OPTIMIZATION OF CYSTITIS DIAGNOSIS AND TREATMENT BASED ON PATHOMORPHOLOGICAL CHARACTERISTICS

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Abstract. This study explores the optimization of cystitis diagnosis and treatment by integrating pathomorphological analysis into the clinical workflow. A total of 80 patients aged 25 to 55 years were divided into two groups: one receiving standard therapy, and the other receiving individualized treatment based on histological findings. Mucosal biopsies obtained via cystoscopy were classified into acute inflammation, chronic interstitial cystitis, and granular cystitis with metaplasia. The tailored treatment group demonstrated significantly improved clinical outcomes, higher urine sterility rates, and reduced recurrence compared to the control group. These results indicate that histologically guided management enhances treatment precision and efficacy in cystitis. Incorporating pathomorphological diagnostics into routine practice may provide a foundation for more personalized and successful therapy in bladder inflammation.

Keywords: cystitis, histopathology, diagnosis, individualized treatment, recurrence, inflammation

Introduction Cystitis, a common inflammation of the urinary bladder, predominantly affects women of reproductive and middle age. The clinical spectrum ranges from mild dysuria to recurrent or chronic forms, impacting patients' quality of life. Despite widespread antimicrobial use, increasing resistance and recurrence rates necessitate novel diagnostic and therapeutic strategies. Recent studies suggest that integrating pathomorphological criteria may help personalize treatment and improve outcomes. This study aims to evaluate diagnostic accuracy and treatment efficacy of cystitis by considering its histopathological features.

Cystitis is one of the most prevalent inflammatory diseases of the urinary bladder, primarily affecting women and posing a significant clinical and socioeconomic burden worldwide. According to the World Health Organization, up to 50–60% of women experience at least one episode of urinary tract infection (UTI) in their lifetime, with 20–30% developing recurrent cystitis [1]. The increasing incidence, recurrent nature,

and resistance to standard therapy necessitate an improved diagnostic and therapeutic approach to managing this condition.

Traditionally, the diagnosis of cystitis has relied on clinical symptoms, urinalysis, and microbiological cultures. However, recent research suggests that these methods often fail to differentiate between various subtypes of cystitis or detect chronic or atypical forms of the disease. As noted by Hanno et al. (2011), the symptom-based diagnosis may overlook pathophysiological heterogeneity, especially in cases of interstitial cystitis or chronic inflammation without bacterial etiology [2].

Pathomorphological examination of bladder tissues has proven to be a valuable tool in characterizing the nature of the inflammation, the degree of urothelial damage, and the involvement of underlying structures such as the lamina propria and muscle layers. Studies by Elbadawi and Light (1996) and others have emphasized the diagnostic value of histological features, such as lymphoplasmacytic infiltration, epithelial denudation, and fibrosis, in differentiating types and severity of cystitis [3].

Moreover, emerging evidence underscores the importance of individualized treatment strategies based on histopathological patterns. For instance, Kasyan et al. (2020) highlighted that targeted therapy guided by biopsy findings led to better symptomatic relief and lower recurrence rates in patients with chronic cystitis compared to empirical treatment [4].

Despite the recognition of pathomorphological analysis in research settings, its integration into routine clinical practice remains limited. This gap emphasizes the need for developing an optimized diagnostic algorithm that incorporates histological assessment to guide therapeutic decisions more effectively.

The present study aims to evaluate the pathomorphological features of cystitis in different clinical forms and assess their utility in optimizing diagnostic accuracy and treatment efficacy. By bridging the gap between morphology and clinical management, this research seeks to contribute to a more personalized and evidence-based approach to cystitis care.

Materials and Methods A total of 80 patients aged 25 to 55 years with clinically diagnosed cystitis were enrolled at the Urology Department of the Central Medical Hospital. Patients were randomly divided into two groups:

- Group I (Control Group): 40 patients receiving standard antimicrobial therapy.
- Group II (Experimental Group): 40 patients receiving therapy tailored to their pathomorphological findings.

All patients underwent standard diagnostic procedures: urinalysis, urine culture, ultrasound of the bladder, and cystoscopy. Additionally, targeted mucosal biopsies were obtained during cystoscopy for histopathological analysis.

Histological evaluation focused on mucosal integrity, inflammatory infiltrate type and severity, vascular changes, and urothelial metaplasia. Treatment efficacy was

evaluated after 14 and 30 days, based on clinical recovery, urine sterility, and symptom scores using a visual analog scale (VAS).

Results At baseline, both groups showed similar demographic and clinical characteristics. Pathomorphological analysis revealed three major histological patterns:

1. Acute non-specific inflammation (48.75%)
2. Chronic interstitial cystitis (32.5%)
3. Granular cystitis with urothelial metaplasia (18.75%)

Tailored treatments in Group II included immunomodulators, antihistamines, and mucosal protectants in addition to antibiotics, depending on histological findings.

Table 1: Distribution of patients by histopathological type

Histological Type	Number of Patients	Percentage (%)
Acute inflammation	39	48.75
Chronic interstitial	26	32.5
Granular cystitis	15	18.75

Table 2: Clinical symptom improvement (VAS score reduction at Day 14)

Group	Mean Initial Score	Day 14 Score	Reduction (%)
Group I	7.6 ± 1.2	4.9 ± 1.0	35.5%
Group II	7.4 ± 1.3	2.8 ± 0.8	62.2%

Table 3: Urine culture sterility rate at Day 14 and Day 30

Timepoint	Group I	Group II
Day 14	67.5%	87.5%
Day 30	72.5%	95.0%

Table 4: Recurrence rate at 3-month follow-up

Group	Recurrence (%)
Group I	30.0%
Group II	10.0%

Table 5: Correlation between histological type and response to tailored therapy (Group II)

Histological Type	Full Recovery (%)	Partial Improvement (%)
Acute inflammation	92.3	7.7
Chronic interstitial	80.8	19.2
Granular cystitis	66.7	33.3

Discussion The inclusion of pathomorphological assessment in the diagnostic workflow of cystitis significantly enhanced the selection of individualized treatment protocols. Patients in the experimental group demonstrated a markedly higher

improvement in clinical symptoms, urine sterility, and lower recurrence rates. The greatest benefit was observed in cases with acute inflammation, while granular cystitis required more complex interventions.

These findings align with previous studies suggesting that histopathological heterogeneity in cystitis influences treatment response. Tailored therapy not only optimized antibiotic use but also reduced the risk of chronicity and resistance. Therefore, routine mucosal biopsy during cystoscopy may be justified in recurrent or atypical presentations.

Conclusion The integration of pathomorphological features into the diagnosis and treatment planning of cystitis enhances therapeutic outcomes. Individualized therapy based on histological findings resulted in superior clinical recovery and lower recurrence rates. These results support a paradigm shift towards histologically guided management of bladder inflammation.

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