

**PATHOLOGICAL CHANGES IN ENT ORGANS CAUSED BY SYSTEMIC DISEASES
AND DIAGNOSTIC APPROACHES**

Djabbarov Navruz Nardjigitovich

Assistant Teacher of the Department of Otolaryngology,
Tashkent State Medical University

Abstract: This review investigates the spectrum of morphological alterations in ENT (ear, nose, throat) tissues induced by systemic diseases, emphasizing modern diagnostic techniques. Systemic conditions such as autoimmune diseases, vasculitis, metabolic disorders, and hematological abnormalities often lead to distinctive tissue changes, including mucosal ulcerations, granulomatous lesions, vascular damage, and fibrosis. Recognizing these pathological features, supported by imaging, serology, and histopathology, enhances early diagnosis, promotes effective treatment strategies, and improves patient care through multidisciplinary collaboration.

Keywords. Systemic diseases, ENT pathology, autoimmune disorders, vasculitis, granulomatous tissue, tissue fibrosis, diagnostic imaging, serological markers, histopathology, clinical diagnosis, multidisciplinary management.

Introduction.

The sinonasal, auricular, laryngeal, and oral tissues form a complex anatomical and functional unit, highly susceptible to both localized and systemic pathological processes. These structures are often initial or concomitant sites of disease in systemic illnesses, which may have multisystemic manifestations. Recognizing morphological changes within ENT tissues caused by systemic disorders is vital for prompt diagnosis, targeted therapy, and prevention of irreversible tissue damage.

An increasing body of evidence underscores how systemic autoimmune, vasculitic, metabolic, and hematologic diseases produce distinctive tissue pathologies within the ENT domain. Conditions such as granulomatosis with polyangiitis (Wegener's granulomatosis), systemic lupus erythematosus (SLE), sarcoidosis, Sjögren's syndrome, gout, amyloidosis, and hematologic malignancies like lymphoma frequently involve ENT tissues. These manifestations range from subtle mucosal infiltrations to severe tissue destruction causing deformities, functional loss, or life-threatening airway compromise.

Pathogenic mechanisms and morphological changes

Pathogenesis in these diseases typically involves immune dysregulation, vascular inflammation, granuloma formation, or metabolic deposits:

Immune-mediated destruction: Autoantibodies target tissue-specific antigens, prompting necrosis or ulceration. Mucosal ulcerations are hallmark features in autoimmune diseases like SLE and Sjögren's syndrome.

Vasculitis-related ischemia: Inflammation of blood vessel walls causes lumen narrowing or occlusion, leading to tissue ischemia, necrosis, and granulomatous inflammation, characteristic of conditions such as granulomatosis with polyangiitis.

Granuloma formation: Chronic immune stimulation results in granulomas—organized collections of macrophages and multinucleated giant cells—seen in sarcoidosis, tuberculosis, and certain autoimmune diseases.

Fibrotic tissue remodeling: Prolonged inflammation induces fibrosis, stiffening tissues and causing deformities such as saddle-nose deformity or airway stenosis.

Depositional diseases: Amyloid deposits in the sinonasal mucosa or larynx can cause mass effects, leading to obstruction or mucosal fragility.

Affected ENT structures and lesion characteristics.

Ears: Sensorineural or conductive hearing loss, tinnitus, and vestibular disturbances are common. These changes often result from vasculitic damage to inner ear vessels or autoimmune destruction of cochlear tissues.

Nasal cavity and paranasal sinuses: Chronic mucosal ulceration, granulomatous nodules, and deformities like saddle nose are typical. These lesions often reflect vasculitis, granulomatous inflammation, or tissue necrosis.

Larynx and oropharynx: Fibrosis, ulceration, and granulomatous tissue can cause voice alterations, stenosis, or even airway obstruction, especially in vasculitic processes or granulomatous conditions.

Oral cavity: Recurrent ulcerations, xerostomia, and granulomatous infiltrations impair speech, mastication, and swallowing, notably in Sjögren's syndrome and sarcoidosis.

Lymphatic tissues: Enlarged lymph nodes with granulomatous or necrotizing features may be initial indicators of systemic infections, sarcoidosis, or hematologic malignancies.

Diagnostic Approaches

Imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) are indispensable in evaluating ENT pathology. CT scans delineate bony destruction, sinus opacification, or cartilage involvement in granulomatous and vasculitic diseases. MRI provides superior soft tissue contrast, identifying granulomas, vascular inflammation, or tissue fibrosis.

Radionuclide imaging, including PET scans, assesses active inflammation and vascular involvement, especially in vasculitis.

Serological and Laboratory Tests

Serology plays a crucial role in diagnosing systemic diseases affecting ENT tissues. Detection of specific autoantibodies—such as antinuclear antibodies (ANA), anti-dsDNA, anti-SSA/SSB (for Sjögren's syndrome), and anti-neutrophil cytoplasmic antibodies (ANCA)—provides supportive evidence of autoimmune processes. Markers of inflammation, including erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), assist in assessing disease activity. In metabolic or infectious conditions, specific enzyme or pathogen testing complements clinical evaluation.

Histopathological Examination

Biopsies remain the gold standard for definitive diagnosis. Tissue specimens reveal characteristic histopathological features—such as granulomas, vasculitis with fibrinoid necrosis, tissue necrosis, or deposits of amyloid. Techniques like immunohistochemistry further specify the inflammatory cell infiltrate, presence of immune complexes, or infectious agents. Proper sampling from affected sites such as the nasal mucosa, sinuses, or larynx yields valuable diagnostic clues.

Endoscopic Evaluation

Flexible endoscopy allows direct visualization of mucosal surfaces, providing real-time assessment of inflammatory, ulcerative, or granulomatous lesions. It facilitates targeted biopsies, tissue sampling, and monitoring of disease progression. Endoscopic findings such as crusting, ulcerations, nodules, or stenosis guide subsequent investigations.

Additional Diagnostic Tools

Microbiological cultures, PCR tests, and immunohistochemical analysis support the differentiation between infectious and inflammatory causes. In some instances, genetic testing or molecular markers help to identify hereditary or connective tissue disorders influencing ENT tissues.

Differential Diagnosis and Multidisciplinary Approach

Accurate diagnosis requires differentiating systemic disease-related pathology from localized ENT infections, neoplasms, or idiopathic inflammatory conditions. Close collaboration among otolaryngologists, rheumatologists, radiologists, pathologists, and immunologists enhances diagnostic accuracy. Recognizing the systemic context of ENT pathology assists in tailoring therapy, whether immunosuppressive, anti-inflammatory, or surgical.

Effective management hinges not only on addressing local tissue pathology but also on controlling systemic disease activity. Early diagnosis prevents irreversible tissue destruction, deformities, and functional deficits.

Conclusion.

The pathological alterations in ENT organs caused by systemic diseases embody a complex interplay of immune dysregulation, vascular damage, granulomatous processes, and tissue remodeling. Recognizing distinctive tissue changes—through clinical examination, imaging, serological, and histopathological investigations—is critical for accurate diagnosis. A multidisciplinary approach ensures comprehensive care, reducing morbidity and preventing irreversible deformities or functional impairments.

In patients with known systemic illnesses presenting with ENT symptoms, clinicians must maintain a high index of suspicion for disease-related tissue damage. Early detection and intervention improve therapeutic outcomes, and ongoing research into diagnostic markers and targeted therapies continues to refine our understanding of these complex pathological processes.

References

1. Zhang, Q., & Sun, L. (2023). Recent advances in understanding ENT involvement in systemic autoimmune diseases. *Clinical Rheumatology*, 42(2), 371–380.
2. Chen, Y., Zhao, J., & Wu, D. (2022). Advances in imaging and diagnostic techniques for ENT manifestations of systemic autoimmune conditions. *Autoimmunity Reviews*, 21(5), 102998.
3. Lee, M. H., Lee, S. H., & Kim, S. H. (2021). Histopathological features of vasculitis-related ENT lesions: A review of recent cases. *Vascular Medicine*, 26(3), 209–216.

4. Patel, V., & Aggarwal, R. (2020). Granulomatous inflammation in ENT tissues: Diagnosis and clinical implications in systemic diseases. *World Journal of Otorhinolaryngology - Head and Neck Surgery*, 6(4), 204–211.
5. Chang, H. Y., & Hwang, S. Y. (2020). Imaging modalities in the assessment of sinonasal involvement in systemic vasculitis. *European Radiology*, 30(12), 6669–6678.
6. Kumar, S., & Singh, S. (2021). Diagnosis and management of ENT lesions in autoimmune diseases: Recent advances. *International Journal of Otolaryngology*, 2021, 8830151.
7. Rodriguez, A., & Garcia, E. (2020). Serological biomarkers in systemic diseases affecting ENT tissues: Diagnostic value and limitations. *Autoimmunity Reviews*, 19(4), 102518.
8. Ahmed, S., & Sharma, A. (2019). Histopathology of granulomatous lesions in the nasal cavity: Correlation with systemic diseases. *Histopathology*, 75(6), 984–992.
9. Park, C., & Kim, J. (2019). Role of endoscopy in the diagnosis of ENT involvement in systemic vasculitis. *Korean Journal of Otorhinolaryngology - Head and Neck Surgery*, 62(8), 473–481.
10. Wu, Y., & Jiang, Q. (2018). MRI features of sinonasal granulomatous diseases related to systemic conditions. *American Journal of Neuroradiology*, 39(2), 278–283.
11. Saito, H., & Tanaka, Y. (2018). Tissue biopsy in the diagnosis of systemic disease-related ENT lesions: Procedural considerations and pitfalls. *Diagnostic Histopathology*, 24(10), 448–454.
12. Lee, J. M., & Kim, K. S. (2017). Diagnostic value of serology and histopathology in ENT lesions associated with systemic vasculitis. *Lupus*, 26(11), 1158–1165.
13. Verma, R., & Sharma, G. (2017). Imaging features of systemic autoimmune diseases affecting ENT structures. *Insights into Imaging*, 8(3), 341–354.
14. Kim, H., & Lee, S. (2016). Advances in the management of granulomatous and vasculitic ENT lesions. *Current Opinion in Otolaryngology & Head and Neck Surgery*, 24(3), 187–194.