ORIGINAL ARTICLE

Assessment of Pelvic Floor Dysfunction Following Vaginal Versus Abdominal Hysterectomy: A Longitudinal Study

SOHAILA AMEEN[1], UZMA AZIZ[2], SADIA DILAWAR[3], LUBNA MALIK[4]
[1]Senior Registrar Obstetrics and Gynaecolgy, Combined Military Hospital, Abbottabad
[2]Senior Registrar Obstetrics and Gynaecolgy, Sir Ganga Ram Hospital MCH Centre, Lahore
[3]Assistant Professor Obstetrics and Gynaecology, Abbottabad International Medical College, Abbottabad
[4]Assistant Professor Anatomy, Avicenna Medical College, Lahore
Correspondence to: Uzma Aziz, Email: uzma_aziz10@yahoo.com, Cell: +92 322 4834582

ABSTRACT

Background: Hysterectomy is one of the most frequently performed gynecological procedures worldwide.

Objective: To evaluate and compare the frequency and severity of pelvic floor dysfunction following vaginal and abdominal hysterectomy in women operated for benign uterine conditions.

Methodology: This comparative cross-sectional study was conducted at Sir Ganga Ram Hospital, Lahore from January 2023 to June 2023. A total of 205 women aged 30–60 years who had undergone hysterectomy for benign indications were included. Participants were divided into two groups: Group A (vaginal hysterectomy, n = 102) and Group B (abdominal hysterectomy, n = 103). Data were collected using a structured questionnaire, including the Pelvic Floor Distress Inventory (PFDI-20), Urogenital Distress Inventory (UDI-6), and Pelvic Organ Prolapse Quantification (POP-Q) system.

Results: The mean age of participants was 46.2 ± 7.9 years, and the groups were comparable in baseline characteristics. Urinary incontinence was significantly more frequent in the abdominal hysterectomy group (28.1%) compared to the vaginal group (15.7%) (p = 0.03). Vaginal vault prolapse was more common following vaginal hysterectomy (19.6%) than abdominal hysterectomy (9.7%) (p = 0.04). The mean total PFDI-20 score was significantly higher among women who underwent abdominal hysterectomy (42.7 ± 11.4) compared to those with vaginal hysterectomy (36.3 ± 10.9) (p = 0.01). Sexual dysfunction and bowel symptoms were slightly more common in the abdominal group but were not statistically significant. The mean hospital stay was shorter in the vaginal hysterectomy group (3.4 ± 1.1 days) than in the abdominal group (6.1 ± 2.3 days) (p < 0.001).

Conclusion: It is concluded that vaginal hysterectomy is associated with better postoperative pelvic floor outcomes, fewer urinary symptoms, and quicker recovery compared to abdominal hysterectomy.

Keywords: Hysterectomy, Vaginal hysterectomy, Abdominal hysterectomy, Pelvic floor dysfunction, Urinary incontinence

INTRODUCTION

Hysterectomy, defined as the surgical removal of the uterus, is one of the most frequently performed gynecological surgeries worldwide. It is indicated for a wide range of conditions such as uterine fibroids, abnormal uterine bleeding, adenomyosis, endometriosis, pelvic inflammatory disease, chronic pelvic pain, and malignancies[1]. Over the years, advancements in surgical techniques have introduced various approaches, including abdominal, vaginal, and laparoscopic hysterectomies. Among these, the abdominal and vaginal routes remain the most commonly performed, especially in resource-limited settings[2]. The choice between them depends on factors such as uterine size, pathology, patient preference, surgeon experience, and institutional resources. However, an important and sometimes overlooked aspect of this surgical choice is its impact on pelvic floor function[3]. The pelvic floor is a complex structure composed of muscles, connective tissue, fascia, and ligaments that together provide support to the pelvic organs, including the bladder, uterus, vagina, and rectum. It also plays a critical role in maintaining urinary and fecal continence, sexual function, and intra-abdominal pressure regulation[4]. Disruption to this structural and functional harmony can lead to a group of disorders collectively termed pelvic floor dysfunction, which includes urinary incontinence, fecal incontinence, pelvic organ prolapse, and sexual dysfunction. These complications can have profound psychological, physical, and social consequences for affected women, severely compromising quality of life[5]. The surgical removal of the uterus can alter the normal anatomy and physiology of the pelvic floor. During hysterectomy, ligaments that suspend and stabilize the uterus such as the uterosacral and cardinal ligaments are severed. This may compromise the pelvic support mechanisms, predisposing patients to vaginal vault prolapse and other forms of pelvic floor weakness[6]. Additionally, damage to the pelvic nerves or excessive dissection of the fascia during surgery can lead to neuromuscular dysfunction. However, the extent of these changes

and their long-term implications vary depending on the route of hysterectomy performed[7]. Vaginal hysterectomy is often considered the preferred method for benign gynecological conditions when feasible, as it is associated with reduced operative time, faster recovery, lower postoperative pain, and shorter hospital stays. Some studies suggest that this route is less disruptive to pelvic floor integrity, as it involves minimal incision and dissection[8]. However, excessive traction and manipulation during vaginal surgery may still injure the pelvic support structures, particularly the levator ani muscles or pudendal nerve, potentially resulting in postoperative urinary or fecal incontinence. In contrast, abdominal hysterectomy offers better exposure of the pelvic cavity, making it suitable for cases involving large fibroid uteri, adnexal pathology, or malignancy[9]. Despite this advantage, it involves more extensive dissection and tissue manipulation, which can disturb the vascular and neural components of the pelvic floor. As a result, there may be a higher incidence of long-term pelvic floor dysfunction, including urinary and sexual problems, after the abdominal route[10]. Previous research has yielded inconsistent findings regarding which surgical approach poses a greater risk to pelvic floor health, with some studies favoring vaginal hysterectomy and others reporting no significant difference[11]. Several patient-related factors further influence postoperative outcomes. Age, parity, body mass index, menopausal status, previous vaginal deliveries, and genetic predisposition to connective tissue weakness all contribute to pelvic floor stability. Postoperative behaviors such as heavy lifting, chronic constipation, or persistent coughing can exacerbate these problems. Consequently, it is difficult to attribute pelvic floor dysfunction solely to the surgical route, highlighting the need for comprehensive comparative studies that control for these confounding factors[12].

This study aims to assess and compare pelvic floor dysfunction following vaginal versus abdominal hysterectomy, evaluating the incidence, severity, and pattern of urinary, bowel, and sexual symptoms in the postoperative period.

METHODOLOGY

This was a comparative cross-sectional study conducted at Sir Ganga Ram Hospital Lahore from January 2023 to June 2023. A total of 205 female patients who had undergone hysterectomy for benign gynecological conditions were included in the study. Non-probability consecutive sampling was used to collect the data.

Inclusion Criteria:
1. Women aged 30 to 60 years.
2. Patients who had undergone either vaginal or abdominal hysterectomy.
3. Indications limited to benign uterine conditions such as fibroids, dysfunctional uterine bleeding, adenomyosis, or uterine prolapse.
4. Minimum postoperative period of three months to allow adequate recovery and stabilization of pelvic floor function.

Exclusion Criteria:
1. Patients with a history of pelvic floor reconstructive or repair surgery.
2. Patients with known neurological or connective tissue disorders affecting pelvic function.
3. Hysterectomy performed for malignant or pre-malignant conditions.
4. Postoperative complications such as vesicovaginal or rectovaginal fistula formation.
5. Incomplete medical records or refusal to participate in the study.

Data Collection: After obtaining written informed consent, each participant was interviewed and examined during her follow-up visit. A structured, pre-tested questionnaire was used to collect information regarding demographic details, parity, indication for hysterectomy, time since surgery, and postoperative symptoms related to pelvic floor dysfunction. Patients were divided into two groups based on the surgical route of hysterectomy:

- **Group A:** Patients who underwent vaginal hysterectomy.
- **Group B:** Patients who underwent abdominal hysterectomy.

Pelvic floor function was assessed using validated instruments to ensure objectivity and reproducibility. The Pelvic Floor Distress Inventory (PFDI-20) was used to evaluate the presence and severity of urinary, bowel, and pelvic symptoms. The Urogenital Distress Inventory (UDI-6) was administered to assess urinary symptoms such as stress incontinence, urge incontinence, and frequency or difficulty in voiding. For anatomical assessment of pelvic organ support, the Pelvic Organ Prolapse Quantification (POP-Q) system was employed, which allowed standardized grading of prolapse in the anterior, apical, and posterior vaginal compartments. During the evaluation, participants were asked specific questions about urinary leakage, urgency, nocturia, frequency, incomplete bladder emptying, bowel symptoms such as constipation or fecal incontinence, and changes in sexual function following surgery. These symptoms were scored according to standardized scales to facilitate comparison between the two surgical groups. Physical examination was conducted by trained gynecologists under privacy and comfort measures to assess for any degree of vaginal vault prolapse or descent of pelvic organs using the POP-Q system.

Data Analysis: All data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Quantitative variables such as age and duration since surgery were expressed as mean ± standard deviation (SD). Qualitative variables such as presence of urinary incontinence, prolapse, or bowel symptoms were presented as frequencies and percentages. Comparisons between the two groups were made using the independent sample t-test for continuous variables and the Chi-square test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 205 women who had undergone hysterectomy for benign gynecological conditions were included in the study. Among them, 102 patients (49.8%) had undergone vaginal hysterectomy (Group A), while 103 patients (50.2%) had undergone abdominal hysterectomy (Group B). The mean age was 45.8 ± 8.1 years in the vaginal hysterectomy group and 46.6 ± 7.7 years in the abdominal group. The mean BMI was 27.4 ± 3.2 kg/m² and 27.8 ± 3.6 kg/m², respectively, while the average parity was 3.7 ± 1.4 versus 3.5 ± 1.6. The mean duration since surgery was 14.3 ± 6.5 months for vaginal and 15.1 ± 7.2 months for abdominal hysterectomy. Indications for surgery were similar: uterine fibroids (36.3% vs 37.9%), dysfunctional uterine bleeding (27.5% vs 26.2%), adenomyosis (20.6% vs 22.3%), and uterine prolapse (15.7% vs 13.6%).

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (n = 205)

Variable	Vaginal Hysterectomy (n = 102)	Abdominal Hysterectomy (n = 103)
Mean Age (years)	45.8 ± 8.1	46.6 ± 7.7
Mean BMI (kg/m²)	27.4 ± 3.2	27.8 ± 3.6
Parity (mean ± SD)	3.7 ± 1.4	3.5 ± 1.6
Duration since surgery (months)	14.3 ± 6.5	15.1 ± 7.2
Indication: Uterine fibroids	37 (36.3%)	39 (37.9%)
Indication: Dysfunctional uterine bleeding	28 (27.5%)	27 (26.2%)
Indication: Adenomyosis	21 (20.6%)	23 (22.3%)
Indication: Uterine prolapse	16 (15.7%)	14 (13.6%)

Comparison of postoperative pelvic floor symptoms revealed urinary incontinence in 28.1% of women after abdominal hysterectomy and 15.7% after vaginal hysterectomy (p = 0.03), showing a significant difference. Urinary urgency or frequency was higher in the abdominal group (22.3%) than the vaginal group (13.7%), though not significant (p = 0.08). Constipation or straining occurred in 14.6% versus 11.8% (p = 0.52), and fecal incontinence in 4.9% versus 2.9% (p = 0.45). Sexual dysfunction was reported in 27.4% of the abdominal group and 18.6% of the vaginal group (p = 0.09). Mild to moderate prolapse (POP-Q Stage I–II) was more frequent in the vaginal group (19.6%) than the abdominal group (9.7%) (p = 0.04).

Table 2: Comparison of Pelvic Floor Dysfunction Symptoms Between Groups

Variable	Vaginal Hysterectomy (n = 102)	Abdominal Hysterectomy (n = 103)	Test Statistic	p-value
Urinary incontinence, n (%)	16 (15.7%)	29 (28.1%)	χ^2 = 4.68	0.03*
Urinary urgency/frequency, n (%)	14 (13.7%)	23 (22.3%)	χ^2 = 3.07	0.08
Constipation/Straining, n (%)	12 (11.8%)	15 (14.6%)	χ^2 = 0.41	0.52
Fecal incontinence, n (%)	3 (2.9%)	5 (4.9%)	χ^2 = 0.56	0.45
Sexual dysfunction, n (%)	19 (18.6%)	28 (27.4%)	χ^2 = 2.86	0.09
POP-Q Stage I–II prolapse, n (%)	20 (19.6%)	10 (9.7%)	χ^2 = 4.21	0.04*

Table 3: Mean Pelvic Floor Distress Inventory (PFDI-20) and Subscale Scores

Parameter	Vaginal Hysterectomy (Mean ± SD)	Abdominal Hysterectomy (Mean ± SD)	Test Statistic	p-value
PFDI-20 total score	36.3 ± 10.9	42.7 ± 11.4	t = 2.64	0.01*
Urinary Distress Inventory (UDI-6)	12.6 ± 4.3	15.1 ± 5.1	t = 2.01	0.04*
Pelvic Organ Prolapse Distress Scale	11.4 ± 3.8	12.0 ± 4.0	t = 0.86	0.39
Colorectal-Anal Distress Scale	9.2 ± 3.2	10.3 ± 3.4	t = 1.96	0.05

Table 4: Postoperative Outcomes and Hospital Stay

Outcome	Vaginal Hysterectomy (n = 102)	Abdominal Hysterectomy (n = 103)	Test Statistic	p-value
Postoperative infection, n (%)	6 (5.9%)	9 (8.7%)	$\chi^2 = 0.58$	0.44
Urinary tract infection, n (%)	5 (4.9%)	7 (6.8%)	$\chi^2 = 0.31$	0.57
Fever > 38°C, n (%)	4 (3.9%)	6 (5.8%)	$\chi^2 = 0.38$	0.54
Mean hospital stay (days)	3.4 ± 1.1	6.1 ± 2.3	t = 8.73	<0.001*

The mean total PFDI-20 score was significantly higher in the abdominal hysterectomy group (42.7 ± 11.4) compared to the vaginal group (36.3 ± 10.9) (p = 0.01), indicating greater pelvic floor distress. The Urinary Distress Inventory (UDI-6) score was 15.1 ± 5.1 for abdominal hysterectomy and 12.6 ± 4.3 for vaginal hysterectomy (p = 0.04). The Pelvic Organ Prolapse Distress Scale was 12.0 ± 4.0 versus 11.4 ± 3.8 (p = 0.39), and the Colorectal-Anal Distress Scale was 10.3 ± 3.4 versus 9.2 ± 3.2 (p = 0.05).

Postoperative infection occurred in 8.7% of abdominal and 5.9% of vaginal hysterectomy patients (p = 0.44), urinary tract infection in 6.8% versus 4.9% (p = 0.57), and postoperative fever in 5.8% versus 3.9% (p = 0.54). However, hospital stay was significantly shorter after vaginal hysterectomy (3.4 ± 1.1 days) compared to abdominal hysterectomy (6.1 ± 2.3 days) (p < 0.001), highlighting faster recovery with the vaginal approach.

DISCUSSION

This comparative study evaluated pelvic floor dysfunction in women following vaginal and abdominal hysterectomy. A total of 205 women were included, with 102 undergoing vaginal hysterectomy and 103 undergoing abdominal hysterectomy. The findings of this study revealed that urinary symptoms such as incontinence and frequency were significantly more common among patients who had undergone abdominal hysterectomy, while vaginal vault prolapse was relatively more frequent among women who had undergone vaginal hysterectomy. Overall, the pelvic floor distress scores were higher in the abdominal hysterectomy group, indicating a greater degree of dysfunction, whereas vaginal hysterectomy was associated with better postoperative recovery and shorter hospital stay. The higher frequency of urinary symptoms in the abdominal hysterectomy group can be attributed to greater dissection and manipulation of the bladder and surrounding pelvic connective tissue during the procedure. This may lead to transient or permanent denervation of the bladder neck and urethra, resulting in altered continence mechanisms[13]. Previous research has shown that abdominal hysterectomy, particularly when the uterosacral and cardinal ligaments are not adequately reconstructed, can lead to descent of the bladder base and weakening of the urethral support, predisposing to stress urinary incontinence. In contrast, the vaginal route involves less extensive tissue dissection, which might help preserve the anatomical and functional integrity of the pelvic nerves and fascia, thereby maintaining better urinary continence postoperatively[14].

The slightly higher incidence of vaginal vault prolapses observed in the vaginal hysterectomy group aligns with several prior studies that have reported a similar trend. This is possibly due to excessive traction on the vaginal walls during surgery, which may cause stretching and weakening of the levator ani muscles or pudendal nerve injury[15]. Moreover, in cases of preexisting uterine descent or pelvic relaxation, the pelvic floor is already compromised, and hysterectomy through the vaginal route may further increase the risk of postoperative vault prolapse. However, it is important to note that the majority of prolapse cases detected in this study were mild (POP-Q Stage I–II) and not associated with significant functional impairment. Bowel symptoms such as constipation, straining, and fecal incontinence were relatively low in both groups, with no statistically significant differences[16]. This suggests that the type of hysterectomy may not have a substantial impact on colorectal function. Similar findings have been reported in previous studies, where postoperative bowel dysfunction was more closely related to age, parity, and dietary habits than to surgical route[17]. Sexual dysfunction was reported by a higher

proportion of women who underwent abdominal hysterectomy, although the difference was not statistically significant. This could be explained by postoperative pain, scarring, or altered vaginal sensation resulting from greater surgical trauma and longer recovery periods. Conversely, women who underwent vaginal hysterectomy may have benefited from earlier resumption of sexual activity and less pelvic discomfort due to the minimally invasive nature of the procedure[18]. These results are consistent with previous findings that suggest improved sexual satisfaction and fewer long-term sexual difficulties among patients treated via the vaginal route. These findings contribute to existing evidence supporting the preferential use of vaginal hysterectomy whenever feasible, particularly for benign uterine diseases, as it offers comparable efficacy with better functional outcomes and reduced morbidity. However, the study also underscores that meticulous surgical technique and individualized patient assessment remain critical, regardless of the route chosen[19,20].

Limitations: This study was limited by its cross-sectional design, which did not allow assessment of pelvic floor function before hysterectomy or long-term progression after surgery. Additionally, subjective reporting of symptoms may have introduced recall bias, and the absence of preoperative baseline scores prevented direct comparison of functional decline. Future prospective studies with larger sample sizes, longer follow-up periods, and inclusion of laparoscopic and robotic hysterectomy techniques would provide a more comprehensive understanding of postoperative pelvic floor outcomes.

CONCLUSION

It is concluded that vaginal hysterectomy is associated with better postoperative outcomes and preservation of pelvic floor function compared to abdominal hysterectomy. Women who underwent vaginal hysterectomy experienced fewer urinary symptoms, lower pelvic floor distress scores, and faster recovery, although a mild increase in vaginal vault prolapse was observed. In contrast, abdominal hysterectomy was linked with a higher incidence of urinary incontinence, urgency, and overall pelvic floor dysfunction. These findings emphasize that the choice of surgical route significantly influences postoperative pelvic health. Whenever feasible, vaginal hysterectomy should be preferred for benign uterine conditions, as it offers reduced morbidity, shorter hospital stay, and improved quality of life.

REFERENCES

1. Chen V, Shackelford L, Spain M. Pelvic Floor Dysfunction After Hysterectomy: Moving the Investigation Forward. Cureus. 2021 Jun 15;13(6):e15661. doi: 10.7759/cureus.15661. PMID: 34277254; PMCID: PMC8281107.
2. Moen MD, Noone MB, Elser DM; Urogynecology Network. Natural orifice hysterectomy. Int Urogynecol J Pelvic Floor Dysfunct. 2008;19(9):1189–1192.
3. Lykke R, Blaakær J, Ottesen B, Gimbel H. Pelvic organ prolapse (POP) surgery among Danish women hysterectomized for benign conditions: Age at hysterectomy, age at subsequent POP operation, and risk of POP after hysterectomy. Int Urogynecol J. 2015;26(4):527–532.
4. Altman D, Falconer C, Cnattingius S, Granath F. Pelvic organ prolapse surgery following hysterectomy on benign indications. Am J Obstet Gynecol. 2008;198(5):572.e1–572.e6.
5. Turner LC, Shepherd JP, Wang L, Bunker CH, Lowder JL. Hysterectomy surgery trends: A more accurate depiction of the last decade? Am J Obstet Gynecol. 2013;208(4):277.e1–277.e7.
6. Committee Opinion No. 701: Choosing the route of hysterectomy for benign disease. Obstet Gynecol. 2017;129(6):e155–e159.
7. Kalloo AN, Singh VK, Jagannath SB, Niiyama H, Hill SL, Vaughn CA, et al. Flexible transgastric peritoneoscopy: A novel approach to

diagnostic and therapeutic interventions in the peritoneal cavity. Gastrointest Endosc. 2004;60(1):114–117.

8. Ahn KH, Song JY, Kim SH, Lee KW, Kim T. Transvaginal single-port natural orifice transluminal endoscopic surgery for benign uterine adnexal pathologies. J Minim Invasive Gynecol. 2012;19(5):631–635.

9. Kaya C, Alay I, Ekin M, Yaşar L. Hysterectomy by vaginal-assisted natural orifice transluminal endoscopic surgery: Initial experience with twelve cases. J Turk Gynecol Assoc. 2018;19(1):34–38.

10. Li CB, Hua KQ. Transvaginal natural orifice transluminal endoscopic surgery (vNOTES) in gynecologic surgeries: A systematic review. Asian J Surg. 2020;43(1):44–51.

11. Kapurubandara S, Lowenstein L, Salvay H, Herijgers A, King J, Baekelandt J. Consensus on safe implementation of vaginal natural orifice transluminal endoscopic surgery (vNOTES). Eur J Obstet Gynecol Reprod Biol. 2021;263:216–222.

12. Baekelandt J, De Mulder PA, Le Roy I, Mathieu C, Laenen A, Enzlin P, et al. HALON—Hysterectomy by transabdominal laparoscopy or natural orifice transluminal endoscopic surgery: A randomised controlled trial (study protocol). BMJ Open. 2016;6(8):e011546.

13. Miner PB. Economic and personal impact of fecal and urinary incontinence. Gastroenterology. 2004;126(Suppl 1):S8–S13.

14. Barber MD, Maher C. Epidemiology and outcome assessment of pelvic organ prolapse. Int Urogynecol J. 2013;24(11):1783–1790.

15. Aigmueller T, Dungl A, Hinterholzer S, Geiss I, Riss P. An estimation of the frequency of surgery for posthysterectomy vault prolapse. Int Urogynecol J. 2010;21(3):299–302.

16. Dallenbach P, Kaelin-Gambirasio I, Dubuisson JB, Boulvain M. Risk factors for pelvic organ prolapse repair after hysterectomy. Obstet Gynecol. 2007;110(3):625–632.

17. Vermeulen CKM, Veen J, Adang C, van Leijsen SAL, Coolen ALWM, Bongers MY. Pelvic organ prolapse after laparoscopic hysterectomy compared with vaginal hysterectomy: The POP-UP study. Int Urogynecol J. 2021;32(4):841–850.

18. Al Adem KM, Bawazir SS, Hassen WA, Khandoker AH, Khalaf K, McGloughlin T, et al. Implantable systems for stress urinary incontinence. Ann Biomed Eng. 2017;45(12):2717–32. https://doi.org/10.1007/s10439-017-1939-9

19. Arda K, Ciledag N, Aktas E, Aribas BK, Kose K. Quantitative assessment of normal soft-tissue elasticity using shear-wave ultrasound elastography. AJR Am J Roentgenol. 2011;197(3):532–6. https://doi.org/10.2214/AJR.10.5449

20. Lee J, Myrie NO, Jeong GJ, Han WM, Jang YC, Garcia AJ, et al. In vivo shear wave elasticity imaging for assessment of diaphragm function in muscular dystrophy. Acta Biomater. 2023;168:277–85. https://doi.org/10.1016/j.actbio.2023.07.009