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Research Article

Histopathological Spectrum of Non-neoplastic and Neoplastic lesions of Female Genital Tract at a Tertiary Care Center in Western Rajasthan – An Observational Study

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Abstract

Background: Female genital tract lesions comprise a wide spectrum of non-neoplastic and neoplastic conditions involving the cervix, uterus, ovaries, fallopian tubes, vagina, and vulva. Histopathological examination remains the gold standard for definitive diagnosis.

Aims: To evaluate the histopathological spectrum and organ-wise distribution of female genital tract lesions at a tertiary care centre in Western Rajasthan.

Settings and Design: Retrospective observational study conducted in the Department of Pathology at a Tertiary Care Centre.

Materials and Methods: Histopathology records and archived slides of female genital tract specimens received between January 2021 and December 2024 were reviewed. Lesions were classified according to organ and histopathological diagnosis.

Statistical Analysis: Data were analyzed using R software version 4.4.2. Frequencies and percentages were calculated, and the Chi-square test was applied, with $p<0.05$ considered statistically significant.

Results: Of the 3,000 specimens analyzed, 60.6% were from women aged 36–55 years. The cervix was the most frequently involved organ, with chronic nonspecific cervicitis (45.4%) as the commonest lesion. Disordered proliferative endometrium (36.8%), leiomyoma (29.6%), and functional ovarian cysts predominated in the endometrium, myometrium, and ovaries, respectively. Cervical carcinoma accounted for 51.1% of all malignant lesions. Non-neoplastic lesions significantly outnumbered neoplastic lesions ($p = 0.0001$).

Conclusions: Non-neoplastic lesions predominate in the female genital tract. Histopathological evaluation remains essential for accurate diagnosis, early detection of malignancy, and appropriate patient management.

Keywords: Cervix; Female genital tract; Histopathology; Neoplasms; Uterus.

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Introduction

Lesions of the female genital tract (FGT) encompass a wide range of non-neoplastic and neoplastic conditions involving the cervix, uterus, ovaries, fallopian tubes, vagina, and vulva, and remain an important cause of gynecological morbidity across all age groups.[1,2] Women commonly present with symptoms such as abnormal uterine bleeding, vaginal discharge, pelvic pain, or adnexal masses, making histopathological evaluation indispensable for establishing an accurate diagnosis and guiding subsequent management.[3,4] Despite advances in screening and imaging, malignancies of the cervix, endometrium, and ovary continue to contribute substantially to the disease burden among women.[5–7] Comprehensive studies evaluating the histopathological spectrum of lesions involving the entire female genital tract are limited, particularly in Western Rajasthan.[8] Therefore, the present study was undertaken to analyze the histopathological spectrum and organ-wise distribution of non-neoplastic and neoplastic lesions of the female genital tract in a tertiary care center.

Materials and Methods

An observational retrospective study was conducted in the Department of Pathology at a tertiary care teaching hospital over a four-year period (January 2021 to December 2024). The study included archived histopathology records and corresponding tissue sections obtained from female patients who underwent biopsy or surgical excision

for lesions of the female genital tract. The study protocol was approved by the Institutional Ethics Committee before commencement, and confidentiality of patient information was maintained throughout the study.

Archived tissue specimens from the cervix, uterus, ovaries, fallopian tubes, vagina, and vulva with complete demographic, clinical, and histopathological records were included. Only adequately preserved tissue sections with satisfactory staining and definitive histopathological diagnosis were considered eligible. Specimens showing inadequate tissue, fixation or processing artefacts, incomplete clinical information, unavailable histopathology slides, or lesions unrelated to the female genital tract were excluded from the analysis.

All eligible cases available during the study period were included; therefore, no formal sample size calculation was performed. Randomization and blinding were not applicable because of the retrospective observational design.

Histopathological slides stained with hematoxylin and eosin (H&E) were retrieved from the departmental archives and independently reviewed by the investigators. Additional sections from archived paraffin blocks were examined whenever required to confirm the diagnosis. Lesions were classified according to their anatomical site and categorized as non-neoplastic or neoplastic based on established histopathological criteria.

Clinical and pathological data, including age, anatomical site, clinical diagnosis, and final histopathological diagnosis, were extracted from departmental records using a predesigned data collection form. Data were entered into Microsoft Excel and analyzed using R software version 4.4.2. Categorical variables were summarized as frequencies and percentages. Associations were assessed using the Chi-square test. A P value <0.05 was considered statistically significant.

Results

During the four-year study period, 3,000 histopathological specimens of the female genital tract were evaluated. Most patients belonged to the 36–45-year age group (1,054; 35.1%), followed by 46–55 years (763; 25.4%) and 26–35 years (438; 14.6%). Overall, 60.6% of the study population was between 36 and 55 years of age. Abnormal uterine bleeding was the most frequent clinical presentation (851; 28.4%), followed by the complaint of something coming out per vaginum (701; 23.4%) and heavy menstrual bleeding/menorrhagia (642; 21.4%) (Table 1).

Table 1: Demographic characteristics and clinical presentation of patients with female genital tract lesions (n = 3000)

Variable	Category	n (%)
Age (years)	16–25	122 (4.1)
	26–35	438 (14.6)
	36–45	1054 (35.1)
	46–55	763 (25.4)
	56–65	291 (9.7)
	>65	332 (11.1)
Clinical presentation	Abnormal uterine bleeding	851 (28.4)
	Something coming out per vaginum	701 (23.4)
	Heavy menstrual bleeding/menorrhagia	642 (21.4)
	Irregular menses/dysfunctional uterine bleeding	182 (6.1)
	Pain abdomen	147 (4.9)
	Bleeding per vaginum	121 (4.0)
	Prolapse	112 (3.7)
	Ovarian cyst	63 (2.1)
	Others*	181 (6.0)

*Others include ruptured ectopic pregnancy, retained products of conception, torsion, postmenopausal bleeding, infertility, abdominal/pelvic mass, medical termination of pregnancy, and miscellaneous complaints occurring in <1% of patients individually.

Histopathological examination demonstrated that non-neoplastic lesions predominated across all female genital tract organs. The cervix was the most frequently sampled organ (2,475 specimens), with chronic nonspecific cervicitis (45.4%) being the commonest diagnosis, followed by chronic nonspecific cervicitis with squamous metaplasia (20.4%). Cervical carcinoma constituted 0.9% of cervical lesions. Among the 2,690 endometrial specimens, disordered proliferative pattern (36.8%) was the predominant finding, followed by proliferative endometrium (23.0%) and atrophic endometrium (20.3%). Endometrial hyperplasia accounted for 4.9%, whereas endometrial carcinoma was identified in 0.5% of cases. Evaluation of 2,477 myometrial specimens showed leiomyoma (29.6%) as the most frequent lesion,

followed by adenomyosis (15.5%), while leiomyosarcoma was identified in only one specimen. The differences in the distribution of non-neoplastic and neoplastic lesions in the cervix, endometrium, and myometrium were statistically significant (Chi-square test, P= 0.001) (Table 2).

Table 2: Organ-wise distribution of major histopathological lesions of the female genital tract

Organ	Total specimens	Predominant non-neoplastic lesion, n (%)	Predominant benign neoplasm, n (%)	Malignant lesion, n (%)
Cervix	2475	Chronic nonspecific cervicitis, 1124 (45.4)	Endocervical polyp, 16 (0.6)	Cervical carcinoma, 23 (0.9)
Endometrium	2690	Disordered proliferative pattern, 990 (36.8)	Endometrial hyperplasia, 133 (4.9)	Endometrial carcinoma, 13 (0.5)
Myometrium	2477	Adenomyosis, 385 (15.5)	Leiomyoma, 732 (29.6)	Leiomyosarcoma, 1 (<0.1)
Ovary†	1666	Corpus luteum cyst, 307 (18.4)	Serous cystadenoma, 73 (4.4)	Serous/mucinous cystadenocarcinoma, 6 (0.4)
Fallopian tube†	1613	Ectopic pregnancy, 62 (3.8)	None	None
Vulva	27	Bartholin cyst, 27 (100)	None	None
Vagina	—	No significant lesion identified	None	None

†Combined right- and left-sided specimens.

Functional lesions predominated in the adnexa. Among 861 right and 805 left ovarian specimens, corpus luteum cyst was the most frequent lesion, accounting for 19.7% and 17.0% of cases, respectively, followed by follicular cysts. Serous cystadenoma was the commonest benign ovarian neoplasm, whereas malignant ovarian tumors were uncommon. In the fallopian tubes, most specimens were histologically unremarkable, and ectopic pregnancy represented the most frequent pathological finding on both sides. All 27 vulvar specimens were diagnosed as Bartholin cysts, while no significant pathological lesion was identified in vaginal biopsies

A total of 45 malignant lesions were identified during the study period. The cervix accounted for the largest proportion of malignancies (51.1%), followed by the uterine corpus (35.6%) and the ovary (13.3%), whereas no malignant lesions were observed in the fallopian tube, vagina, or vulva. The organ-wise distribution of malignant lesions differed significantly (Chi-square test, P = 0.001) (Table 3).

Table 3: Distribution of malignant lesions according to organ of origin (n = 45)

Organ	Malignant lesions, n	Percentage (%)
Cervix	23	51.1
Uterus (endometrium + myometrium)	14*	31.1
Ovary	6	13.3
Fallopian tube	0	0
Vulva	0	0
Vagina	0	0
Other uterine malignancy†	2	4.5
Total	**45**	**100**

*Includes endometrial carcinoma and leiomyosarcoma.

†Includes uterine involvement by cervical carcinoma/infiltrative lesions reported in the study dataset.

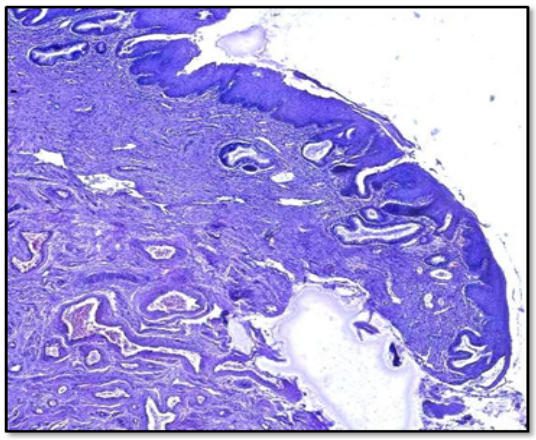

Figure 1: Photomicrograph showing chronic nonspecific cervicitis with squamous metaplasia (Hematoxylin and eosin, ×4).

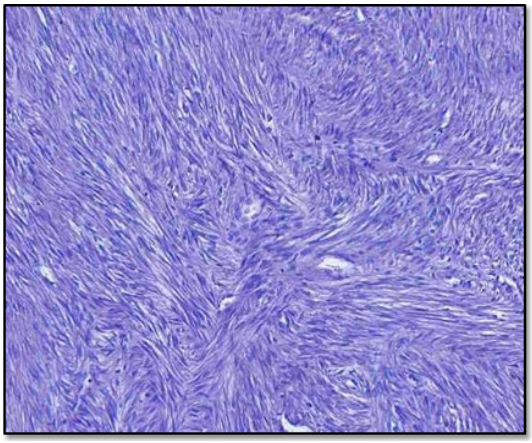

Figure 2: Photomicrograph showing uterine leiomyoma composed of interlacing bundles of benign smooth muscle cells (Hematoxylin and eosin, ×40).

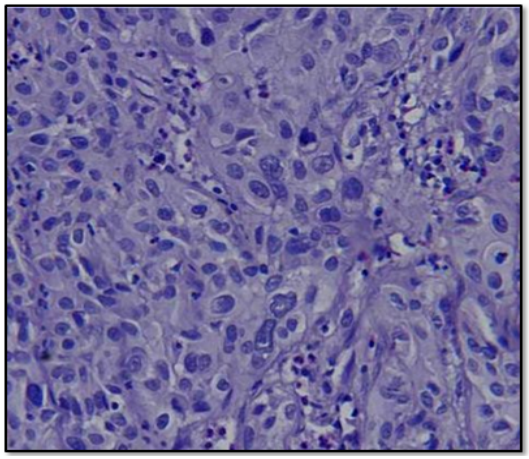

Figure 3: Photomicrograph showing non-keratinizing squamous cell carcinoma of the cervix with malignant squamous cells exhibiting marked nuclear pleomorphism and hyperchromasia (Hematoxylin and eosin, ×40).

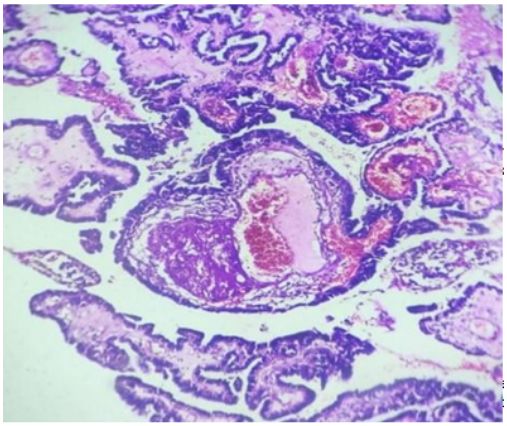

Figure 4: Photomicrograph showing serous cystadenocarcinoma of the ovary with complex branching papillary fronds containing fibrovascular cores lined by atypical stratified epithelial cells (Hematoxylin and eosin, ×10).

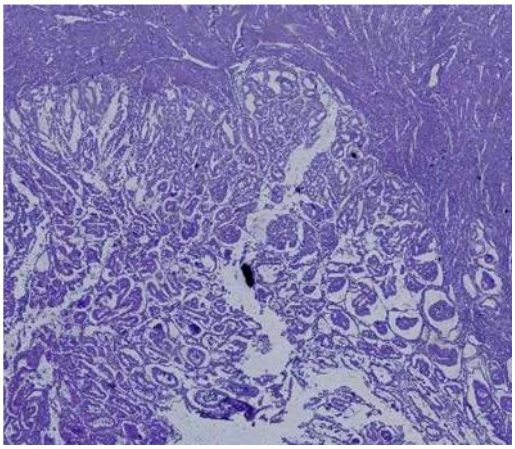

Figure 5: Photomicrograph showing endometrioid adenocarcinoma of the endometrium with crowded irregular malignant endometrial glands exhibiting complex glandular architecture (Hematoxylin and eosin, ×4).

Discussion

The present study evaluated the histopathological spectrum of female genital tract lesions in a tertiary care centre in Western Rajasthan. Non-neoplastic lesions predominated across all anatomical sites, confirming the pivotal role of histopathological examination in the diagnosis and classification of gynecological lesions.

Most patients belonged to the 36–55-year age group, which is consistent with previous studies reporting the highest frequency of female genital tract lesions during the fourth and fifth decades of life.[9–11] The cervix was the most frequently involved organ, with chronic nonspecific cervicitis and squamous metaplasia being the predominant lesions. Similar findings have been reported in studies evaluating the histopathological spectrum

of female genital tract lesions and hysterectomy specimens.[10,11]

Disordered proliferative endometrium was the commonest endometrial lesion, followed by proliferative and atrophic endometrium, whereas endometrial hyperplasia and carcinoma were relatively uncommon. Similar observations have been reported by Gangwal et al., who identified disordered proliferative endometrium as the predominant finding in women with abnormal uterine bleeding.[12] Leiomyoma was the most frequent myometrial lesion, consistent with the findings of Wankhade and Dawande.[10] Functional ovarian cysts predominated over ovarian neoplasms, while benign epithelial tumours were considerably more common than malignant tumours, in agreement with previous reports by Batool et al. and Paswan et al.[13,15]

Fallopian tube, vulvar, and vaginal lesions were relatively uncommon. Ectopic pregnancy was the most frequent fallopian tube pathology, whereas Bartholin cyst was the predominant vulvar lesion. Similar observations have been reported by Siddiqui et al. and Borgohain et al.[14,16]

Cervical carcinoma constituted the largest proportion of malignant lesions, followed by uterine and ovarian malignancies, reflecting the continued burden of cervical cancer in developing countries despite improvements in screening and awareness. Early histopathological diagnosis remains essential for timely treatment and improved patient outcomes.

The major strengths of this study include its large sample size, comprehensive organ-wise evaluation, and inclusion of both non-neoplastic and neoplastic lesions over a four-year period. However, the retrospective single-centre design and lack of clinicopathological follow-up, HPV testing, and immunohistochemical or molecular correlation may limit the generalizability of the findings. Future multicentric prospective studies incorporating long-term follow-up and ancillary diagnostic techniques are warranted to validate and expand upon these findings.

Non-neoplastic lesions, particularly inflammatory and benign proliferative lesions, constituted the predominant histopathological spectrum of the female genital tract, whereas malignant lesions were relatively infrequent. The present study provides valuable regional epidemiological data and reinforces the importance of meticulous histopathological examination in the diagnosis, risk stratification, and management of gynecological diseases.

Conclusion

The present study demonstrates that non-neoplastic lesions constitute the predominant histopathological spectrum of female genital tract lesions in this tertiary care centre in Western Rajasthan. The majority of cases occurred in women aged 36–55 years, with the cervix being the most frequently represented site. Chronic nonspecific cervicitis was the commonest cervical lesion, while disordered proliferative endometrium, leiomyoma, and functional ovarian cysts were the predominant lesions involving the endometrium, myometrium, and ovary, respectively. Among malignant lesions, cervical carcinoma constituted the largest proportion, followed by uterine and ovarian malignancies.

These findings highlight the considerable burden of benign and inflammatory gynecological lesions alongside a clinically important proportion of malignant disease. Histopathological examination remains essential for definitive diagnosis, accurate classification, and early detection of malignancy, particularly in patients presenting with abnormal uterine bleeding, pelvic symptoms, or adnexal pathology. The study also provides useful regional data on the pattern of female genital tract lesions in Western Rajasthan. Further multicentric prospective studies incorporating HPV testing, immunohistochemistry, molecular investigations, and clinical follow-up are recommended to improve diagnostic precision and establish broader epidemiological patterns.

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