postoperative complications, Postoperative vaginal length

Results: Out of 30 TLH procedures, 17 patients underwent laparoscopic vault closure (Group A) and 13 underwent transvaginal closure (Group B). Both groups had comparable preoperative (8.96 ± 0.41 cm vs. 9.02 ± 0.37 cm) and postoperative vaginal lengths(8.41 ± 0.46 vs. 8.45 ± 0.48 cm). Also, No significant intergroup differences were noted in complication rates.

Conclusions: Our findings indicate no significant clinical advantage of one vault closure technique over the other in terms of early or delayed complications and postoperative vaginal length. Therefore, the choice of closure method should rely on the surgeon's expertise and intraoperative judgment. Adherence to standardized procedures and postoperative protocols is essential to ensure favorable outcomes, regardless of the approach employed.

1. Introduction

Hysterectomy remains the most frequently performed surgical procedure in gynecology.[1] Over time, surgical techniques have evolved from the traditional open approach to minimally invasive methods. The total laparoscopic hysterectomy (TLH), first described by Reich et al. in 1988,[1] has proven advantageous, offering reduced hospital stays, diminished infection risks, superior cosmetic outcomes, and decreased

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postoperative pain and adhesions..[1,2] However, after the technically demanding step of uterine removal, where we focus more on preventing injury to ureters, we often underestimate the final step of vaginal cuff closure.. Despite being critical, this step poses challenges due to the intricacies of laparoscopic suturing. The use of energy sources for colpotomy contributes to ischemia and thermal injury at the vaginal cuff, warranting meticulous closure to prevent adverse outcomes. The choice of "route of vault closure" is a matter of conflict among laparoscopic surgeons. Some prefer endosuturing of vault laparoscopically while some prefer transvaginal closure of vaginal vault. Laparoscopic suturing offers enhanced visualization through magnification but may miss adequate tissue purchase. Conversely, the vaginal approach facilitates robust tissue handling and knot tying with superior tactile feedback, often requiring less technical expertise. While the laparoscopic approach is linked to better visualization, it may be associated with a higher risk of vault dehiscence. Transvaginal suturing is considered more prone to infection.. The experts in laparoscopy find endosuturing less time consuming and safe. The risk of infection is thought to be higher with transvaginal suturing while chances of dehiscence are more with laparoscopic closure. The postoperative vaginal length is significant for restoring the sexual function of female and to avoid dyspareunia in future. There are varying views regarding the appropriate method of vaginal cuff closure after TLH. There are few studies which compare both the routes of vault closure i.e laparoscopic and transvaginal. But, those studies lack standardisation with respect to type and number of sutures used, technique of suturing (locking/ non-interlocking) and the surgeries were performed by different surgeons. We conducted the study with same suture i.e Polygalactin 910 no.1 with the same technique by continuous non interlocking technique performed by a single surgeon.

2. Objectives

This study aims to compare the differences in outcomes in relation to immediate (<48 hrs) and late (48 hrs- 4 weeks) post operative complications and post operative vaginal length between laparoscopic route and vaginal route for vault closure in total laparoscopic hysterectomy in all standardized conditions in our setting.

3. Methods

It was a Prospective observational study conducted in department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Raipur for a duration of 6 months from February 2022 to July 2022 and followed up till August 2022. All women above 35 yrs of age admitted in Gynecology ward(IPD) for undergoing total laparoscopic hysterectomy for benign disease and fulfilling the inclusion criteria were taken for study. The inclusion criteria was preanaesthetic fitness and consent for TLH, completion of the entire procedure by laparoscopic approach up to colpotomy, benign gynaecological disease as indication to hysterectomy like abnormal uterine bleeding not due to malignancy, endometriosis, chronic pelvic pain, etc. Any genital malignancy diagnosed before surgery or at frozen section, previous radiation therapy, known allergy to suturing materials used and those who refused to give consent were excluded from the study. Consecutive purposive sampling was done. As the number of TLH cases performed in our department per unit was 4-5 / month, the number of cases that can be performed in 6 months was nearly 30. Therefore, the sample size was kept 30. Institutional research committee approval and ethical committee approval was taken.

After obtaining informed consent, all the patients fulfilling inclusion criteria and exclusion criteria planned for total laparoscopic hysterectomy were noted. Detailed history and examination and relevant investigations done as per institutional protocol were noted. Preoperative vaginal length was noted when examination was done prior to surgery. Vaginal length was measured from hymen to posterior fornix with the help of sponge holding forceps in centimeters. All patients were given presurgical antibiotic prophylaxis with Ceftriaxone 1g, 60 minutes before surgery after checking sensitivity. After general anaesthesia was given, and proper positioning and painting draping was done, the time of start of surgery was noted from the time of insertion of veress needle. All the total laparoscopic hysterectomies included in the study were performed by a single surgeon by standard technique upto circular colpotomy which was performed with active blade of harmonic ACE in all cases. Uterus was delivered vaginally. In all cases included in the study, the vault closure was done either by laparoscopic approach or vaginal approach by standardised suture material braided round bodied

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Polygalactin 910 No 1 suture by standardised continuous non interlocking suturing method. The time of starting and ending of vault closure was noted. The starting time of vault closure was noted from the point of holding the needle with needle holder. The end point of vault closure was noted from the time when the remaining suture was cut. The end point of surgery will be the time when the last port site was sutured and remaining suture was cut. The patients who underwent laparoscopic closure of vault were considered in Group A and those who underwent vaginal closure of vault were considered Group B. Post operative surgical prophylaxis with antibiotic Inj Ceftriaxone 1 g 12 hrly and Inj Metrogyl 500 mg 8 hrly was given for 24 hrs in all cases. Postoperatively, the immediate complications if any (like fever, vaginal discharge , urinary retention , urinary frequency) and length of hospital stay was noted. Patient was followed up after 4 weeks and any complications arising within this period (like fever, vaginal discharge, dyspareunia, wound dehiscence) were noted. Vaginal length measurement was done during this follow up as a routine. Data was coded and recorded in MS Excel spreadsheet program. SPSS v23 (IBM Corp.) was used for data analysis. The Outcome Variables were

- Operative time (Time from point of insertion of veress needle to point of cutting last skin suture)
- Vault closure time (Time from point of holding the needle to point of cutting the remaining suture after vault closure)
- Immediate (<48 hrs) post operative complications (fever, vaginal discharge , urinary retention , urinary frequency)
- Late (48 hrs- 4 weeks) post operative complications (fever, vaginal discharge, dyspareunia, vaginal vault dehiscence and vault infection)
- Post operative vaginal length at 4 weeks (Normal vaginal length 9-11 cm , less than 8 cm indicates shortening)

4. Results

A total of 30 cases of total laparoscopic hysterectomies done by the same surgeon i.e the principal investigator were included. Out of the 30 cases, in 17 cases (56.66%) laparoscopic route of vaginal vault closure was performed and in 13 cases (43.33%), transvaginal route of vaginal vault closure was done by standardized suture i.e braided coated .Polygalactin 910 no.1 by standard technique of continuous non locking suturing

(Figure 1)

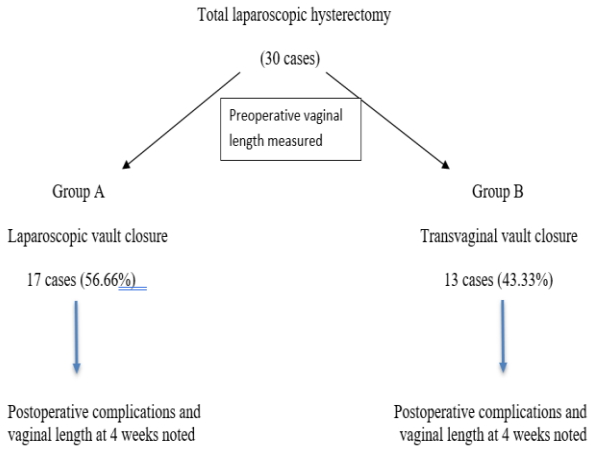

Figure 1: A flowchart to show the division of patients and parameters studied

The average age of patients undergoing surgery was similar in the two groups laparoscopic vs vaginal group (46.24 ± 4.19 vs 49.00 ± 5.08). The BMI of patients was also similar in both the groups (24.24 ± 2.29 vs 25.79 ± 2.86 kg/m2). All the patients were multiparous in both the groups. Minilaparotomy tubectomy was the most common surgery performed previously in patients in both the arms. The most common indication of surgery in both the groups was fibroid.

A. Vaginal length:

As shown below in Table 1 and Figure 2, the mean preoperative vaginal length is nearly same in both the groups laparoscopic (8.96 ± 0.41 cm) and transvaginal (9.02 ± 0.37 cm). Likewise the mean postoperative vaginal length at 4 weeks is also nearly same in both groups (8.41 ± 0.46 vs 8.45 ± 0.48). The decrease in mean vaginal length from pre-operative period to 4 weeks post operative period was statistically significant in each group individually but there was no significant difference in the fall in vaginal length between the two groups postoperatively.

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Table 1: Comparison of preoperative and postoperative vaginal length in both groups

a:Paired t-test b:generalized estimating equations

	Laparoscopic Mean ± SD	Transvaginal Mean ± SD	p value
Mean Pre-Operative Vaginal Length (cm)	8.96 ± 0.41	9.02 ± 0.37	0.758[b]
Mean 4 weeks post operative vaginal length (cm)	8.41 ± 0.46)	8.45 ± 0.48)	0.657[b]
Difference in mean vaginal length (cm)	0.55	0.57	0.768[b]
P Value for change in Vaginal Length	<0.001[a]	<0.001[a]	

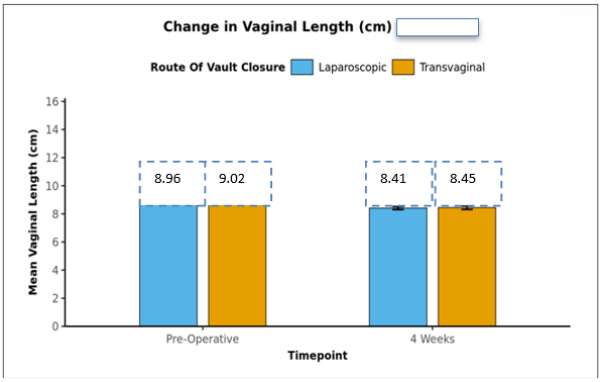

Figure 2 : Bar chart depicting the vaginal length in each group preoperatively and post operatively

B. Post –operative Complications :

As seen in Table 2, Figure 3 and 4 below, there were very few early or late complications in either of the two groups. Only one patient from each group developed fever within 48 hrs of surgery and one patient from transvaginal group had urinary retention. Two patients from each group had complaint of vaginal discharge within 4 weeks of surgery.

Table 2 : Comparison of postoperative complications between two groups

Characteristics	Laparoscopic approach n (n%)	Vaginal approach n (n%)	p-value
Immediate post op complications (≤ 48 hrs)			0.710[2]
None	16 (94.1)	11 (84.6%)	
Fever	1 (5.9)	1 (7.7%)	
Urinary Retention	0 (0.0)	1 (7.7%)	
Late post op complications (after 4 weeks)			0.875[2]
None	14 (82.4)	10 (76.9)	
Fever	0 (0.0)	1 (7.7)	
Vaginal Discharge	2 (11.8)	2 (15.4)	
Bleeding Per Vagina	1 (5.9)	0 (0.0)	

1: Wilcoxon-Mann-Whitney U Test, 2: Fisher's Exact Test

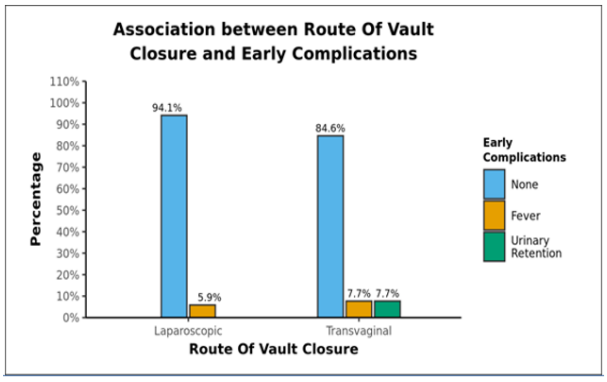

Figure 3: Bar chart depicting the early complications that occurred within 48 hrs in both approaches

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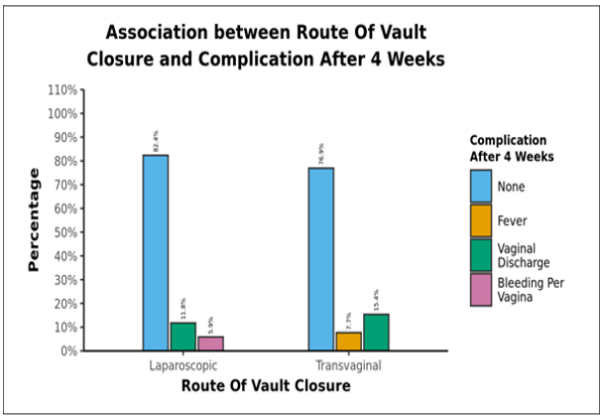

Figure 4 : Bar chart depicting complications that occurred in each approach within 4 weeks

5. Discussion

In our study, which was conducted over a duration of 6 months, seventeen cases had laparoscopic vault closure and thirteen cases had transvaginal vault closure. In our study, the mean preoperative vaginal length was similar in both the groups (8.96 ± 0.41 vs 9.02 ± 0.37 cm). The postoperative vaginal length at 4 weeks was also similar (8.41 ± 0.46 vs 8.45 ± 0.48). There was similar but significant fall in vaginal length in both the groups. In study by Bastu et al,[3] the preoperative vaginal length (9.47 ± 1.30 vs 10 ± 1.30 cm) and vaginal length measured 1 month (8.53 ± 1.41 vs 8.07 ± 0.88 cm) after surgery was similar in both groups. They also followed up the patient upto 3 months after surgery and found vaginal length to be longer in laparoscopic vault closure group as compared to transvaginal group. In study by Singh et al.,[4] there was no comment about preoperative vaginal length. But mean postoperative vaginal length is s 8.34 cm by vaginal vault closure and 9.4 cm by laparoscopic vault closure. They accredited this to vault margins being not everted in laparoscopic suturing and the ligature was passed just 1 cm below the cut margin.

In present study, we observed that only 5.9% patients in laparoscopic group had fever while in transvaginal group 7.7% patients had fever and 7.7% patients had urinary retention within 48 hrs of surgery. After 48 hrs but within 4 weeks of surgery, 11.8% patients had vaginal discharge and 5.9% patients had bleeding per vaginum in laparoscopic group. In transvaginal group, 7.7% patients had fever and 15.4% patients had vaginal discharge. This is similar to studies by Bastu et al.[3] and Hwang et al.,[5] in which no significant difference was observed between two groups in terms of postoperative complications. Hwang et al.[5] mentioned in his study about the cuff-related complications including vaginal disruption (3.4%), dehiscence (1.27%), vaginal vault bleeding (1.91%), vaginal spotting (19.32%), granulation (1.27%), cuff infection (1.49%), and yellowish vaginal discharge (6.16%). In studies by Singh et al.[4] and Uccella et al.,[6] laparoscopic group had lower post operative complications than transvaginal group. They comment that in laparoscopic approach sutures are inverted and not exposed to vaginal flora thus less chances of post operative vault infection and vault dehiscence. As opposed to this, Karunananda et al,[2] concluded that post-operative complications were more in laparoscopic vault closure group (23%) as compared to transvaginal vault closure group(8.3%). They attributed this to stronger closure of vault allowing use of a larger needle and thicker bite of vaginal edge which may have reduced dehiscence when the cuff is closed vaginally. These studies did not divide the complications on the basis of their early and late occurrence.

Limitations Of Our Study :

Our study had certain limitations. Firstly, it was an observational study. Secondly, the sample size is 30 owing to the single surgeon study in an institute. Thirdly, follow up duration was short so remote complications could not be recorded

Strength of our study :

In our study, there was standardization of suture (braided coated Polygalactin 910 No.1), suturing technique (continuous non interlocking suturing) in all cases.

All cases were operated by the same surgeon and standard steps of hysterectomy were followed in all cases. Colpotomy was done with active blade of harmonic ace in all cases. So confounding factors were minimal in our study.

6. Conclusion :

In our study the vault closure time was shorter in transvaginal approach to vault closure. But the postoperative vaginal length shortening was similar in both groups. The rate of occurrence of early and late complications within 4 weeks is also similar. So based on our study we cannot prove the supremacy of one

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approach over the other. A longer follow up period may help to understand the remote complications better.

In general it can be concluded that, it's the surgeons discretion depending on his clinical judgement and expertise to decide the route of vault closure in patients undergoing TLH. These can be minimized by following a standardised technique during surgery, aseptic precautions and appropriate follow up after surgery as was done in our study so that the route of vault closure doesn't affect the outcome of surgery.

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