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Abnormal uterine bleeding and hysterectomy: Insights from histopathological analysis of hysterectomy specimens from a tertiary care hospital

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ABSTRACT

Background: The surgical procedure of hysterectomy, which involves the removal of the uterus, is widely performed in the field of gynecology globally. However, the frequency of hysterectomies varies across countries and regions.

Aim: The study aimed to determine the most frequent cause of abnormal uterine bleeding and the age group that undergoes hysterectomies most frequently by examining the histopathological results of hysterectomy specimens.

Materials and Methods: A cross-sectional study was conducted at a tertiary care hospital in India, including 218 hysterectomy specimens received over a three-year period. The specimens were processed and examined histopathologically, and data on age, indication for hysterectomy, type of hysterectomy, and presence of co-existing gynecological pathology were collected and analyzed using SPSS software.

Results: The study found that the highest frequency of hysterectomy was observed in the age group of 40-49 years, accounting for 39.9% of all cases. The most common type of hysterectomy performed was Subtotal Hysterectomy / Supracervical Hysterectomy, which accounted for 34.4% of all cases. The most frequent cause of abnormal uterine bleeding was leiomyoma, accounting for 40.4% of all cases, followed by adenomyosis, which accounted for 22.5% of all cases.

Conclusion: The study identifies abnormal uterine bleeding (AUB), predominantly due to leiomyoma, as the leading cause of hysterectomy among women aged 40-49 years. The findings emphasize the critical role of histopathological examination in all hysterectomy specimens to detect malignancies, regardless of preoperative assessments.

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1. Introduction

Hysterectomy, the surgical removal of the uterus, is one of the most common gynecological procedures performed worldwide. It is done for various reasons, including benign uterine conditions, gynecological cancers, and uncontrollable bleeding. Hysterectomy is considered a major surgery, and it has implications for the patient's

health, quality of life, and reproductive function. The histopathological examination of hysterectomy specimens is an essential component of the diagnostic workup, treatment planning, and follow-up of patients undergoing this procedure.

The histopathological spectrum of lesions in hysterectomy specimens is broad and includes a wide range of benign and malignant conditions affecting the uterus and its adnexa. Some of the most common benign conditions include leiomyomas, adenomyosis,

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endometriosis, and hyperplasia. Malignant conditions include endometrial, cervical, and ovarian cancers, as well as sarcomas and lymphomas.

The prevalence of hysterectomy varies across countries and regions, and it is influenced by various factors, including age, parity, socioeconomic status, and access to healthcare. Globally, hysterectomy rates have been declining in some countries, such as the United States and Australia, but they remain high in others, such as Eastern Europe and Latin America. In the United States, an estimated 600,000 hysterectomies are performed each year, making it one of the most common major surgeries for women.¹

In India, the prevalence of hysterectomy is high, with an estimated 2 million procedures performed annually.² The indications for hysterectomy in India are diverse and include benign conditions, such as fibroids and prolapse, as well as gynecological cancers. The burden of gynecological disorders in India is high, with an estimated 25% of women suffering from menstrual disorders, 20-25% from fibroids, and 10% from endometriosis.³ The prevalence of gynecological cancers is also increasing in India, particularly in urban areas.⁴

In Jammu & Kashmir, the prevalence of gynecological disorders is higher than the national average, with fibroids being the most common indication for hysterectomy.⁵ The region faces various challenges in providing adequate healthcare services, including inadequate infrastructure, shortage of skilled personnel, and lack of awareness among patients.⁶ The histopathological spectrum of lesions in hysterectomy specimens in Jammu & Kashmir is not well studied, and there is a need for more data to inform the diagnosis and management of gynecological conditions in the region.

The aim of this study is to identify the most frequent cause of abnormal uterine bleeding by examining the histopathological results of hysterectomy specimens. Additionally, the study seeks to determine the age group that undergoes hysterectomies most frequently.

2. Materials and Methods

This was a cross-sectional study conducted at a tertiary care hospital in India. A total of 218 hysterectomy specimens were included in the study. All hysterectomy specimens received in the pathology department during a three-year period were included. Hysterectomy specimens with inadequate clinical and pathological information were excluded. The procedure of the samples involved the following steps: Collection of hysterectomy specimens as per protocol. Fixation of the specimens in 10% buffered formalin. Cutting of large specimens and leaving them for fixation. Recording of gross features of the specimens. Taking representative samples after proper fixation of the specimen. Processing of multiple representative bits and making paraffin blocks. Staining of sections with

Hematoxylin and Eosin stains (H & E Staining). Thorough microscopic examination of the stained sections. Giving a histopathological diagnosis based on the findings from the microscopic examination. Overall, the study involved a standardized protocol for the collection, fixation, processing, and examination of hysterectomy specimens to arrive at a histopathological diagnosis.

The pathological diagnosis of each hysterectomy specimen was recorded from the pathology reports. The following data were also collected: age, indication for hysterectomy, type of hysterectomy, and presence of co-existing gynecological pathology. Descriptive statistics were used to summarize the data. The data were analyzed using SPSS version 26.0 software.

2.1. Ethical considerations

Ethical clearance was obtained from the institutional review board. This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and its subsequent amendments. The study protocol was reviewed and approved by the institutional review board (IRB) before any data collection or analysis was conducted. All participants provided informed consent before participating in the study, and their confidentiality and privacy were protected throughout the research process.

3. Results

In our study, a total of 218 specimens were analyzed, with the highest frequency of hysterectomy observed in the age group of 40-49 years, accounting for 39.9% (n=87) of all cases. The second most common age group was 30-39 years, comprising 22.5% (n=49) of all cases, followed by 60-69 years with 15.6% (n=34) of cases. The least number of hysterectomies was performed in the 70-79 years group, with only 3.2% (n=7) of all cases, as shown in (Table 1). The most common type of hysterectomy performed was the Subtotal Hysterectomy / Supracervical Hysterectomy, which accounted for 34.4% (n=75) of all cases. The second most common type was Total Abdominal Hysterectomy, accounting for 30.7% (n=67) of all cases, followed by Vaginal Hysterectomy with 23.9% (n=52) of all cases. The least common type of hysterectomy was Total Abdominal Hysterectomy with Bilateral Salphingo-Oophorectomy, accounting for only 11.0% (n=24) of all cases, as shown in (Table 2).

Regarding the distribution of lesions, (Table 3) reveals that the most common anatomical site for hysterectomy was the endometrium, accounting for 43.1% (n=94) of cases, followed by the myometrium with 29.4% (n=64) and the cervix with 16.1% (n=35). The least common site requiring hysterectomy was the ovary, with only 11.5% (n=25) of cases. The results of the study indicate that chronic nonspecific cervicitis with squamous

metaplasia was the most frequently observed cervical lesion, followed by cervical leiomyoma, carcinoma cervix, cervical polyp, and cervical leiomyomatous polyp. Among the endometrial lesions, simple endometrial hyperplasia was the most common, followed by complex endometrial hyperplasia without atypia, endometrial polyp, and complex endometrial hyperplasia with atypia, which can cause abnormal uterine bleeding. Endometrioid adenocarcinoma was the least common lesion. In the myometrium, leiomyoma and leiomyomata were more prevalent than other lesions. Among the ovarian lesions, cystic lesions were more common, including serous cystadenoma, mucinous cystadenoma, simple cyst, and dermoid cyst. The least common ovarian lesion was the granulosa cell tumor, as shown in (Table 4).

Table 5 shows that the most common clinical diagnosis was abnormal uterine bleeding, accounting for 42.0% of cases, followed by leiomyoma with 20.5%, ovarian cysts/tumors with 12.0%, and adenomyosis with 7.5%. Uterovaginal prolapse, cervical leiomyoma, carcinoma cervix/cervical intraepithelial neoplasia (CIN), endocervical polyp, and cervical leiomyomatous polyp were less common diagnoses.

In (Figure 1 a and b), the H&E stained sections of ovarian tissue reveal papillary carcinoma. At 10X magnification in (Figure 1 a), the specimen displays prominent papillary projections with fibrovascular cores, a hallmark feature of papillary carcinoma. Moving to (Figure 1 b) at higher magnification, the epithelial cells lining the papillae show stratification, indicating high-grade characteristics of papillary carcinoma. Together, these images confirm the diagnosis of papillary carcinoma of the ovary, showcasing its distinct histological features.

Turning to (Figure 2 a and b), which depict H&E stained cervical tissue at 10X magnification, the sections illustrate squamous cell carcinoma infiltrating the cervix. (Figure 2 a) shows sheets and nests of squamous epithelial cells with evident keratinization invading the stroma. (Figure 2 b) provides a closer view, revealing keratin pearls within the squamous nests, confirming the diagnosis of well-differentiated squamous cell carcinoma of the cervix. These images highlight the characteristic morphology and invasive nature of squamous cell carcinoma in cervical tissue.

Moving on to (Figure 3 a and b), the H&E stained sections of ovarian tissue at 10X magnification show a mixed germ cell tumor. (Figure 3 a) displays varied cellular elements including immature teratoma components and yolk sac tumor elements. (Figure 3 b) zooms in to reveal distinct areas of immature teratoma with neural tissue and glandular structures resembling yolk sac tumor components. These findings collectively support the diagnosis of a mixed germ cell tumor of the ovary, demonstrating the diverse histological features present within the tumor.

Lastly, in (Figure 4 a and b), the H&E stained sections of ovarian tissue at 10X magnification depict clear cell carcinoma. (Figure 4 a) shows cells with clear cytoplasm arranged in sheets or nests, characteristic of clear cell carcinoma. (Figure 4 b) offers a closer view, highlighting the clear cytoplasm and distinct cell borders of the tumor cells. These images confirm the diagnosis of clear cell carcinoma involving the ovary, showcasing its typical histological appearance.

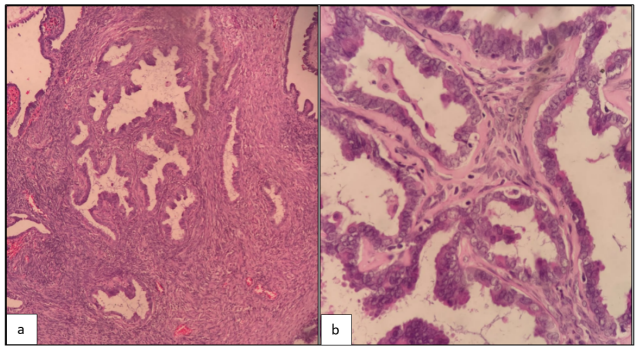


Figure 1: a, b): H & E 10X papillary carcinoma of ovary

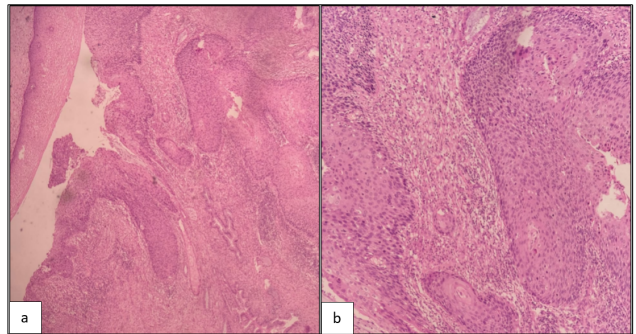


Figure 2: a, b): H&E 10X squamous cell carcinoma of cervix

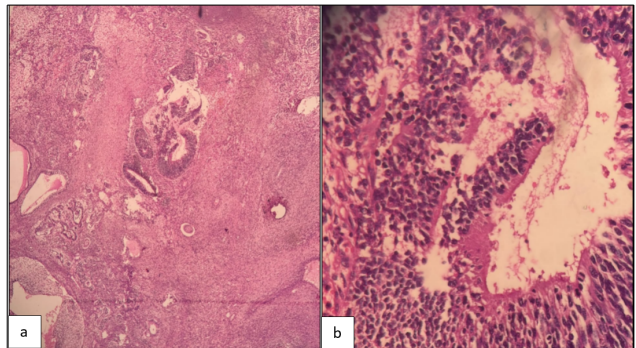


Figure 3: a, b): H&E 10x mixed germ cell tumour of ovary

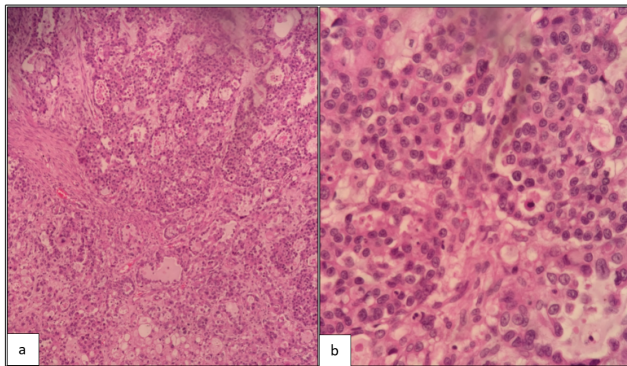


Figure 4: a, b): H&E clear cell carcinoma of ovary

Table 1: Age wise distribution of cases (n=218)

Age Group	Frequency (n)	Percentage (%)
20-29	9	4.1
30-39	49	22.5
40-49	87	39.9
50-59	32	14.7
60-69	34	15.6
70-79	7	3.2

Table 2: Types of hysterectomies performed on the study population.(n=218)

Type of Hysterectomy	Frequency (n)	Percentage (%)
Subtotal Hysterectomy / Supracervical Hysterectomy	75	34.4
Vaginal Hysterectomy	52	23.9
Total Abdominal Hysterectomy	67	30.7
Total Abdominal Hysterectomy with Bilateral Salphingo-Oophorectomy	24	11.0

Table 3: Distribution of the lesions- anatomical site wise (n=218)

Anatomical Site	Frequency (n)	Percentage (%)
Cervix	35	16.1
Endometrium	94	43.1
Myometrium	64	29.4
Ovary	25	11.5

4. Discussion

Hysterectomy, which involves removing the uterus, is the most commonly performed major gynecological surgery worldwide, with its prevalence varying by region.^{7,8} Since 1901, it has been the standard treatment for a variety of pelvic pathologies, such as fibroids, abnormal uterine bleeding, pelvic pain, endometriosis, adenomyosis, uterine prolapse, pelvic inflammatory disease, and reproductive organ cancer.⁹ The type of hysterectomy performed

Table 4: Histopathological lesions of hysterectomy specimens

Anatomical site	Type of Lesion	No. of cases
Cervix (N=35)	Chronic Non-Specific Cervicitis with Squamous Metaplasia	13
	Cervical Polyp	6
	Cervical Leiomyoma	7
	Cervical Leiomyomatous Polyp	3
	Carcinoma Cervix	7
Endometrium (N=94)	Endometrial Polyp	15
	Simple Hyperplasia	31
	Complex Hyperplasia Without Atypia	16
	Complex Hyperplasia With Atypia	9
	Endometroid	10
	Adenocarcinoma	12
	Endometritis	12
	Leiomyoma	18
	Leiomyomata	21
	Myohyperplasia	4
Myometrium (N=64)	Myohyperplasia With Leiomyoma	6
	Adenomyosis	4
	Adenomyosis With Leiomyoma	5
	Adenomyosis With Monckeberg's Sclerosis	4
	Adenomyosis With Leiomyomatous Polyp	2
	Simple Cyst	6
	Serous Cystadenoma	9
	Mucinous Cystadenoma	5
	Dermoid Cyst	1
	Granulosa Cell Tumor	2
Ovary(N=25)	Chocolate Cyst	1

depends on the underlying pathology and the patient's age. Total abdominal hysterectomy removes the uterus, cervix, and adnexal tissues via an incision in the abdomen, while vaginal hysterectomy removes the uterus through the vagina. Subtotal or supracervical hysterectomy removes the uterus while leaving the cervix in place. The clinical presentation and rationale for hysterectomy vary depending on the underlying pathology, which can be benign or malignant. Although the abdominal route is associated with a longer hospital stay, slightly increased postoperative complications, and higher costs compared to other types of hysterectomy, most gynecologists still use it due to their practice styles, training habits, and performance.⁹ Vaginal hysterectomy, which is less risky and less complicated, is recommended, particularly when the disease is limited to

Table 5: Clinical indication of hysterectomy in the study population

Clinical Diagnosis	Number of Cases (n=218)	Percentage
Abnormal Uterine Bleeding	94	43.1%
Leiomyoma (Fibroids)	43	19.7%
Ovarian Cysts/Tumors	26	11.9%
Adenomyosis	17	7.8%
Uterovaginal (UV) Prolapse	16	7.3%
Carcinoma Cervix/Cervical Intraepithelial Neoplasia (CIN)	7	3.2%
Cervical Leiomyoma	7	3.2%
Endocervical Polyp	5	2.3%
Cervical Leiomyomatous Polyp	3	1.4%

the uterus. Hysterectomy provides the greatest amount of symptomatic relief and satisfaction to the patient, and it is a permanent solution for many disorders involving the uterus and adnexae.^{7,8}

After examining 218 cases, we found that the most common age range for hysterectomy was between 40 to 49 years, followed by 30 to 39 years. The least number of hysterectomies were performed on patients between 70 to 79 years old. These results align with several previous investigations conducted by Yogesh Neena et al,¹⁰ G Gupta et al,¹¹ Jha R et al,¹² and Vandana et al,¹³ which reported average ages of 45 years, 45.6 years, 46.3 years, and 40 to 49 years, respectively. Our study found a higher incidence of abnormal uterine bleeding (AUB), which is consistent with Karthikeyan et al’s¹⁴ discovery that the most common clinical presentation of AUB was increased menstrual bleeding (62.5%), compared to 43% in our study. The prevalence of leiomyoma/leiomyomata in our study was in agreement with the findings of Vandana et al.¹³ Similar to Chryssiopoulos et al,¹⁵ who studied 3410 total hysterectomies over sixteen years and found that the abdominal method was preferred in 85.33% of cases and the vaginal method in 14.67%, our study also showed consistency in terms of the preferred hysterectomy technique. Abnormal uterine bleeding (AUB) is characterised by irregular uterine bleeding in the absence of identifiable pelvic pathology, pregnancy or general medical condition, and results from a disturbance in the normal ovulatory hormonal cycle of the endometrial lining. Abnormal uterine bleeding (AUB) can manifest as unusually heavy or light flow, and it can occur continuously, intermittently, or sporadically. Anovulatory haemorrhage, if left untreated, can result in endometrial cancer in 1-2% of women. Patients with polycystic ovarian syndrome (PCOS) may experience irregular menstrual cycles since

their first period due to anovulation or oligo-ovulation, as well as hyper-androgenism. These individuals may have irregular periods and/or infertility, hirsutism, with or without hyperinsulinemia, and obesity. Individuals who are at a high risk of developing endometrial cancer, including those with morbid obesity, diabetes, chronic hypertension, age over 35 years, and extended, persistent anovulation cycles, should undergo evaluation to exclude the possibility of the disease. To determine if there is endometrial cancer, endometrial sampling through a procedure called dilatation and curettage (D&C) has conventionally been performed.

Uterine fibroids, also known as uterine leiomyomas or fibroids, are tumours that develop in the smooth muscle of the uterus. While many women may not experience any symptoms, others may experience heavy or painful menstrual cycles. If they grow large enough, they may put pressure on the urinary bladder, leading to frequent urination. Depending on their size and location, they may cause mild to severe lower back pain or pain during sexual intercourse. Fibroids can be singular or multiple and their exact cause remains unknown. However, there is evidence to suggest that they run in families and are partly influenced by hormonal levels, as well as risk factors such as obesity and consumption of red meat. Diagnosis of uterine fibroids can be made through a pelvic examination or medical imaging. If symptoms are minor or non-existent, treatment may not be necessary. While medications like gonadotropin releasing hormone agonists may reduce the size of fibroids, they are expensive and have adverse effects. Surgery to remove the fibroid or uterus is the preferred treatment if symptoms are severe. Fibroid cancers are rare and categorized as leiomyosarcomas; however, they are not linked to benign fibroids.

Ovarian neoplasms, also known as ovarian tumours, are abnormal growths that originate from the ovary. These tumours can be either noncancerous (benign) or cancerous (malignant). Benign ovarian tumours include cysts like borderline tumour cysts, as well as serous cystadenoma, mucinous cystadenoma, fibroma, and thecoma. Simple ovarian cysts larger than 5-10 cm, particularly if symptomatic, and complex ovarian cysts should be surgically removed. Cystectomy may be preferred over oophorectomy in younger women and children.¹⁶ Ovarian cancer is more likely to occur in women who have ovulated more frequently throughout their lives. Women who have not given birth, who start ovulating early or enter menopause late are at increased risk of ovarian cancer. Other factors that increase the risk include postmenopausal hormone therapy, fertility treatments, and obesity. Cervical cancer is caused by the abnormal and uncontrolled growth of cells in the lining of the cervix. Squamous cell carcinoma is the most common type of cervical cancer, while adenocarcinoma, which occurs in the mucus-producing endocervical glands, is the second

most common type, accounting for 10 to 20% of all cases. Although less common than squamous cell carcinoma, the incidence of adenocarcinoma is increasing, especially in younger women. Almost all cervical cancers (about 99%) are caused by human papillomavirus (HPV).

5. Limitations of the Study

The cross-sectional nature of the study limits causal inferences between clinical presentations and histopathological outcomes. Being limited to one tertiary care hospital, the findings may not reflect the broader population, affecting generalizability. The study does not explore the conservative treatments patients may have undergone before hysterectomy, which could have provided additional context regarding the decision-making process for surgery.

6. Recommendations

Future research should include longitudinal studies to better understand the progression of gynecological conditions and the impact of different management strategies before hysterectomy. Expanding the research to include multiple centers across different regions would provide a more representative sample and improve the generalizability of the findings. Incorporating data on conservative treatment options and their outcomes could provide insights into whether hysterectomy could be avoided in certain cases.

7. Conclusion

The study concludes that abnormal uterine bleeding (AUB), primarily associated with leiomyoma, is the most frequent indication for hysterectomy among women aged 40–49 years in this region. These findings underscore the importance of histopathological examination in all hysterectomy specimens to detect potential malignancies, irrespective of preoperative assessments. This study's insights contribute to understanding the histopathological spectrum of hysterectomy specimens, which is crucial for improving diagnostic and therapeutic approaches in gynecological practice.

8. Source of Funding

None.

9. Conflict of Interest

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