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Original Research Article

Endometrial Biopsy in Infertility Evaluation: Histopathological Spectrum and Clinical Correlation

Paras Majithia[1], Jalpa Bhadja Dhoriyani[2], Ruchi Pandya[3]

[1]Assistant Professor, Department of Obstetrics & Gynaecology, GMERS Medical College, Porbandar, Gujarat, India

[2]Consultant Pathologist, Accura Diagnostic Centre, Morbi, Gujarat, India

[3]Consultant Pathologist, Unipath Speciality Laboratory, Ahmedabad, Gujarat, India

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Corresponding author: Dr. Ruchi Pandya

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Abstract

Background: Infertility is a multifactorial condition affecting a significant proportion of reproductive-age women. While ovulatory and tubal factors are commonly evaluated, the role of endometrial receptivity remains crucial for successful implantation. Endometrial biopsy offers a simple and cost-effective method to assess histological patterns, hormonal response, and pathological abnormalities that may contribute to infertility. This study aimed to analyze the histopathological spectrum of endometrial biopsy in infertile women and correlate findings with clinical profiles.

Material and Methods: This prospective observational study was conducted over a period of one year at a tertiary care centre in Western Gujarat. Women presenting with primary or secondary infertility underwent endometrial biopsy in the premenstrual phase. Specimens were processed and examined histopathologically. Clinical data including age, type and duration of infertility, menstrual pattern, and associated comorbidities were recorded. Statistical analysis was performed to assess associations between histopathological findings and clinical parameters.

Results: A total of 120 infertile women were evaluated. Primary infertility was more common (68.3%) than secondary infertility (31.7%). The most frequent histopathological pattern observed was secretory endometrium (41.7%), followed by proliferative endometrium (28.3%). Luteal phase defect was identified in 15% cases, while chronic endometritis was seen in 8.3%. Endometrial hyperplasia without atypia was detected in 4.2% cases. Significant associations were noted between luteal phase defect and primary infertility, as well as between chronic endometritis and prolonged duration of infertility.

Conclusion: Endometrial biopsy remains a valuable diagnostic tool in infertility evaluation, particularly in identifying subtle endometrial abnormalities that may impair implantation. Histopathological assessment, when correlated with clinical findings, can guide targeted therapeutic interventions and improve reproductive outcomes.

Keywords: Endometrial Biopsy, Infertility, Histopathology, Luteal Phase Defect, Chronic Endometritis.

Introduction

Infertility is defined as the inability to conceive after one year of regular, unprotected sexual intercourse and affects nearly 10–15% of couples globally. In developing countries like India, infertility carries profound social, psychological, and economic consequences, particularly for women. While advances in imaging and hormonal assays have enhanced infertility evaluation, assessment of endometrial receptivity remains an essential yet often underutilized component.

The endometrium plays a pivotal role in implantation and early pregnancy maintenance. Cyclical hormonal changes induce characteristic histological transformations in the endometrium, and deviations from these patterns may compromise fertility. Endometrial biopsy enables direct evaluation of these changes and helps detect conditions such as luteal phase defect, chronic endometritis, and endometrial hyperplasia. [1,2]

Despite emerging molecular diagnostic tools, endometrial biopsy remains relevant in resource-limited settings due to its simplicity, affordability, and diagnostic yield. Several studies have demonstrated variable prevalence of endometrial abnormalities among infertile women, highlighting the need for region-specific data. [3,4] Western

Gujarat represents a unique demographic with diverse socioeconomic and health profiles, yet limited data exist regarding endometrial histopathology in infertility from this region. Therefore, this study was undertaken to analyze the histopathological spectrum of endometrial biopsy in infertile women and to correlate these findings with clinical characteristics, thereby justifying its role in routine infertility work-up.

Material and Methods

This prospective observational study was conducted over a period of one year in the Departments of Obstetrics & Gynecology and Pathology at a tertiary care centre in Western Gujarat. Ethical approval was obtained from the Institutional Ethics Committee prior to study initiation. Written informed consent was obtained from all participants, and confidentiality of patient data was strictly maintained. Women aged 20–40 years presenting with primary or secondary infertility were included in the study. Endometrial biopsy was performed during the premenstrual phase (day 21–24 of the menstrual cycle). Patients with pregnancy, known genital tuberculosis, pelvic inflammatory disease, uterine malignancy, or hormonal treatment within the previous three months were excluded from the study.

Clinical data including age, type and duration of infertility, menstrual history, body mass index, and associated medical conditions were recorded. Endometrial tissue samples were fixed in 10% formalin, processed routinely, and stained with hematoxylin and eosin. Histopathological findings were categorized and correlated with clinical parameters. Data were entered in Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics were used, and associations were assessed using chi-square test, with p-value <0.05 considered statistically significant.

Results

Table 1: Age Distribution of Study Participants (n = 120)

Variable (Age in years)	Frequency	Percentage (%)
20–25	26	21.7
26–30	44	36.7
31–35	32	26.7
>35	18	15
Total	**120**	**100**

Table 2: Type and Duration of Infertility

Variable	Frequency	Percentage (%)
Type of Infertility		
Primary infertility	82	68.3
Secondary infertility	38	31.7
Duration of Infertility		
< 5 years	74	61.7
≥ 5 years	46	38.3
Total	**120**	**100**
Chi-square test - p-value: 0.041*		

Table 3: Histopathological Spectrum of Endometrial Biopsy

Variable (Histopathology)	Frequency	Percentage (%)
Secretory endometrium	50	41.7
Proliferative endometrium	34	28.3
Luteal phase defect	18	15
Chronic endometritis	10	8.3
Endometrial hyperplasia (without atypia)	5	4.2
Disordered proliferative endometrium	3	2.5
Total	**120**	**100**
Chi-square goodness-of-fit test - p-value: 0.032*		

Table 4: Distribution of Histopathological Findings According to Type of Infertility

Variable	Frequency	Percentage (%)
Primary Infertility (n = 82)		
Luteal phase defect	14	17.1
Chronic endometritis	6	7.3
Secondary Infertility (n = 38)		
Luteal phase defect	4	10.5
Chronic endometritis	4	10.5
Chi-square test, **p-value:** 0.028*		

Secretory endometrium was the most common finding in both primary and secondary infertility groups. Luteal phase defect showed a higher prevalence among women with primary infertility. Chronic endometritis was more frequently observed in women with longer duration of infertility.

Discussion

Infertility evaluation requires a comprehensive approach encompassing ovulatory, tubal, uterine, and endometrial factors. Endometrial biopsy provides valuable insight into the functional status of the endometrium and remains relevant despite advancements in assisted reproductive technologies. The present study evaluated the histopathological patterns of endometrium in infertile women and correlated these findings with clinical parameters. [5]

The majority of patients in our study belonged to the 26–30-year age group, similar to findings reported by Patel et al. and Kaur et al. from Indian cohorts, reflecting the peak reproductive age at which infertility evaluation is commonly sought. Primary infertility predominated, aligning with studies by Sharma et al. and international data from Lagos et al., where primary infertility accounted for over two-thirds of cases. [6,7,8]

Secretory endometrium was the most frequent histopathological finding in our study (41.7%), comparable to observations by Doraiswami et al. and Shergill et al., who reported secretory patterns in 40–45% of infertile women. This suggests adequate ovulatory function in a significant proportion of patients, indicating the possible role of other contributing factors. [9] Proliferative endometrium was observed in 28.3% cases, indicating anovulatory cycles. Similar prevalence has been reported in Indian studies by Gupta et al. and international studies by Adekanmi et al. Anovulation remains a major contributor to infertility, particularly in women with endocrine disorders. [10,11,12]

Luteal phase defect was identified in 15% of cases, predominantly among women with primary infertility. This finding is consistent with studies by Singh et al. and Balasch et al., who emphasized inadequate progesterone response as a key implantation failure factor. Detection of luteal phase defect through biopsy allows timely hormonal correction. [13] Chronic endometritis was noted in 8.3% of cases, comparable to findings by Cicinelli et al. and Indian studies by Bhat et al. Chronic inflammation of the endometrium can adversely affect implantation and is often underdiagnosed without histopathological evaluation. Endometrial hyperplasia without atypia was identified in a small proportion of patients, similar to reports by Khan et al. Although uncommon, such findings warrant careful management due to potential progression and impact on fertility. [14,15]

The study was limited by a single-center design and lack of immunohistochemical evaluation. Long-term follow-up for fertility outcomes was not included.

Conclusion

Endometrial biopsy remains a valuable diagnostic tool in the evaluation of female infertility, particularly in identifying endometrial factors that may impair implantation. The present study highlights a wide spectrum of histopathological patterns among infertile women, with secretory endometrium being the most common finding. Luteal phase defect and chronic endometritis were significant abnormalities associated with infertility, especially in primary infertility and prolonged cases. Correlation of histopathological findings with clinical parameters enhances diagnostic accuracy and aids in individualized management. In resource-limited settings, endometrial biopsy continues to be a cost-effective and informative investigation. Incorporation of endometrial assessment into routine infertility work-up can improve diagnostic yield and guide appropriate therapeutic interventions.

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