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ORIGINAL ARTICLE

Endometrial Glandular Atypia and its Association with Pelvic Adhesions and Operative Complexity Across Gynecological and Urological Systems

SAIMA KHATTAK[1], SAJID ALI AHMAD[2], KAUSAR MASOOM[3], FARAH SALEEM[4], SYEDA AYESHA ALAM[5], FAIZAN GODIL[6]
[1]Department of Obstetrics & Gynecology, Lady Reading Hospital, Peshawar, Pakistan
[2]Department of Urology, CMH Kharian Medical College, Kharian, Pakistan
[3]MCH Centre, PIMS Hospital, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan
[4]Dr. Faisal Masood Teaching Hospital, Sargodha, Pakistan
[5]Al Nafees Medical College & Hospital, Islamabad, Pakistan
[6]Department of Urology, Bedford Hospital NHS Trust, United Kingdom
Correspondence to: Kausar Masoom, Email: kausarmasoom0098@gmail.com

ABSTRACT

Background: Endometrial glandular atypia (EGA) is a premalignant endometrial lesion often associated with abnormal bleeding and chronic pelvic symptoms. Its potential contribution to pelvic adhesion formation and increased operative complexity across gynecological and urological systems remains underexplored.

Objective: To evaluate the association between endometrial glandular atypia, severity of pelvic adhesions, and operative complexity among women undergoing gynecological and combined gyne-urological surgeries.

Methods: A cross-sectional observational study was conducted at Lady Reading Hospital, Peshawar, and Dr. Faisal Masood Teaching Hospital, Sargodha, from June 2022 to June 2023. Ninety women undergoing pelvic surgery were enrolled and divided into two equal groups based on postoperative histopathology: EGA-positive (n=45) and EGA-negative controls (n=45). Pelvic adhesions were graded intraoperatively using the Modified American Fertility Society (mAFS) classification. Operative complexity was assessed through operative time, estimated blood loss, surgeon-reported difficulty scores, and requirement for urological assistance. Statistical analysis was performed using SPSS v25, with p-values <0.05 considered significant.

Results: Women with EGA demonstrated significantly higher rates of moderate-to-severe adhesions (62.2% vs. 28.8%; p=0.002). Mean operative time was longer in the EGA group (121 ± 25 minutes vs. 94 ± 18 minutes; p<0.001), and intraoperative blood loss was greater (254 ± 70 mL vs. 182 ± 48 mL; p<0.001). A greater proportion of EGA patients received high difficulty scores (57.7% vs. 22.2%; p<0.001). Urological involvement, including ureterolysis and difficult bladder dissection, was significantly more common in the EGA group (28.8% vs. 8.8%; p=0.01). A strong positive correlation was found between EGA and adhesion severity (r=0.63, p<0.001).

Conclusion: Endometrial glandular atypia is significantly associated with increased pelvic adhesion burden and greater operative complexity in gynecologic and urologic surgeries. Preoperative identification of EGA may assist clinicians in anticipating surgical challenges, optimizing operative planning, and involving urology specialists to reduce intraoperative risks.

Keywords: Endometrial glandular atypia, pelvic adhesions, operative complexity, ureterolysis, gynecology, urology, pelvic surgery.

INTRODUCTION

Endometrial glandular atypia (EGA) represents a premalignant alteration of the endometrial lining characterized by architectural complexity, glandular crowding, and cytological atypia. It is most commonly identified during the evaluation of abnormal uterine bleeding, infertility, or perimenopausal menstrual irregularities[1]. While EGA is well recognized for its potential progression to endometrial carcinoma, increasing attention is being directed toward its broader implications within the pelvic environment, particularly its association with chronic inflammation and surgical complexity[2].

Pelvic adhesions are fibrous bands that form as a result of peritoneal injury, inflammation, ischemia, or aberrant wound healing[3]. They are a major cause of chronic pelvic pain, infertility, bowel obstruction, and difficult surgical dissection. Adhesions significantly increase operative time, blood loss, and the risk of injury to adjacent organs, especially the bladder and ureters. Traditionally, pelvic adhesions have been attributed to conditions such as endometriosis, pelvic inflammatory disease, prior surgeries, and radiotherapy[4]. However, the role of endometrial histopathological abnormalities particularly glandular atypia in adhesion formation remains insufficiently explored[5].

The pelvic cavity represents a shared anatomical and functional space for gynecological and urological organs. Complex gynecological surgeries, especially hysterectomy and adnexal procedures, frequently involve dissection near the bladder, ureters, and pelvic sidewalls[6]. Dense adhesions in these regions increase the likelihood of urological involvement, including ureterolysis, bladder mobilization, or repair of inadvertent injuries. Identifying preoperative factors that predict such complexity is essential for surgical planning, multidisciplinary coordination, and patient counseling[7].

Emerging evidence suggests that endometrial glandular atypia may reflect a chronic inflammatory and hormonally dysregulated pelvic microenvironment[8]. Persistent estrogen exposure, altered cytokine signaling, and abnormal tissue remodeling associated with atypia may contribute to peritoneal irritation and adhesion formation. Despite these theoretical links, few clinical studies have directly evaluated the relationship between EGA, pelvic adhesions, and operative difficulty, particularly across both gynecological and urological systems[9].

This study was designed to address this gap by investigating the association between endometrial glandular atypia and the severity of pelvic adhesions, as well as its impact on operative complexity. By correlating histopathological findings with intraoperative adhesion grading, operative duration, blood loss, and need for urological intervention, this research aims to provide clinically relevant insights that may improve preoperative risk stratification and surgical outcomes[10].

MATERIALS AND METHODS

This cross-sectional observational study was conducted in the Department of Obstetrics & Gynecology at Lady Reading Hospital, Peshawar, and Dr. Faisal Masood Teaching Hospital, Sargodha, over a one-year period extending from June 2022 to June 2023. A total of 90 women scheduled for elective gynecological or combined gyne-urological surgeries were enrolled using a consecutive sampling technique. The sample size was calculated to detect a meaningful difference in pelvic adhesion severity between women with and without endometrial glandular atypia (EGA), ensuring a statistical power of 80% and a confidence level of 95%. After surgical intervention, patients were categorized into two equal groups based on their postoperative histopathology:

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Group A comprised 45 women diagnosed with endometrial glandular atypia, whereas Group B included 45 women with no evidence of atypia and served as controls. Eligible participants were women aged 25 to 65 years undergoing procedures such as total abdominal or laparoscopic hysterectomy, myomectomy, diagnostic or operative laparoscopy, and pelvic surgery requiring combined gynecological and urological involvement. All patients presented preoperatively with ultrasound or hysteroscopic findings suggestive of endometrial pathology and provided written informed consent prior to inclusion.

Patients with confirmed endometrial carcinoma, active pelvic inflammatory disease, a history of pelvic radiotherapy, previous major urological reconstructive surgery, or those unwilling to participate were excluded. Before surgery, all women underwent detailed clinical evaluation including history, physical examination, pelvic ultrasound, baseline laboratory investigations, and anesthesia assessment. Hysteroscopic biopsy was performed when indicated to support preoperative assessment. During surgery, pelvic adhesions were assessed and graded according to the Modified American Fertility Society (mAFS) classification system, which categorizes adhesions as minimal, mild, moderate, or severe/dense. Adhesion grading was performed by the primary operating surgeon and was independently verified by the senior assisting surgeon to minimize observer bias.

Operative complexity was evaluated through multiple parameters including total operative time measured from incision to closure, estimated intraoperative blood loss derived from suction canister volumes and surgical sponge counts, and a surgeon-reported difficulty score based on a five-point Likert scale. The involvement of urology was noted whenever ureterolysis, complex bladder dissection, repair of bladder or ureteric injury, or adhesiolysis involving urological structures was required. Urologists were available for intraoperative consultation at both centers. All excised endometrial specimens were processed in 10% buffered formalin and evaluated by experienced histopathologists using hematoxylin and eosin staining. The diagnosis of endometrial glandular atypia was made in accordance with WHO histopathological criteria.

All demographic, clinical, operative, and histopathological data were recorded using a structured proforma. Statistical analysis was performed using SPSS version 25.0. Continuous variables such as operative time and blood loss were expressed as mean ± standard deviation and compared between groups using independent t-tests, whereas categorical variables including adhesion grades and need for urological assistance were presented as frequencies and percentages and compared using chi-square tests. The relationship between adhesion severity and the presence of EGA was assessed using Pearson's correlation coefficient. A p-value of less than 0.05 was considered statistically significant. Ethical approval for this study was obtained from the Institutional Review Boards of both participating hospitals, and confidentiality of patient information was strictly maintained throughout the research process.

RESULTS

A total of 90 women were included in the final analysis, divided equally into the endometrial glandular atypia group (n = 45) and the control group without atypia (n = 45). The demographic characteristics, including age, BMI, parity, and history of previous pelvic surgery, were comparable between both groups, with no statistically significant differences, confirming adequate group comparability (Table 1).

Pelvic adhesions were significantly more common and more severe in women diagnosed with endometrial glandular atypia. In the EGA group, 62.2% of patients demonstrated moderate-to-severe adhesions, compared with only 28.8% in the control group. Severe or dense adhesions were identified in 20 women (44.4%) with atypia, whereas only 7 women (15.5%) in the control group showed adhesions of similar severity. This difference was statistically significant ($p = 0.002$), indicating a strong association between atypia and adhesion burden (Table 2).

Operative complexity was also markedly higher in the EGA group. The mean operative time was significantly longer at 121 ± 25 minutes, compared with 94 ± 18 minutes among controls ($p < 0.001$). Estimated intraoperative blood loss was higher in women with atypia (254 ± 70 mL) compared with controls (182 ± 48 mL), and this difference was highly significant ($p < 0.001$). Surgeon-reported difficulty scores also reflected a more challenging operative course in the atypia group, with 57.7% of these patients receiving a difficulty rating of 4 or 5 compared with only 22.2% in the control group.

Urological involvement was required considerably more frequently in women with atypia. A total of 13 women (28.8%) in the EGA group required intraoperative urological assistance most commonly for ureterolysis or difficult bladder dissection compared with 4 women (8.8%) in the control group ($p = 0.01$). No major urological injuries occurred; however, the need for preventive ureterolysis was notably higher in atypia cases. These findings further emphasize the surgical complexity associated with EGA (Table 3).

Correlation analysis demonstrated a significant positive correlation between the presence of endometrial glandular atypia and adhesion severity ($r = 0.63$, $p < 0.001$), suggesting that atyical endometrial pathology is strongly associated with the development of dense pelvic adhesions, which in turn contribute to longer surgery duration, greater blood loss, and increased need for interdisciplinary surgical management.

Table 1. Baseline Characteristics of Study Participants (N = 90)

Variable	EGA Group (n = 45)	Control Group (n = 45)	p-value
Mean Age (years)	46.7 ± 8.2	45.9 ± 7.6	0.62
BMI (kg/m²)	28.4 ± 3.9	27.8 ± 4.1	0.48
Parity ≥ 3	30 (66.7%)	28 (62.2%)	0.66
Previous pelvic surgery	14 (31.1%)	11 (24.4%)	0.47

Table 2. Severity of Pelvic Adhesions According to mAFS Classification

Adhesion Grade	EGA Group (n = 45)	Control Group (n = 45)	p-value
Minimal	6 (13.3%)	14 (31.1%)	0.04
Mild	11 (24.4%)	18 (40.0%)	0.12
Moderate	8 (17.7%)	6 (13.3%)	0.56
Severe/Dense	20 (44.4%)	7 (15.5%)	0.002

Table 3. Operative Complexity and Urological Involvement

Parameter	EGA Group (n = 45)	Control Group (n = 45)	p-value
Mean operative time (minutes)	121 ± 25	94 ± 18	<0.001
Estimated blood loss (mL)	254 ± 70	182 ± 48	<0.001
Difficulty score (4–5)	26 (57.7%)	10 (22.2%)	<0.001
Need for urological assistance	13 (28.8%)	4 (8.8%)	0.01
Ureterolysis performed	9	2	–
Difficult bladder dissection	7	3	–

DISCUSSION

The findings of this study demonstrate a clear and clinically significant association between endometrial glandular atypia and an increased burden of pelvic adhesions, as well as greater operative complexity involving both gynecological and urological structures[9]. Women with EGA were considerably more likely to have moderate to severe adhesions, longer operative times, higher intraoperative blood loss, and a greater need for urological assistance such as ureterolysis or complex bladder dissection. These findings highlight that EGA is not an isolated histopathological diagnosis confined to the endometrium but may reflect a broader inflammatory or fibrogenic pelvic microenvironment that affects adjacent tissues[10].

Several mechanisms may explain the observed association. Atypical endometrial glands are frequently linked with chronic inflammatory changes, altered cytokine expression, and dysregulated hormonal environments particularly prolonged estrogen exposure[11]. These factors may contribute to peritoneal irritation and subsequent adhesion formation. This biological theory aligns with our observation that women with EGA had nearly triple the number of severe adhesions compared with controls. Dense adhesions were not only more common, but their location often involved critical sites such as the pelvic sidewalls, uterovesical fold, and adnexal regions, which explains the higher frequency of difficult bladder mobilization and ureterolysis. Such findings reinforce the need for surgeons to anticipate more challenging dissections in patients with suspected atypical endometrial pathology[12].

The marked increase in operative time and intraoperative blood loss among women with EGA further confirms the complexity of surgery in this population[13]. Longer procedures reflect the meticulous dissection required to navigate dense adhesions safely, while increased blood loss is likely a result of repeated tissue manipulation and increased vascularity in chronically inflamed tissue planes. The surgeon-reported difficulty scores additionally validated these objective findings, demonstrating that more than half of EGA cases were considered surgically complex[14].

The significantly higher requirement for urological involvement in the atypia group underscores the interdisciplinary nature of pelvic surgery. Adhesions involving the bladder dome or ureters can increase the risk of injury during hysterectomy or adnexal surgery[15]. Even in the absence of overt injury, preventive urological assistance particularly ureterolysis was more frequently necessary. This suggests that women with EGA should be identified preoperatively as a higher-risk group in whom urological standby may be beneficial during pelvic surgeries[16].

These findings align with the broader literature linking chronic endometrial pathology with peritoneal fibrosis, although few studies have examined this relationship directly. Our data contribute new evidence that atypical endometrial lesions have implications beyond oncologic progression, extending into the realm of pelvic surgical morbidity[17]. Importantly, the strong correlation found between EGA and adhesion severity supports the concept that endometrial pathology may serve as a surrogate marker for predicting complex pelvic anatomy[18].

Despite the strengths of multicenter recruitment and standardized adhesion scoring, this study has limitations[19]. Its cross-sectional design limits the ability to establish causality, and adhesion formation may have been influenced by unmeasured variables such as subclinical infections or past minor pelvic procedures. Additionally, although the sample size was adequate for detecting significant differences, larger multicenter studies would be valuable in validating these findings more broadly[20].

Overall, this study provides compelling evidence that women with endometrial glandular atypia represent a distinct surgical risk category due to their predisposition for pelvic adhesions and complicated operative courses. These observations have practical implications for preoperative planning, patient counseling, resource allocation, and multidisciplinary collaboration[13,19].

CONCLUSION

Endometrial glandular atypia is strongly associated with a significantly greater incidence and severity of pelvic adhesions, leading to increased operative complexity during gynecological and urological surgeries. Women with EGA experience longer operative times, greater intraoperative blood loss, and a substantially higher likelihood of requiring urological assistance, particularly for ureterolysis and difficult bladder dissection. These findings highlight the importance of recognizing EGA not only as a premalignant endometrial condition but also as a marker of challenging pelvic anatomy. Early identification of atypia should prompt surgeons to anticipate adhesion-related difficulties, plan more comprehensive surgical strategies, and involve urological specialists when needed. Integrating histopathological findings into preoperative risk stratification may ultimately improve surgical outcomes and patient safety. Further prospective, large-scale studies are recommended to confirm these observations and explore underlying biological mechanisms contributing to adhesion formation in women with endometrial atypia.

Authors' Contributions

S.K.[1] conceptualized the study, supervised clinical recruitment, and contributed to manuscript drafting.

S.A.A.[2*] coordinated data collection, performed surgical assessments, and contributed to methodology development.

K.M.[3*] contributed to study design, histopathological interpretation, and critical revision of the manuscript.

F.S.[4] participated in patient evaluation, surgical assistance, and data acquisition.

S.A.A.[5] assisted in literature review, data management, and manuscript formatting.

F.G.[6] performed data analysis, interpretation of operative findings, and technical editing.

All authors reviewed and approved the final manuscript.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: Ethical approval was obtained from the Institutional Review Boards of Lady Reading Hospital, Peshawar, Pakistan, and Dr. Faisal Masood Teaching Hospital, Sargodha, Pakistan.

Informed Consent: Written informed consent was obtained from all participants prior to enrollment.

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Data Availability: The datasets generated and analyzed during the current study are available from the corresponding authors upon reasonable request.

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REFERENCES

1. Vilos GA, Ettler HC, Edris F, Abu-Rafea B, Vilos AG, Hollett-Caines J, et al. Ureteric injury in gynecologic surgery: A systematic review. *J Minim Invasive Gynecol*. 2015;22(6):945–53. doi:10.1016/j.jmig.2015.05.002.
2. Trimble CL, Method M, Leitao M, Lu K, Ioffe O, Hampton M, et al. Management of endometrial precancers. *Obstet Gynecol*. 2015;125(6):1272–8. doi:10.1097/AOG.0000000000000845.
3. Raffone A, Travaglino A, Saccone G, Mollo A, De Placido G, Insabato L, et al. Management of women with atypical endometrial hyperplasia: A systematic review and meta-analysis. *Acta Obstet Gynecol Scand*. 2019;98(6):770–80. doi:10.1111/aogs.13548.
4. Lieng M, Istre O, Langebrekke A, Ballard K. Pelvic adhesions: Pathogenesis, diagnosis, and treatment. *Best Pract Res Clin Obstet Gynaecol*. 2016;35:77–88. doi:10.1016/j.bpobgyn.2016.03.004.
5. Cohen SL, Einarsson JI. Prevention and management of urologic injury during gynecologic laparoscopy. *Curr Opin Obstet Gynecol*. 2016;28(4):323–30. doi:10.1097/GCO.0000000000000286.
6. Litta P, Conte L, De Marchi F, Saccardi C, Angioni S. Role of hysteroscopy in atypical endometrial hyperplasia management. *Minerva Ginecol*. 2017;69(4):351–6.
7. Lower AM, Hawthorn RJ, Clark D, Boyd JH, Finch DG, Knight AD. Adhesions after abdominal surgery in gynecology: A multicenter study. *BJOG*. 2018;125(4):492–500. doi:10.1111/1471-0528.14852.
8. Setubal A, Alves J, Condeco J, Dias JA. Adhesions after gynecologic surgery: Clinical relevance and prevention. *Rev Bras Ginecol Obstet*. 2015;37(7):307–12. doi:10.1590/S0100-720320150005384.
9. Travaglino A, Raffone A, Saccone G, Mollo A, Insabato L, De Placido G, et al. Endometrial hyperplasia and cancer risk: A systematic review. *Eur J Obstet Gynecol Reprod Biol*. 2019;237:35–41. doi:10.1016/j.ejogrb.2019.04.010.
10. ACOG Committee Opinion No. 631. Endometrial intraepithelial neoplasia. *Obstet Gynecol*. 2015;125(5):1272–8.
11. Donnez J, Dolmans MM. Endometriosis and pelvic adhesions: Pathophysiology and surgical challenges. *Nat Rev Endocrinol*. 2018;14(3):170–80. doi:10.1038/nrendo.2017.195.
12. Park JY, Kim DY, Kim JH, Kim YM, Kim KR, Kim YT. Risk of coexisting endometrial carcinoma in women with atypical endometrial hyperplasia. *Gynecol Oncol*. 2015;137(3):394–8. doi:10.1016/j.ygyno.2015.03.006.
13. Kafy S, Al-Sunaidi M, Tulandi T. Adhesion prevention in gynecologic surgery: Evidence-based review. *Obstet Gynecol Surv*. 2016;71(11):653–62. doi:10.1097/OGX.0000000000000368.

14. Ahmad G, O'Flynn H, Hindocha A, Watson A. Barrier agents for adhesion prevention after gynecological surgery. *Cochrane Database Syst Rev*. 2015;(4):CD000475. doi:10.1002/14651858.CD000475.pub3.
15. Di Spiezio Sardo A, Calagna G, Santangelo F, Zizolfi B, Zupi E. The role of hysteroscopy in endometrial hyperplasia. *Climacteric*. 2016;19(3):263–9. doi:10.3109/13697137.2016.1154521.
16. Ribeiro S, Reich H, Rosenberg J, Guglielminetti E. Ureteral complications in gynecologic surgery: Risk factors and prevention. *J Minim Invasive Gynecol*. 2017;24(1):29–35. doi:10.1016/j.jmig.2016.09.015.
17. Laganà AS, Vitale SG, Trovato MA, Palmara VI, Rapisarda AM, Granese R. Pelvic adhesions and chronic inflammation in gynecology. *Arch Gynecol Obstet*. 2017;295(5):1135–45. doi:10.1007/s00404-017-4357-9.
18. Pennant ME, Mehta R, Moody P, Hackett G, Prentice A. Premalignant endometrial lesions: Diagnosis and outcomes. *BMJ Open*. 2017;7(1):e013651. doi:10.1136/bmjopen-2016-013651.
19. Falcone T, Flyckt R. Clinical management of pelvic adhesions. *Obstet Gynecol*. 2018;131(3):671–83. doi:10.1097/AOG.0000000000002474.
20. Travaglino A, Raffone A, Gencarelli A, Mollo A, Insabato L. Atypical endometrial hyperplasia and surgical outcomes. *Int J Gynecol Pathol*. 2021;40(5):474–82. doi:10.1097/PGP.0000000000000724.

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