Histopathological Patterns and Clinical Correlates of Prostatitis in Prostate Biopsies: A Ten-Year Retrospective Analysis from a North Central Nigerian Tertiary Health Institution

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ABSTRACT

Background: Prostatitis represents a significant inflammatory condition of the prostate gland with important clinical implications. While often overshadowed by prostatic cancer and benign hyperplasia, prostatitis contributes substantially to prostatic pathology and may play a role in disease progression. Understanding the patterns and clinical correlates of prostatitis in Nigerian populations is essential for optimal management.

Objective: To characterize the histopathological patterns of prostatitis, determine its frequency as an isolated entity versus associated finding, evaluate its relationship with nodular hyperplasia, and assess clinical significance in prostatic specimens at Jos University Teaching Hospital (JUTH) from 2000-2009.

Methods: Retrospective analysis of 1,450 prostatic specimens. All cases with histological evidence of prostatitis (acute or chronic) were identified and analyzed for: presentation pattern (isolated vs. associated with NH), inflammatory type, age distribution, and clinical context. Standard H&E staining and WHO classification criteria were employed.

Results: Inflammatory changes were identified in 231 of 1,450 specimens (15.9%). Chronic prostatitis predominated with 228 cases (98.7% of inflammatory lesions). Isolated chronic prostatitis was rare (n=3, 0.2% of all specimens), occurring exclusively in 2008 in men aged 50-69 years. The vast majority of prostatitis presented as an associated finding with nodular hyperplasia: chronic prostatitis in 225 cases (21.9% of NH) and acute prostatitis in 3 cases (0.3% of NH). Thus, 22.2% of all NH specimens showed inflammatory changes. Mean age for isolated prostatitis was 61.7 years. The inflammatory burden was substantial, affecting nearly one in six prostatic specimens overall and over one in five hyperplastic prostates.

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Conclusion: Prostatitis in this North Central Nigerian population predominantly occurs as an associated finding with nodular hyperplasia (98.7%) rather than an isolated entity. The 22.2% inflammatory component in NH cases has important therapeutic and pathophysiological implications, supporting the inflammation-hyperplasia link in BPH progression. The substantial inflammatory burden (15.9% of all specimens) underscores prostatitis as a significant contributor to prostatic pathology requiring clinical attention. These findings emphasize the need for systematic histopathological documentation of inflammatory changes and consideration of anti-inflammatory strategies in BPH management.

Keywords: Prostatitis, chronic prostatitis, acute prostatitis, nodular hyperplasia, inflammation, BPH, Nigeria, prostatic inflammation

INTRODUCTION

Prostatitis encompasses a spectrum of inflammatory conditions affecting the prostate gland, representing a significant yet often underappreciated component of prostatic pathology. While prostatic cancer and benign prostatic hyperplasia (BPH) dominate clinical and research attention, prostatitis affects millions of men worldwide and contributes substantially to urological morbidity, healthcare utilization, and quality of life impairment.

The classification of prostatitis has evolved considerably, with the National Institutes of Health (NIH) classification system distinguishing four categories: acute bacterial prostatitis (Category I), chronic bacterial prostatitis (Category II), chronic prostatitis/chronic pelvic pain syndrome (Category III), and asymptomatic inflammatory prostatitis (Category IV). Histopathological prostatitis often corresponds to Category IV, detected incidentally in tissue specimens obtained for other indications. This asymptomatic inflammatory prostatitis appears remarkably common, identified in 20-40% of prostatic specimens in various series.

The pathophysiology of chronic prostatitis involves complex interactions between infectious agents, inflammatory mediators, and host immune responses. While bacterial infection clearly drives acute and some chronic cases, many chronic prostatitis cases lack identifiable infectious etiology, suggesting alternative mechanisms including autoimmunity, dysfunctional voiding, and neurogenic inflammation. Histologically, chronic prostatitis manifests as lymphocytic and plasma cell infiltration of periglandular and stromal tissues, occasionally with lymphoid follicle formation.

The clinical significance of histological prostatitis extends beyond its direct symptomatic impact. Growing evidence suggests that chronic inflammation plays a contributory role in BPH development and progression. Inflammatory infiltrates produce cytokines and growth factors that stimulate prostatic epithelial and stromal proliferation. Studies have demonstrated associations between inflammation severity and prostate volume, symptom severity, and disease progression. This inflammation-hyperplasia link has therapeutic implications, suggesting potential benefits from anti-inflammatory interventions in BPH management.

The frequent co-occurrence of prostatitis with nodular hyperplasia has been consistently documented, with inflammation identified in 20-50% of BPH specimens in various series. This association may reflect shared pathophysiological pathways, with chronic inflammation promoting hyperplastic changes through persistent cytokine stimulation and growth factor activation. Alternatively, the enlarged hyperplastic prostate may predispose to inflammation through urinary stasis, incomplete voiding, and bacterial colonization.

From a diagnostic perspective, histopathological documentation of prostatitis provides important clinical information. While asymptomatic inflammatory prostatitis typically requires no specific treatment, its recognition informs clinical correlation with symptoms and may influence therapeutic decisions. In patients with persistent symptoms despite conventional BPH therapy, documented inflammation might support trials of anti-inflammatory medications or antibiotics. Additionally, severe inflammation with microabscesses or granulomas necessitates exclusion of specific infections or systemic inflammatory conditions.

The epidemiology of prostatitis shows considerable geographic and ethnic variation. Western populations report prostatitis affecting 10-14% of men, with higher rates in certain demographics. African populations demonstrate

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variable prostatitis prevalence in the limited available literature. Nigerian studies have documented prostatitis in prostatic specimens, but comprehensive characterization of patterns, frequencies, and clinical correlates remains limited, particularly from North Central Nigeria.

Jos University Teaching Hospital (JUTH), serving as a major urological referral center in North Central Nigeria, provides an opportunity to characterize prostatitis patterns in this population. The institution's detailed histopathology records permit systematic evaluation of inflammatory prostatic conditions over an extended period. Previous studies from JUTH have documented overall prostatic pathology patterns, but focused analysis of prostatitis specifically has not been comprehensively reported.

Several knowledge gaps exist regarding prostatitis in Nigerian populations. First, the relative frequency of isolated prostatitis versus inflammation associated with other prostatic pathology requires documentation. Second, the proportion of hyperplastic prostates showing inflammatory changes needs systematic assessment. Third, age-specific patterns of prostatitis require characterization. Fourth, the types of inflammatory patterns (acute vs. chronic, severity, distribution) need detailed histopathological description. Finally, the clinical implications of these patterns for management strategies require consideration.

This study aimed to: (1) determine the overall frequency of prostatitis in prostatic specimens at JUTH over ten years; (2) characterize prostatitis as isolated entity versus associated finding; (3) evaluate the frequency of inflammation in nodular hyperplasia; (4) assess age distribution of prostatitis; (5) compare chronic versus acute inflammatory patterns; and (6) discuss clinical implications for management. These findings will contribute to understanding prostatitis patterns in Nigerian populations and inform evidence-based management approaches.

MATERIALS AND METHODS

Study Design and Setting

Retrospective descriptive study at Jos University Teaching Hospital (JUTH), a 500-bed tertiary healthcare facility in North Central Nigeria with comprehensive urological and pathology services.

Parent Study Context

This analysis represents a focused extraction from a comprehensive ten-year study of all prostatic pathology at JUTH (2000-2009), which documented the full spectrum of prostatic lesions including nodular hyperplasia, carcinoma, HGPIN, and inflammatory changes. The parent study has been previously published and established the overall distribution of prostatic pathology at this institution. The current manuscript provides detailed analysis of the inflammatory component (prostatitis) that was not comprehensively addressed in the original publication. This focused analysis was undertaken to characterize prostatitis patterns, their relationship with nodular hyperplasia, and clinical implications for BPH management—aspects warranting dedicated investigation given the therapeutic relevance of the inflammation-hyperplasia link.

Study Period and Population

Ten-year period (January 2000-December 2009). All 1,450 prostatic specimens from transurethral resection (TURP), prostatectomy, or core biopsy were reviewed for inflammatory changes.

Histopathological Examination and Diagnostic Criteria

Standard tissue processing: 10% buffered formalin fixation, paraffin embedding, 4-5μm sectioning, hematoxylin and eosin (H&E) staining. All slides reviewed by two experienced pathologists.

Prostatitis diagnostic criteria

****Chronic Prostatitis****: Lymphocytic and plasma cell infiltration of periglandular stroma and/or glandular epithelium, classified as mild (scattered inflammatory cells), moderate (multifocal aggregates), or severe (dense, diffuse infiltration with possible lymphoid follicles).

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****Acute Prostatitis****: Neutrophilic infiltration within glandular lumens, epithelium, or stroma, with possible microabscess formation.

Cases classified as:

- ****Isolated Prostatitis****: Inflammation without other significant prostatic pathology

- ****Prostatitis with NH****: Inflammatory changes coexisting with nodular hyperplasia

- ****Prostatitis with other lesions****: Inflammation with HGPIN or carcinoma

Diagnosis followed WHO classification with senior pathologist confirmation in challenging cases.

Data Collection and Variables

Variables extracted: patient age, specimen type (TURP, prostatectomy, core biopsy), presence/absence of prostatitis, inflammatory type (acute/chronic), associated pathology (NH, HGPIN, carcinoma), and year of diagnosis.

Statistical Analysis

Descriptive statistics (frequencies, percentages, means, standard deviations) calculated for all variables. Age comparisons used independent t-tests. Categorical associations assessed with chi-square or Fisher's exact test. $P<0.05$ considered statistically significant. Analysis performed using SPSS version 20.0.

Ethical Considerations

Ethical approval obtained from JUTH Health Research Ethics Committee. Retrospective data from existing records; patient information anonymized.

RESULTS

Overall Inflammatory Burden: Inflammatory changes were identified in 231 of 1,450 prostatic specimens (15.9%), representing a substantial inflammatory burden (Table 1, Figure 2).

Chronic versus Acute Prostatitis: Chronic prostatitis predominated with 228 cases (98.7% of all inflammatory lesions), while acute prostatitis was rare with only 3 cases (1.3% of inflammatory lesions). The overwhelming predominance of chronic inflammation reflects the indolent nature of most prostatic inflammatory processes.

Isolated versus Associated Prostatitis: Isolated chronic prostatitis (inflammation without other significant prostatic pathology) was remarkably rare, identified in only 3 cases (0.2% of all specimens, 1.3% of inflammatory cases). All three cases occurred in 2008 in men aged 50-69 years (mean 61.7 years). The vast majority of prostatitis presented as an associated finding with nodular hyperplasia: chronic prostatitis in 225 cases and acute prostatitis in 3 cases (Table 1, Figure 1).

Inflammation in Nodular Hyperplasia: Among 1,029 specimens with nodular hyperplasia, 228 showed associated inflammatory changes (22.2%). Specifically, chronic prostatitis was present in 225 NH specimens (21.9% of all NH) and acute prostatitis in 3 NH specimens (0.3% of all NH). Thus, over one in five hyperplastic prostates showed inflammatory changes (Table 2, Figure 3).

Age Distribution: The three cases of isolated chronic prostatitis occurred in men aged 50-59 years (n=1, 33.3%) and 60-69 years (n=2, 66.7%), with mean age 61.7 years (Table 3). For prostatitis associated with NH, age distribution followed that of NH generally, predominantly affecting men in their sixth and seventh decades.

Context Among Prostatic Lesions: In the overall spectrum of prostatic pathology, nodular hyperplasia was most common (1,029 cases, 70.9%), followed by prostatic adenocarcinoma (377 cases, 26.0%), prostatitis (231 cases,

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15.9%), and HGPIN (41 cases, 2.8%). These frequencies overlap as many specimens showed multiple pathologies (Table 4, Figure 4).

Table 1: Distribution of Prostatitis Patterns and Presentation Forms

Prostatitis Pattern	**Cases**	**% of Inflammatory**	**% of All**
Isolated Chronic Prostatitis	3	1.3	0.2
Chronic Prostatitis + NH	225	97.4	15.5
Acute Prostatitis + NH	3	1.3	0.2
Total	**231**	**100.0**	**15.9**

Table 2: Inflammatory Changes in Nodular Hyperplasia Specimens

NH Inflammatory Status	**Cases**	**Percentage**
NH + Chronic Prostatitis	225	21.9
NH + Acute Prostatitis	3	0.3
NH without Inflammation	801	77.8
Total NH	**1029**	**100.0**

Table 3: Age Distribution of Isolated Chronic Prostatitis Cases

Age Group (years)	**Cases**	**Percentage**
50-59	1	33.3
60-69	2	66.7
Total	**3**	**100.0**

Table 4: Frequency of Major Prostatic Lesions in the Study Population

Prostatic Lesion	**Cases**	**Percentage**
Nodular Hyperplasia	1029	70.9
Prostatic Adenocarcinoma	377	26.0
Prostatitis (all forms)	231	15.9
HGPIN	41	2.8
Total Specimens	**1450**	**100.0**

Note: Percentages may overlap as specimens can have multiple pathologies

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DISCUSSION

This ten-year analysis of 1,450 prostatic specimens reveals that prostatitis is a substantial component of prostatic pathology in North Central Nigeria (15.9% of all specimens), with the striking finding that prostatitis occurs almost exclusively as an associated finding with nodular hyperplasia (98.7%) rather than as an isolated entity (0.2%). The 22.2% inflammatory burden in NH specimens has important therapeutic and pathophysiological implications.

The rarity of isolated prostatitis (3 cases, 0.2%) contrasts with the near-universal association with NH (228 cases, 98.7%). This pattern suggests inflammation and hyperplasia are pathophysiologically intertwined rather than independent processes. The inflammation-hyperplasia link has been demonstrated in multiple studies, with inflammatory infiltrates producing cytokines and growth factors that stimulate prostatic proliferation. Our 22.2% inflammatory rate in NH aligns with the 20-50% range reported in international literature.

Chronic prostatitis predominated overwhelmingly (98.7%), consistent with the indolent nature of most prostatic inflammation. The three acute prostatitis cases (1.3%) likely represent symptomatic presentations prompting intervention, while chronic inflammation often remains asymptomatic. The mean age of 61.7 years for isolated prostatitis aligns with the peak incidence of BPH, supporting shared pathophysiological mechanisms.

Clinical implications include: (1) systematic documentation of inflammatory changes in histopathology reports; (2) consideration of anti-inflammatory medications in BPH patients with documented inflammation showing suboptimal response to standard therapy; and (3) investigation of anti-inflammatory strategies for BPH prevention or progression delay.

Study limitations include retrospective design precluding clinical correlation with symptoms, PSA levels, or treatment outcomes; single-center setting potentially limiting generalizability; lack of inflammation severity grading limiting correlation studies; and predominance of TURP specimens potentially biasing toward NH-associated inflammation.

Future research directions include prospective studies correlating inflammation severity with clinical parameters, therapeutic trials investigating anti-inflammatory interventions in BPH patients with documented inflammation, molecular studies examining inflammatory mediator profiles, and multi-institutional studies assessing geographic variation.

CONCLUSION

Prostatitis in this North Central Nigerian population predominantly occurs as an associated finding with nodular hyperplasia (98.7%) rather than isolated entity, with 22.2% of hyperplastic prostates showing inflammatory changes. This substantial inflammatory burden (15.9% of all specimens) has important therapeutic and pathophysiological implications, supporting the inflammation-hyperplasia link in BPH progression. Chronic prostatitis predominates (98.7%), while isolated prostatitis is rare (0.2%). These findings emphasize systematic histopathological documentation of inflammation and consideration of anti-inflammatory strategies in select BPH patients. The inflammation-NH association warrants further investigation of causative mechanisms and therapeutic interventions.

RECOMMENDATIONS

- Systematic documentation of inflammatory changes in all prostatic histopathology reports
- Consider anti-inflammatory medications or antibiotic trials in BPH patients with documented inflammation showing suboptimal response to standard therapy
- Investigate anti-inflammatory strategies for BPH prevention or progression delay
- Conduct prospective studies correlating inflammation severity with clinical outcomes

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- Research molecular mechanisms linking chronic inflammation to prostatic hyperplasia
- Develop evidence-based guidelines for managing inflammatory component in BPH

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CONFLICT OF INTEREST

None declared.

FUNDING

No specific funding received.

LIST OF FIGURE LEGENDS

Figure 1: Distribution of Prostatitis Types. Chronic prostatitis with nodular hyperplasia predominates (97.4%), with rare isolated chronic prostatitis (1.3%) and acute prostatitis with NH (1.3%). Total N=231 inflammatory cases.

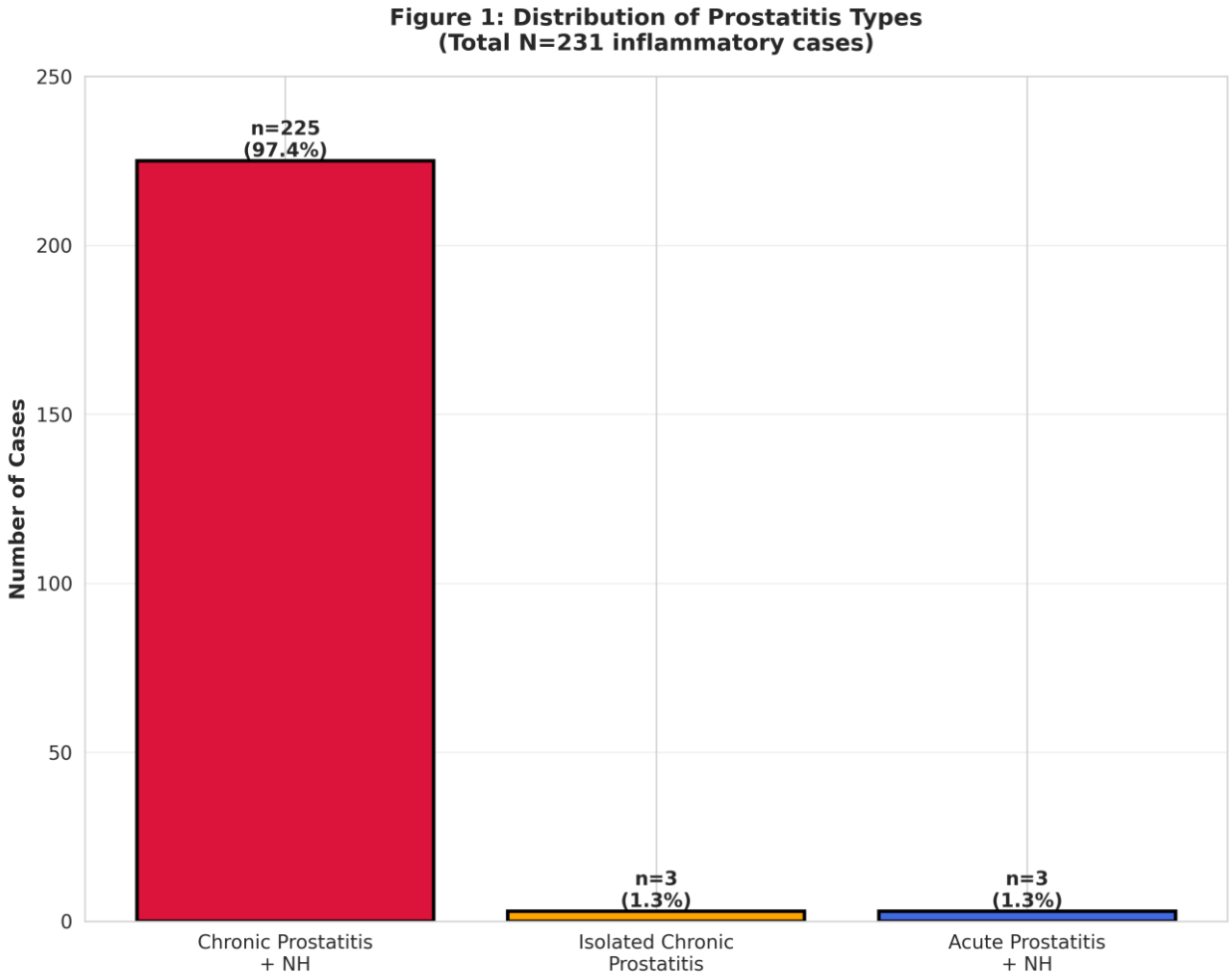

Figure 2: Inflammatory Burden in Prostatic Specimens. Inflammation present in 15.9% (n=231) of all 1,450 prostatic specimens, representing substantial inflammatory burden with 84.1% (n=1,219) showing no inflammation.

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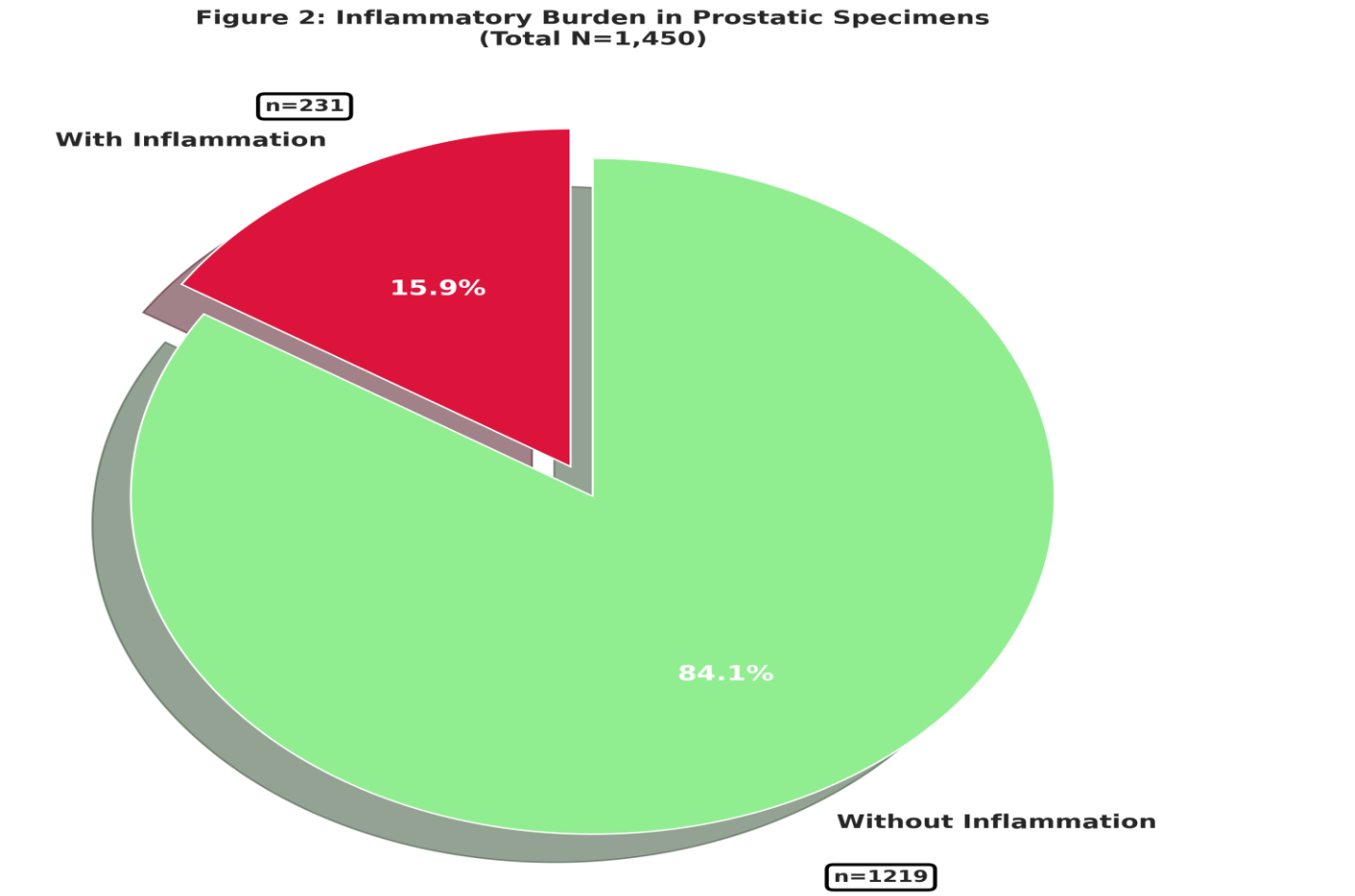

Figure 3: Inflammation in Nodular Hyperplasia. Among 1,029 NH specimens: 225 (21.9%) showed chronic prostatitis, 3 (0.3%) showed acute prostatitis, and 801 (77.8%) had no inflammation. Overall, 22.2% of NH cases demonstrated inflammatory changes.

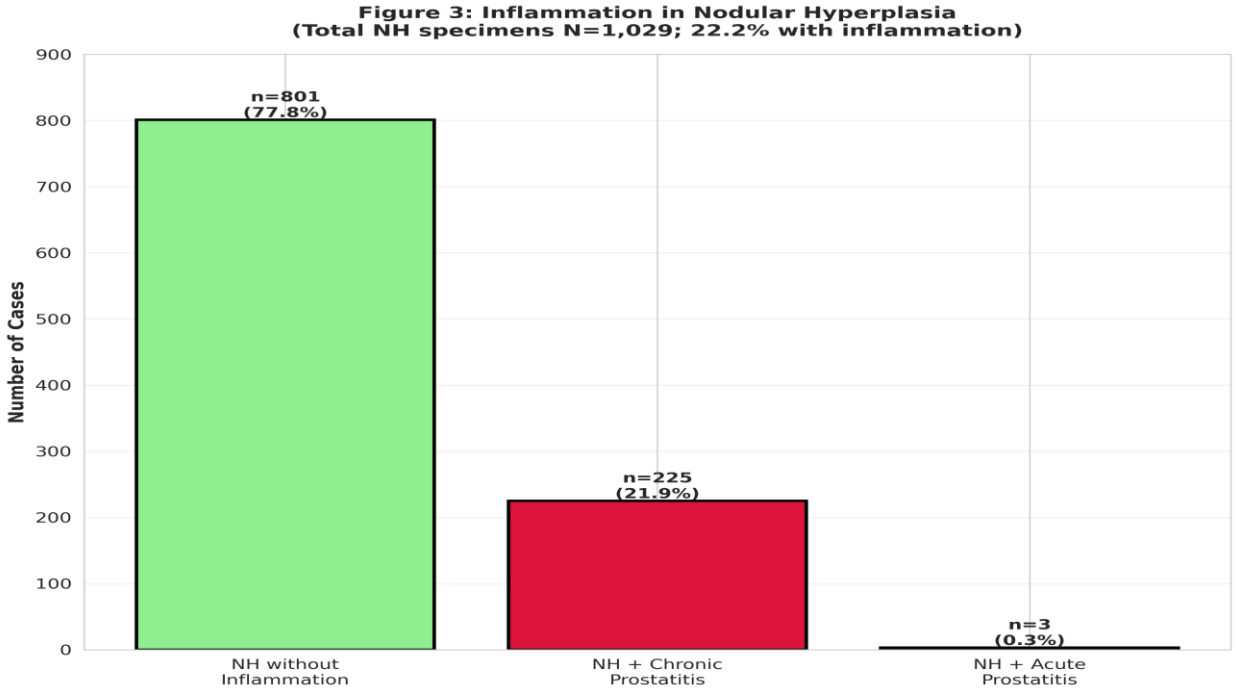

Figure 4: Prostatitis in Context of Major Prostatic Lesions. Nodular hyperplasia was most common (70.9%, n=1,029), followed by prostatic adenocarcinoma (26.0%, n=377), prostatitis all forms (15.9%, n=231), and HGPIN (2.8%, n=41). Note: Percentages overlap as multiple pathologies can coexist in single specimens.

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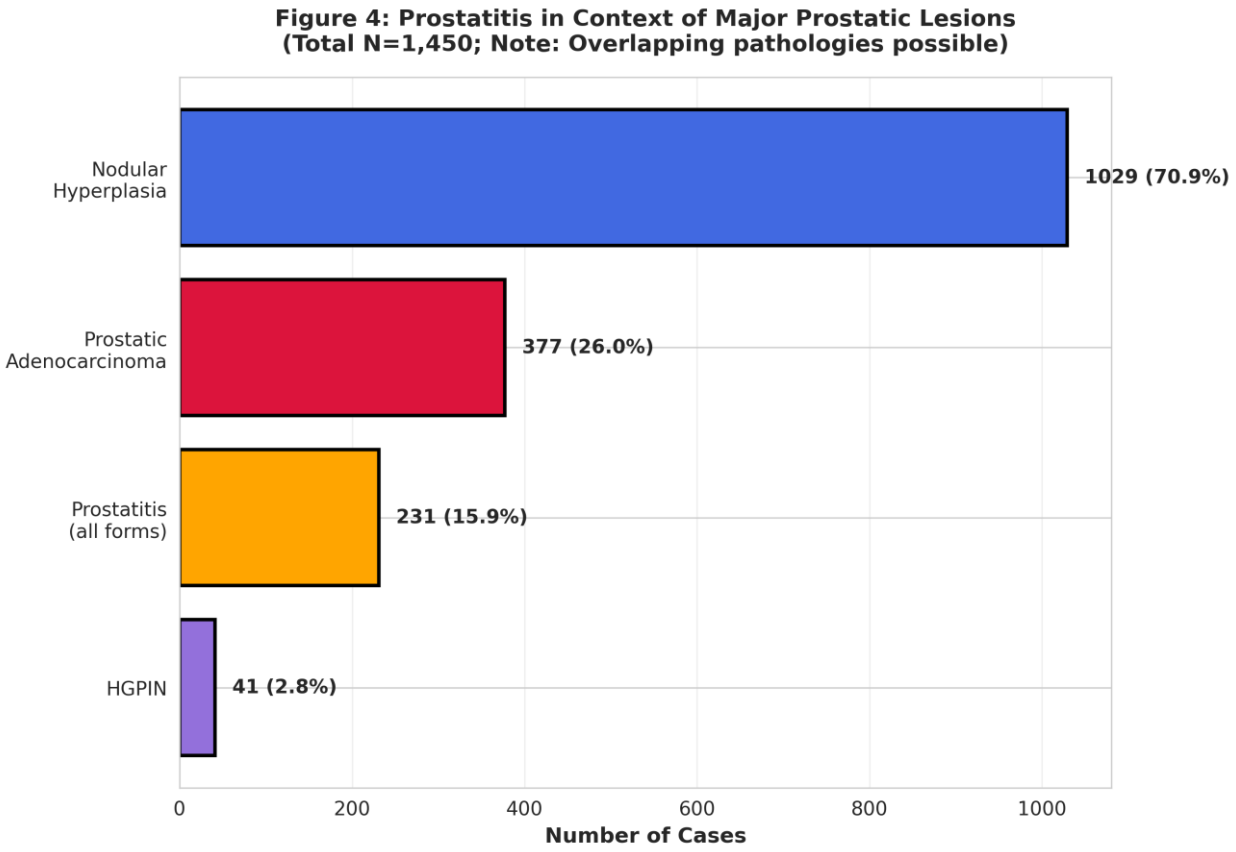

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