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RESEARCH PAPER

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Histopathological Profile of Tonsilloadenoidectomy Specimens at a West Java Tertiary Hospital: Implications for Diagnostic Pathology Practice

Ai Rizkikha Umamy, Agung Dinasti Permana, Mohammad Adithya Prawiranata, Sinta Sari Ratunanda
Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia

ABSTRACT

Histopathological examination of tonsilloadenoidectomy specimens may reveal inflammatory, infectious, and neoplastic lesions; however, the necessity and diagnostic contribution of routine histopathological assessment remain debated because most specimens show benign inflammatory changes and unexpected malignancies are uncommon. This study aimed to describe the histopathological profile of tonsilloadenoidectomy specimens at Dr. Hasan Sadikin General Hospital, West Java, Indonesia, and to evaluate its implications for diagnostic pathology practice and pathology-based laboratory data development. A descriptive cross-sectional study with a retrospective approach was conducted using medical records and histopathology reports of patients who underwent tonsilloadenoidectomy from January to December 2025. Total sampling was applied to include all eligible cases. Seventy patients were included, comprising 44 males (62.9%) and 26 females (37.1%), with the majority aged 5-10 years (44 patients, 62.9%). Concordant histopathological findings between palatine tonsils and adenoids were observed in 37 patients (52.9%), predominantly chronic nonspecific inflammation in 35 patients (50.0%). Actinomyces-associated chronic tonsillitis was identified in 17 patients (24.3%), representing the most frequent infectious finding. Malignant lesions were identified in 2 patients (2.9%), consisting of one follicular lymphoma involving both palatine tonsil and adenoid and one adenoid squamous cell carcinoma. The study provides a baseline histopathological profile from an Indonesian tertiary referral hospital and demonstrates that routine histopathological examination can identify clinically significant infectious and malignant lesions in addition to predominant inflammatory changes. These findings support the diagnostic contribution of histopathological examination and provide baseline information for strengthening diagnostic pathology services, laboratory quality improvement, and future pathology database development and digital pathology initiatives.

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CONTACT:

ai.umamy@gmail.com

I. INTRODUCTION

The palatine tonsils and adenoids are lymphoid components of Waldeyer's ring that function as the first line of mucosal immune defense by capturing inhaled and ingested antigens and initiating local immune responses through nasal-associated lymphoid tissue (NALT), including the production of immunoglobulin A (IgA) [1]. These tissues contribute to immune surveillance within the upper aerodigestive tract and play an important role in host-pathogen interactions [2], [3]. Chronic tonsillitis and adenoid hypertrophy are among the most common pathological conditions affecting Waldeyer's ring. Chronic tonsillitis is characterized by recurrent or persistent inflammation of the palatine tonsils and remains a frequent indication for surgical intervention [2]. In the United States, chronic tonsillitis affects approximately 11.7% of the population and accounts for more than 530,000 pediatric tonsillectomies annually [4]. Adenoid hypertrophy, characterized by abnormal enlargement of adenoid tissue, is a major cause of upper airway obstruction in children and may result in nasal obstruction, mouth breathing, and sleep-disordered breathing [5]. A systematic review estimated its prevalence at approximately 34.5% among children aged 5-14 years [6]. Recurrent antigenic stimulation, respiratory infections, allergic reactions, and immune dysregulation have been implicated in the development of adenotonsillar disease [1], [5].

The etiology of chronic tonsillitis and adenoid hypertrophy is multifactorial. These conditions may involve bacterial, viral, or fungal infections and exhibit varying histopathological characteristics across different patient age groups [2], [7]. In addition to infectious causes, several noninfectious factors have been associated with chronic inflammation of the upper aerodigestive tract, including allergic responses, gastroesophageal reflux, smoking exposure, and environmental irritants [8], [9].

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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Persistent inflammatory stimulation may induce lymphoid hyperplasia and tissue remodeling, contributing to disease progression and recurrence. Clinically, adenotonsillar disease has been associated with recurrent otitis media, impaired quality of life, and craniofacial developmental abnormalities, particularly among pediatric patients [10], [11]. Although these disorders predominantly affect children, adenoid hypertrophy may persist into adulthood and exhibit distinct clinicopathological characteristics [12].

Accurate evaluation of adenotonsillar disease requires integration of clinical examination, endoscopic assessment, imaging modalities, microbiological investigations, and histopathological analysis. Endoscopic examination is considered the preferred method for assessing adenoid enlargement, while radiological techniques provide complementary anatomical information [13], [14]. However, these approaches cannot fully characterize underlying tissue pathology. Histopathological examination remains an important diagnostic method for identifying inflammatory changes, microbial involvement, lymphoid hyperplasia, granulomatous reactions, and neoplastic transformation within excised specimens [15], [16]. Granulomatous inflammation may arise from infectious, autoimmune, allergic, toxic, or neoplastic processes and often requires careful clinicopathological interpretation [17], [18]. Furthermore, routine histopathological evaluation may reveal clinically occult conditions, including chronic granulomatous disease, lymphoproliferative disorders, and malignancies that are not suspected preoperatively [19], [20].

The necessity of routine histopathological examination following tonsillectomy and adenoidectomy remains debated. Several studies have questioned its cost-effectiveness because most specimens demonstrate benign inflammatory changes, whereas unexpected malignancies are relatively uncommon [21], [22]. Nevertheless, histopathological assessment may identify clinically significant findings such as actinomycotic infection, lymphoma, and carcinoma that substantially influence patient management [16]. From the perspective of Medical Laboratory Technology, histopathological examination is a fundamental component of diagnostic pathology services. Histopathological analysis supports disease confirmation, differential diagnosis, and quality assurance within pathology laboratories [23]. Recent developments in laboratory automation, digital pathology, and artificial intelligence-assisted image analysis have further expanded the role of pathology data in diagnostic practice [24], [25]. The successful implementation of these technologies relies on accurate histopathological diagnoses and standardized pathology data generated through routine laboratory practice [26], [27].

Despite the high frequency of tonsilloadenoidectomy procedures, information regarding the histopathological spectrum of tonsillar and adenoidal specimens in Indonesian tertiary referral hospitals remains limited, particularly regarding the occurrence of specific infections and unexpected malignant findings. Previous studies have primarily described the frequency and types of histopathological findings, while evidence regarding their relevance to diagnostic pathology practice and pathology-based laboratory data development in Indonesian tertiary healthcare settings remains limited. Such data are important for strengthening diagnostic pathology services, supporting evidence-based clinical management, and providing reference data for pathology laboratory quality improvement and future digital pathology development.

Therefore, this study aimed to describe the histopathological profile of tonsilloadenoidectomy specimens obtained from patients treated at Dr. Hasan Sadikin General Hospital, West Java, Indonesia, and to evaluate its implications for diagnostic pathology practice and pathology-based laboratory data development.

II. METHODS

A. Study Design and Data Collection

This study employed a descriptive cross-sectional design with a retrospective approach using medical records and histopathological reports. The study was conducted at the Department of Otorhinolaryngology-Head and Neck Surgery and the Department of Anatomical Pathology, Dr. Hasan Sadikin General Hospital, Bandung, Indonesia. The study included patients who underwent tonsilloadenoidectomy between January and December 2025. The study population consisted of all patients whose tonsillar and adenoidal specimens were submitted for histopathological examination during the study period. A total sampling technique was applied to include all eligible cases. Inclusion criteria were patients of all age groups who underwent tonsilloadenoidectomy and had complete histopathological reports and clinical information available in the medical records, including age, sex, and histopathological findings. Patients with incomplete histopathological reports, unavailable medical records, or unreadable documentation were excluded. Patients who underwent only tonsillectomy or only adenoidectomy were excluded because the study focused on paired histopathological findings of palatine tonsil and adenoid specimens obtained from the same patient. The study variables consisted of demographic characteristics (age and sex) and histopathological findings of palatine tonsil and adenoid specimens, as presented in Table 1. Histopathological diagnoses were obtained from official pathology reports issued by the Department of Anatomical Pathology.

Table 1. Study Variables, Operational Definitions, and Data Sources

Variable	Operational Definition	Data Source
Age	<5, 5-10, 11-15, 16-20, and >20 years	Medical records
Sex	Male or female	Medical records
Palatine tonsil histopathology	Final histopathological diagnosis categorized	Histopathology reports

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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Variable	Operational Definition	Data Source
	according to the diagnostic categories described in the Histopathological Data Processing section	
Adenoid histopathology	Final histopathological diagnosis categorized according to the diagnostic categories described in the Histopathological Data Processing section	Histopathology reports

B. Histopathological Data Processing

Histopathological data were retrieved from pathology archives and linked with corresponding medical records. All specimens had been processed according to the standard operating procedures of the Department of Anatomical Pathology. Surgical specimens were fixed in 10% buffered formalin, processed using routine paraffin-embedding techniques, sectioned, and stained with hematoxylin and eosin (H&E) for microscopic evaluation. Histopathological diagnoses reported by certified anatomical pathologists were extracted and categorized according to the pathological findings identified in the palatine tonsils and adenoids. Diagnostic categories included chronic nonspecific inflammation, reactive hyperplasia, adenoid hypertrophy, follicular hyperplasia, Actinomyces-associated chronic tonsillitis, lymphoma, squamous cell carcinoma, and other pathological findings documented in the pathology reports. To ensure data consistency, all extracted variables were reviewed and verified prior to analysis. Patient identifiers were removed and replaced with anonymous study codes to maintain confidentiality.

C. Data Analysis

Cases with incomplete medical records or incomplete histopathological reports were excluded during the screening process; therefore, no missing data were included in the final analysis. Data analysis was descriptive in nature and aimed to characterize the histopathological profile of tonsilloadenoidectomy specimens. Patient demographic characteristics were summarized using frequencies and percentages. Histopathological findings of palatine tonsils and adenoids were tabulated and classified according to the diagnostic categories reported in the pathology records. The distribution of histopathological findings was analyzed to identify the most common pathological patterns, including inflammatory lesions, infectious findings, reactive changes, and malignant conditions. Results were presented in tables and narrative form to describe the histopathological spectrum observed among patients undergoing tonsilloadenoidectomy at the study institution.

III. RESULTS

A total of 70 patients who underwent tonsilloadenoidectomy and fulfilled the study criteria were included in the analysis. The study population consisted of 44 males (62.9%) and 26 females (37.1%). The majority of patients were aged 5-10 years (44 patients, 62.9%), followed by those aged 16-20 years (11 patients, 15.7%). Patients aged <5 years, 11-15 years, and >20 years each accounted for 5 patients (7.1%) (Table 2).

Table 2. Distribution of Patients by Age and Sex (n = 70)

Characteristics	n	%
Sex		
Male	44	62.9
Female	26	37.1
Age		
<5 years	5	7.1
5-10 years	44	62.9
11-15 years	5	7.1
16-20 years	11	15.7
>20 years	5	7.1

Histopathological examination revealed a broad spectrum of pathological findings in paired palatine tonsil and adenoid specimens. Concordant histopathological findings between the palatine tonsils and adenoids were observed in 37 patients (52.9%). Chronic nonspecific inflammation was the most common concordant finding, identified in 35 patients (50.0%), while reactive hyperplasia and follicular lymphoma were each observed in 1 patient (1.4%). The remaining 33 patients (47.1%) showed discordant findings between the palatine tonsils and adenoids. Detailed paired histopathological diagnoses are presented in Table 3.

Table 3. Paired Histopathological Findings of Palatine Tonsil and Adenoid Specimens in Patients Undergoing Tonsilloadenoidectomy (n = 70)

Palatine Tonsils	Adenoids	n	%
Chronic nonspecific inflammation	Chronic nonspecific inflammation	35	50.0
Reactive hyperplasia	Reactive hyperplasia	1	1.4
Follicular lymphoma	Follicular lymphoma	1	1.4
Chronic bilateral tonsillitis caused by *Actinomyces* sp.	Reactive adenoid hyperplasia	7	10.0
Chronic bilateral tonsillitis with *Actinomyces* sp.	Chronic nonspecific inflammation	6	8.6

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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Palatine Tonsils	Adenoids	n	%
Chronic nonspecific inflammation	Reactive adenoid hyperplasia	6	8.6
Chronic nonspecific inflammation	Adenoid hypertrophy	5	7.1
Chronic nonspecific inflammation	Adenoid hyperplasia	2	2.9
Chronic bilateral tonsillitis caused by *Actinomyces* sp.	Reactive lymphoid adenoid	1	1.4
Chronic bilateral tonsillitis with *Actinomyces* sp.	Chronic nonspecific inflammation with hypertrophy	1	1.4
Chronic nonspecific inflammation	Squamous cell carcinoma	1	1.4
Chronic nonspecific inflammation	Reactive adenoid follicular hyperplasia	1	1.4
Chronic nonspecific inflammation	Follicular hyperplasia	1	1.4
Bilateral chronic tonsillitis caused by *Actinomyces* sp.	Adenoid hypertrophy	1	1.4
Chronic bilateral tonsillitis with *Actinomyces* sp.	Follicular hyperplasia	1	1.4

Actinomyces-associated chronic tonsillitis was identified in 17 patients (24.3%), representing the most frequent infectious finding in the study population. Malignant lesions were identified in 2 patients (2.9%), consisting of 1 case of follicular lymphoma involving both the palatine tonsil and adenoid and 1 case of squamous cell carcinoma identified in the adenoid specimen. Although inflammatory findings predominated, histopathological examination also identified infectious and malignant lesions among the tonsilloadenoidectomy specimens.

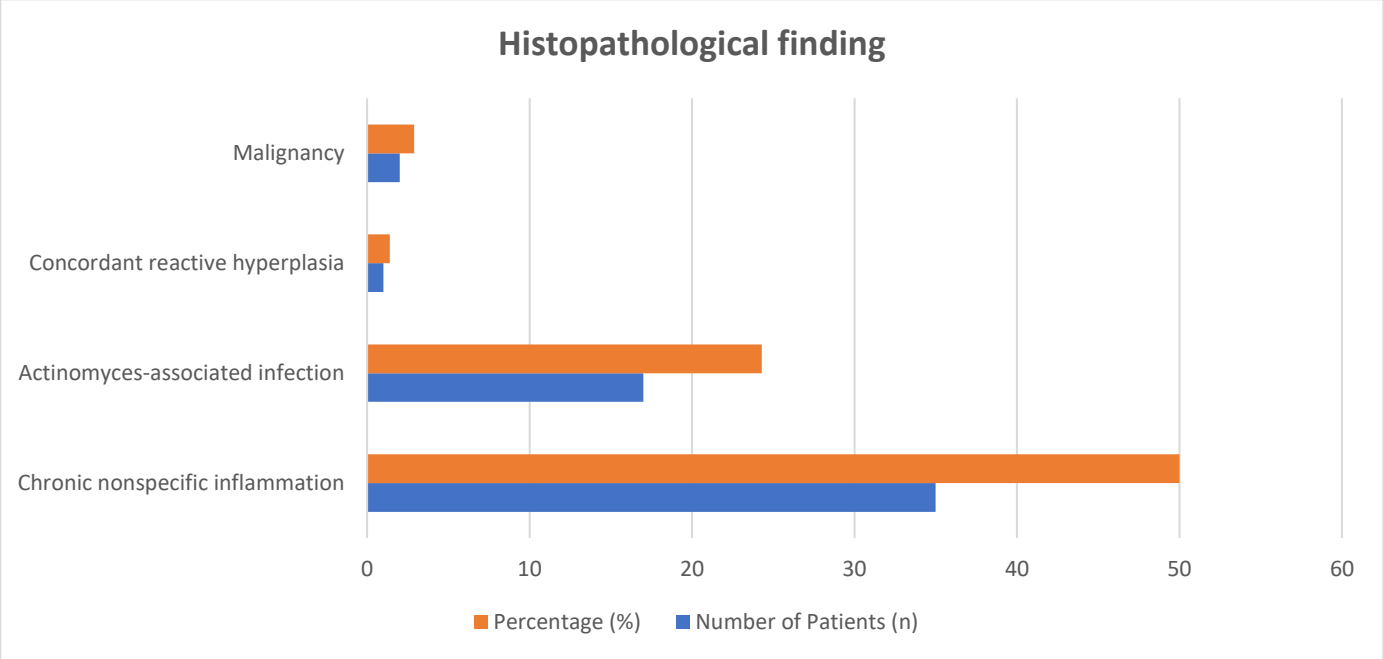


Figure 1. Distribution of Selected Histopathological Findings among 70 Patients Undergoing Tonsilloadenoidectomy

Figure 1. summarizes selected histopathological findings identified among the 70 patients. Chronic nonspecific inflammation was identified as a concordant tonsil-adenoid finding in 35 patients (50.0%), while Actinomyces-associated chronic tonsillitis was identified in 17 patients (24.3%) across the paired diagnostic findings presented in Table 3. Concordant reactive hyperplasia and malignant lesions were identified in 1 patient (1.4%) and 2 patients (2.9%), respectively. These selected findings were derived from the paired diagnoses listed in Table 3 and are not mutually exclusive. Therefore, their frequencies do not sum to the total study population.

IV. DISCUSSION

The present study demonstrated that chronic nonspecific inflammation was the predominant histopathological finding among tonsilloadenoidectomy specimens, followed by Actinomyces-associated chronic tonsillitis and a small proportion of malignant lesions. These findings indicate that chronic inflammatory processes remain the predominant pathological basis of adenotonsillar disease requiring surgical intervention and highlight the diagnostic value of histopathological examination for detecting clinically significant infectious and neoplastic lesions. The

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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predominance of chronic nonspecific inflammation observed in this study is consistent with previous reports describing chronic inflammatory changes as the most common histopathological finding in tonsillectomy and adenoidectomy specimens [2], [16]. Recurrent antigenic exposure and persistent microbial colonization may stimulate prolonged immune responses within Waldeyer's ring, leading to lymphoid hyperplasia, follicular proliferation, crypt obstruction, and chronic inflammatory remodeling [1], [8].

Waldeyer's ring functions as a specialized mucosa-associated lymphoid tissue that continuously samples inhaled and ingested antigens and initiates adaptive immune responses in the upper aerodigestive tract, making it particularly susceptible to chronic immune stimulation [28]. The tonsillar crypt system also facilitates prolonged interactions between microbial agents and immune cells, thereby promoting persistent inflammatory activity [29], [30]. Prolonged inflammatory stimulation may induce epithelial remodeling and follicular hyperplasia, contributing to disease chronicity and recurrent symptoms [31]. The predominance of patients aged 5-10 years in the present study may further explain the high frequency of inflammatory lesions, as this age group is characterized by active lymphoid tissue development and frequent upper respiratory tract infections (Niedzielski et al., 2023). An important finding of this study was the identification of Actinomyces-associated chronic tonsillitis in 17 patients (24.3%). This proportion is clinically relevant because Actinomyces may function either as a commensal organism colonizing tonsillar crypts or as a true pathogen contributing to chronic infection and tonsillar hypertrophy [33], [34]. Previous studies have reported that Actinomyces is a common constituent of the oral and oropharyngeal microbiome and may reside within tonsillar crypts without necessarily causing tissue invasion, which partly explains the ongoing debate regarding its pathogenic significance [35], [36].

Nevertheless, several investigations have demonstrated a higher prevalence of Actinomyces among patients undergoing tonsillectomy for infectious indications than for obstructive conditions, suggesting a possible association with chronic inflammatory processes of the tonsils [37]. Histopathological examination remains essential for confirming the presence of Actinomyces colonies because clinical manifestations are often nonspecific and colonies may be located deep within tonsillar crypts, making microscopic evaluation an important diagnostic approach [16], [35]. The relatively high frequency of Actinomyces identified in the present study further supports the diagnostic contribution of routine microscopic examination of tonsilloadenoidectomy specimens, particularly in patients with recurrent symptoms or persistent hypertrophy.

Although uncommon, malignant lesions were identified in two patients (2.9%), consisting of one follicular lymphoma and one adenoid squamous cell carcinoma. Similar observations have been reported in previous studies, in which unexpected malignancies were occasionally detected despite the absence of strong preoperative clinical suspicion [16], [38]. In the prospective study by Mestry et al. [16], routine histopathological examination revealed clinically significant neoplastic lesions, including non-Hodgkin lymphoma and squamous cell carcinoma, demonstrating that malignant pathology may occasionally be identified in specimens initially removed for presumed benign disease.

The identification of these lesions is clinically significant because histopathological diagnosis may directly influence subsequent management, including staging investigations, immunophenotypic analysis, oncological referral, and treatment planning. This is particularly important for lymphoid malignancies, where accurate classification frequently requires integration of histomorphological findings with ancillary studies and clinicopathological correlation [39]. Furthermore, histopathological assessment provides essential information regarding tumor type, biological behavior, and prognostic characteristics that may influence therapeutic decision-making [40], [41]. Therefore, the detection of malignancy in this cohort reinforces the role of histopathological examination as an important diagnostic safeguard extending beyond the confirmation of inflammatory disease.

From the perspective of Medical Laboratory Technology and diagnostic pathology practice, the findings of this study highlight the continuing importance of routine histopathological assessment in surgical pathology services. Histopathological examination not only supports the confirmation of clinical diagnoses but also facilitates the detection of specific infectious agents and occult neoplastic conditions that may not be apparent during clinical or radiological evaluation [23]. Histopathology provides information regarding tissue architecture, host response, microbial involvement, and disease progression that cannot be obtained through clinical assessment alone [42], [43].

The integration of histopathological findings with clinical and laboratory information supports multidisciplinary diagnostic pathways and contributes to diagnostic accuracy [41]. In addition, standardized pathology data contribute to quality assurance, laboratory performance monitoring, accreditation processes, and evidence-based healthcare services [44], [45]. Recent advances in digital pathology, whole-slide imaging, artificial intelligence-assisted diagnostics, and pathology informatics have further increased the importance of generating high-quality histopathological datasets [24], [25]. As laboratory medicine increasingly adopts digital technologies, pathology datasets generated through routine diagnostic practice may serve as valuable resources for digital archiving, automated image classification, machine-learning applications, and performance evaluation [46]. Consequently, local histopathological profiles such as those reported in the present study may contribute to future pathology database

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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development and technology-supported diagnostic pathology services in Indonesia. The strengths of this study include the use of total sampling and the inclusion of all eligible tonsilloadenoidectomy specimens examined during the 12-month study period at a major tertiary referral hospital, providing an overview of histopathological patterns encountered in routine clinical practice. However, the retrospective design limited clinicopathological correlation, while the relatively small sample size restricted subgroup analyses and may not fully represent patterns across other healthcare institutions in Indonesia. Furthermore, the study relied on archived histopathological reports rather than independent slide re-evaluation.

Future studies should incorporate larger multicenter datasets, standardized clinicopathological assessment, digital pathology integration, and computational pathology approaches to further evaluate the epidemiological and diagnostic significance of adenotonsillar lesions. Such efforts may support the development of more robust pathology databases and strengthen the implementation of technology-based diagnostic pathology services in Indonesia.

V. CONCLUSION

This study aimed to describe the histopathological profile of tonsilloadenoidectomy specimens at Dr. Hasan Sadikin General Hospital, West Java, Indonesia, and to evaluate its implications for diagnostic pathology practice and pathology-based laboratory data development. Chronic nonspecific inflammation was the predominant histopathological finding, identified in 35 patients (50.0%), followed by Actinomyces-associated chronic tonsillitis in 17 patients (24.3%) and malignant lesions in 2 patients (2.9%). Concordant histopathological findings between palatine tonsils and adenoids were observed in 37 patients (52.9%). These findings demonstrate the diagnostic contribution of routine histopathological examination in identifying inflammatory, infectious, and malignant lesions and provide baseline data for diagnostic pathology services and pathology database development. Future studies should incorporate larger multicenter datasets, standardized clinicopathological assessment, and digital or computational pathology approaches to strengthen histopathological databases and technology-supported diagnostic pathology services in Indonesia.

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Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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AUTHOR BIOGRAPHY



Ai Rizkikha Umamy is a physician with a clinical and academic interest in otorhinolaryngology–head and neck surgery. She has previously worked in the Department of Emergency at Sumedang Regional Public Hospital and is currently pursuing a residency program in Otorhinolaryngology–Head and Neck Surgery at Universitas Padjadjaran, Bandung, Indonesia. Her academic activities include clinical research, scientific writing, and the development of evidence-based approaches to patient care. She is particularly interested in integrating clinical practice with research and diagnostic evaluation in otorhinolaryngology. She believes that continuous learning is essential for professional development and strives to balance clinical responsibilities with academic writing and research activities.



Agung Dinasti Permana is an Indonesian medical academic, researcher, and senior consultant in Oncology Otorhinolaryngology–Head and Neck Surgery. He is affiliated with the Department of Otorhinolaryngology–Head and Neck Surgery, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia. His academic and clinical interests focus on otolaryngology, head and neck oncology, and the development of clinical research that may contribute to local diagnostic and therapeutic practices. He has been involved in academic activities and research aimed at improving diagnostic protocols and clinical management in ENT oncology. His professional work combines clinical expertise, academic supervision, scientific research, and contributions to the advancement of evidence-based healthcare and medical education.



Mohammad Adithya Prawiranata is a consultant in Otorhinolaryngology–Head and Neck Surgery with advanced clinical training and a particular focus on Laryngopharyngology and Bronchoesophagology. He is affiliated with the Department of Otorhinolaryngology–Head and Neck Surgery, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia, where he also contributes to medical education. His academic interests include clinical research in otorhinolaryngology, particularly disorders involving the laryngopharyngeal and bronchoesophageal regions. As a faculty member and clinical instructor, he is involved in the education and training of medical residents. His professional activities combine patient care, clinical teaching, research, and academic development within the field of otorhinolaryngology–head and neck surgery.



Sinta Sari Ratunanda is an otorhinolaryngology specialist and Consultant Rhinologist based in Bandung, West Java, Indonesia. She is affiliated with Dr. Hasan Sadikin General Hospital and the Faculty of Medicine, Universitas Padjadjaran, where she is involved in clinical practice and medical education. Her clinical specialization is in rhinology within the broader field of Otorhinolaryngology–Head and Neck Surgery. She contributes to the training of medical residents and participates in academic and professional activities related to rhinology and ENT care. Her professional interests include clinical practice, teaching, research, and the development of diagnostic and therapeutic approaches that support improved patient management in otorhinolaryngology.

Corresponding author: Ai Rizkikha Umamy, ai.umamy@gmail.com, Department of Otorhinolaryngology-Head and Neck Surgery, Universitas Padjadjaran, Bandung, Indonesia.
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