Sarcouncil Journal of Medical Series

ISSN(Online): 2945-3550

Volume- 05| Issue- 04| 2026

Research Article **Received:** 05-03-2026 | **Accepted:** 30-03-2026 | **Published:** 26-04-2026

Nasal and Sinonasal Manifestations of Rheumatologic and Inflammatory Diseases: Bridging Internal Medicine and Otolaryngology

Dr. Sumaya Imad Oleiwi[1], Dr. Tahseen Falih Younis Alabood[2] and Dr. Harith Abbas Hadi Bahader[3]

[1]M.B.Ch.B., F.I.C.M.S. (ENT), Specialist in Otolaryngology, Iraqi Ministry of Health, Al-Karkh Health Directorate, Children's Central Teaching Hospital in Baghdad, Iraq.

[2]M.B.Ch.B., D.M. (Internal Medicine), Iraqi Ministry of Health, Nasiriyah Health Directorate, Al-Shatra General Hospital, Department of Medicine, Nasiriyah, Iraq.

[3]M.B.Ch.B., A.B.H.S. \ (Internal Medicine), Iraqi Ministry of Health, Al-Karkh Health Directorate, Al-Kadhimiya Teaching Hospital, Department of Medicine, Baghdad, Iraq.

Abstract: Background: Rheumatologic and systemic inflammatory diseases often have nasal and sinonasal manifestations that are either early diagnostic manifestations or major disease morbidity. The crossroads between otolaryngology and internal medicine in the treatment of these disorders is under-researched in clinical practice. Purpose: To describe the range of nasal and sinonasal manifestations in patients with known rheumatologic and inflammatory diseases, assess their frequency, clinical relevance, and relationship with the disease activity, and to develop a model of interdisciplinary cooperation between internal medicine and otolaryngology. Methods: The study involved a prospective cross-sectional study that was carried out at the Department of Otolaryngology and Rheumatology between January 2022 and December 2024. Eighty-six (86) patients who had rheumatologic or systemic inflammatory diseases were enrolled. Every patient was thoroughly assessed with otolaryngologic examination of the nasal endoscopy, paranasal sinuses computed tomography (CT), mucosal biopsy in case of need, and approved symptom questionnaires (SNOT-22). Standardized indices such as BVAS (Birmingham Vasculitis Activity Score), DAS28 (Disease Activity Score-28), and SLEDAI (Systemic Lupus Erythematosus Disease Activity Index) were used to measure disease activity. This was done systematically through histopathological analysis, immunological markers, and radiological grading (Lund-Mackay scoring system). Findings: The underlying diagnoses most frequently found in the 86 patients (mean age 47.3 +/- 14.2 years; 58 females, 28 males) were granulomatosis with polyangi The most common symptom was nasal crusting (68.6%), nasal obstruction (62.8%), epistaxis (47.7%), anosmia/hyposmia (38.4%), and saddle nose deformity (15.1%). In 31.4, sinonasal involvement was a precursory of systemic diagnosis. There were also significant correlations between disease activity scores and SNOT-22 scores ($r=0.72$, $p<0.001$). The highest mean Lund-Mackay CT scores were in GPA patients (14.8 ± 4.2) and EGPA patients (13.6 ± 3.8). The histopathological results indicated granulomatous. Conclusions: Nasal and sinonasal presentation is very common in rheumatologic and inflammatory diseases and can be used as sentinel symptoms of the disease. Early otolaryngologic screening of suspected or confirmed rheumatologic patients helps in the timely diagnosis, minimizes diagnostic delay, and enhances patient clinical outcomes. The combination of interdisciplinary internal medicine and otolaryngology approach is necessary to treat patients optimally.

Keywords: Nasal and Sinonasal, Manifestations, Internal, Medicine, Otolaryngology, SLEDAI, obstruction, CT, GPA.

INTRODUCTION

These phenotypes are not only frequent and clinically difficult but also tend to enlighten the underlying systemic inflammatory events that promote a variety of rheumatologic diseases [Knowles, M. R. *et al*., 2013]. A combined knowledge of pathophysiology, clinical manifestation, diagnostic methods, and therapeutic implications is vital to prompt recognition, correct diagnosis, and proper treatment [Mirra, V. *et al*., 2017; Cant, E. *et al*., 2024]. The purpose of this introduction is to define the clinical importance of nasal and sinonasal involvement in rheumatologic and inflammatory diseases, describe the most frequent diseases, and emphasize the importance of a multidisciplinary method in the improvement of patient outcomes. [Bergström, S. E. *et al*., 2012; Boon, M. *et al*., 2013] Naresal and sinonasal tissues are involved in the identical immune cascades that mediate peripheral disease in most rheumatologic diseases. Local symptoms can be antecedent, concomitant, or subsequent to systemic symptoms. They can have a serious effect on quality of life because of persistent nasal congestion, epistaxis, sinusitis, crusting, rhinorrhea, and loss of smell. The activity of the disease process as a whole may be reflected by inflammatory and autoimmune processes of the sinonasal mucosa, providing a special, convenient location to evaluate and, in certain instances, biomarker information. Granulomatitis with polyangiitis (GPA, formerly Wegener granulomatosis) and systemic granulomatous diseases hold a special place among the rheumatologic diseases that are characterized by strong involvement of the nose or sinuses [Lavoie, V. *et al*., 2025; Günaydın, R. Ö. *Et al*., 2023; Lam, Y. T. *et al*., 2023]. Characteristics of GPA include sinonasal crusting, chronic sinusitis, destruction of

***Corresponding Author:** Dr. Sumaya Imad Oleiwi

DOI- https://doi.org/10.5281/zenodo.19795541

nasal cartilage, subglottic stenosis, and otologic pathology. These characteristics can be the beginning of a larger vasculitic disease of the kidneys, lungs, and joints. [Alexandru, M. *et al*., 2023; Benchimol, L. *et al*., 2024] The sinonasal manifestations frequently lead to initial care and may represent the most apparent sign of disease activity, influencing early therapeutic choices with the potential to change disease courses. The nasal cavity and paranasal sinuses may also be involved in other vasculitides and granulomatous diseases, including eosinophilic granulomatosis with polyangiitis (EGPA) and sarcoidosis, with unique histopathologic appearances, imaging appearances, and treatment considerations. [Page, M. J. *et al*., 2021; Guo, Z. *et al*., 2020] Immune-mediated processes, e.g. rheumatoid arthritis, systemic lupus erythematosus, Sjogren syndrome Granulomatous diseases associated with chronic inflammation, e.g. chronic granulomatous disease in exceptional overlaps, or immune-mediated processes, e.g. nasal polyps in chronic rhinosinusitis, can cause nasal dryness Nares and sinus tissue involvement in IgG4-related disease can be in the form of mass lesions or as chronic inflammatory changes, which is a wider range of organ involvement where Chronic rhinosinusitis (CRS) is a comorbidity that is prevalent in patients with inflammatory and autoimmune conditions, and that often has a refractory course in the presence of systemic inflammation as well as Imaging, especially computed tomography (CT) and magnetic resonance imaging (MRI) outlines the sinus opacification, bone destruction [Guan, Y. *et al*., 2021; Legendre, M. *et al*., 2022], osteitis, and soft tissue involvement, which is used in the differentiation diagnosis and treatment planning. Laboratory tests such as antineutrophil cytoplasmic antibodies (ANCA), inflammatory, immunoglobulin, and disease-specific autoantibodies are important indications of systemic involvement and disease activity. Histopathological verification through biopsy is the gold standard in the differentiation between granulomatous inflammation, necrotizing vasculitis, and other tissue-specific patterns and infectious or neoplastic processes in a few instances. The overall goal of management is to control systemic inflammation and treat local sinonasal disease in order to relieve symptoms, maintain function, and avoid complications like orbital or intracranial extension [Lyu, H. *et al*., 2022]. Therapies can be topical, infectious overlays treated with antibiotics, corticosteroids, immunomodulatory (methotrexate, azathioprine, mycophenolate mofetil), biologics (rituximab, TNF inhibitors, IL-6 inhibitors, and targeted based on the disease), and surgical (refractory CRS or structural complications). The therapy should be selected to weigh the disease control against possible side effects, risk of infection and the individual patient factors like comorbidities, prior treatment history, and the fertility of the patient where this aims to This background discussion preludes the discussion of the continuum of sinonasal involvement, the most effective methods of diagnosis and treatment in modern practice, and the future directions that promise to bring about better patient care.

MATERIAL AND METHOD

This is a prospective cross-sectional study that will be carried out in the Departments of Otolaryngology-Head and Neck Surgery and Rheumatology in a tertiary academic medical center, between January 2022 and December 2025 collected from different hospitals from Iraq All participants gave written informed consent before being enrolled in the study. The protocol was approved by the Institutional Review Board. Eighty-six patients who had a confirmed diagnosis of rheumatologic or systemic inflammatory diseases were recruited sequentially. Eligible participants were adults aged 18 years or older with a previously known diagnosis of a rheumatologic or systemic inflammatory condition using internationally accepted classification criteria that include the ACR/EULAR criteria of granulomatosis with polyangiitis (GPA). Patients were also excluded in case of isolated allergic rhinitis or chronic rhinosinusitis without underlying systemic disease, active malignancy of the sinonasal tract, had undergone sinonasal surgery within six months of study, or could not tolerate nasal endoscopy and computed tomography scans.

Each of the participants received a detailed rheumatologic evaluation that involved a thorough medical history, physical examination, and disease activity measurement using validated measures specific to their diagnosis: the Birmingham Vasculitis Activity Score (BVAS) in patients with vasculitis (GPA and EGPA), the Disease Activity Score-28 (DAS28) in patients with rheumatoid arthritis, the Systemic Lupus At the same time, a standardized otolaryngologic examination was

Publisher: SARC Publisher

done to all patients by two senior otolaryngologists who were not aware of the rheumatologic disease activity scores. This assessment was initiated by assessing the symptoms according to the Sino-Nasal Outcome Test-22 (SNOT-22) and was complemented by the documentation of specific symptoms such as unilateral or bilateral nasal obstruction, nasal crusting, epistaxis (with a focus on frequency and severity), rhinorrhea with the description of serous, mucopurulent, or bloody, facial pain Topical decongestion was then applied with oxymetazoline 0.05% and anesthesia with lidocaine 4% followed by anterior rhinoscopy and rigid nasal endoscopy using 0.05° and 30.0 Hopkins rod endoscopes. Endoscopic observations were documented in a systematic manner and included mucosal appearance (erythema, edema, granularity, ulceration, or crusting), septal status (perforation, deviation, or granulation tissue), turbinate morphology, presence of synechiae and pathology in the middle meatus or sphenoethmoidal recess and the Lund-Kennedy endoscop Non-contrast computed tomography of the paranasal sinuses were also performed in axial and coronal planes with 1-mm slices on all patients. Radiological severity was assessed with the Lund-Mackay scoring system, which provides a score of 0-24 based on bilateral evaluation of each sinus group (maxillary, anterior ethmoid, posterior ethmoid, sphenoid, frontal). Statistical tests were carried out in SPSS version 22.0. Continuous variables were presented in the form of mean + standard deviation or median with interquartile range based on normality, as indicated by the Shapiro-Wilk test, whereas categorical variables were presented as frequencies and percentages.

Publisher: SARC Publisher

RESULTS

Table 1: Describe results: Demographic and Baseline Clinical Characteristics of 86 Patients Stratified by Underlying Rheumatologic Disease

Parameter	GPA (n=24)	SLE (n=18)	RA (n=15)	EGPA (n=10)	RP (n=10)	Sarcoido sis (n=9)	Total (N=86)	p- value
Age, years (mean ± SD)	49.1 ±13.8	38.6 ± 11.4	56.2 ± 12.1	44.7 ± 15.3	48.9 ± 14.6	51.3 ±16.2	47.3 ±14.2	0.012*
Female, n (%)	14 (58.3)	15 (83.3)	11 (73.3)	6 (60.0)	6 (60.0)	6 (66.7)	58 (67.4)	0.43 8
Male, n (%)	10 (41.7)	3 (16.7)	4 (26.7)	4 (40.0)	4 (40.0)	3 (33.3)	28 (32.6)	—
Disease duration, years (mean ± SD)	6.2 ± 4.8	7.1 ± 5.2	8.4 ± 5.1	4.3 ± 3.2	3.9 ± 2.8	4.1 ± 3.6	5.8 ± 4.6	0.03 8*
BMI, kg/m² (mean ± SD)	25.4 ± 4.1	24.8 ± 3.9	27.1 ± 4.6	26.3 ± 3.7	24.2 ± 3.5	25.9 ± 4.3	25.6 ± 4.1	0.52 1
Smoking history, n (%)	7 (29.2)	3 (16.7)	5 (33.3)	2 (20.0)	3 (30.0)	2 (22.2)	22 (25.6)	0.78 2
Sinonasal symptoms as initial presentation, n (%)	14(58.3)	2(11.1)	1(6.7)	5 (50.0)	3 (30.0)	2 (22.2)	27 (31.4)	<0.0 01*
ANCA positivity (c- ANCA/PR3), n (%)	21 (87.5)	0 (0)	0 (0)	2 (20.0)	0 (0)	0 (0)	23 (26.7)	<0.0 01*
ANCA positivity (p- ANCA/MPO), n (%)	2 (8.3)	0 (0)	0 (0)	7 (70.0)	0 (0)	0 (0)	9 (10.5)	<0.0 01*
ESR, mm/h (mean ± SD)	48.6 ± 22.4	38.2 ± 18.6	32.4 ± 16.8	42.1 ± 20.3	35.7 ± 19.1	28.6 ± 14.2	39.1 ± 19.8	0.04 6*
CRP, mg/L (mean ± SD)	28.4 ± 18.6	14.2 ± 12.4	18.6 ± 14.2	22.8 ± 16.4	16.4 ± 11.8	12.8 ± 9.6	20.4 ± 15.6	0.02 4*
Current immunosuppressive therapy, n (%)	22 (91.7)	16 (88.9)	13 (86.7)	9 (90.0)	8 (80.0)	7 (77.8)	75 (87.2)	0.81 2

Table 2: Outcomes by Prevalence of Sinonasal Symptoms Stratified by Underlying Rheumatologic Disease

Sinonasal Symptom	GPA (n=24)	SLE (n=18)	RA (n=15)	EGPA (n=10)	RP (n=10)	Sarcoido sis (n=9)	Total (N=86)	p- value
Nasal crusting, n (%)	22 (91.7)	9 (50.0)	7 (46.7)	8 (80.0)	7 (70.0)	6 (66.7)	59 (68.6)	0.00 6*
Nasal obstruction, n (%)	18	10	6	8 (80.0)	7	5 (55.6)	54	0.11

Publisher: SARC Publisher

	(75.0)	(55.6)	(40.0)		(70.0)		(62.8)	8
Epistaxis, n (%)	19 (79.2)	6 (33.3)	3 (20.0)	5 (50.0)	5 (50.0)	3 (33.3)	41 (47.7)	0.001*
Rhinorrhea	16	5	4	7 (70.0)	3	3 (33.3)	38	0.00
(mucopurulent/bloody	(66.7)	(27.8)	(26.7)		(30.0)		(44.2)	8*
), n (%)								
Anosmia/Hyposmia, n	12	5	4	7 (70.0)	3	2 (22.2)	33	0.04
(%)	(50.0)	(27.8)	(26.7)		(30.0)		(38.4)	8*
Facial pain/pressure, n	10	6	4	5 (50.0)	2	2 (22.2)	29	0.54
(%)	(41.7)	(33.3)	(26.7)		(20.0)		(33.7)	2
Saddle nose deformity, n (%)	8 (33.3)	0 (0)	0 (0)	0 (0)	5 (50.0)	0 (0)	13 (15.1)	<0.001*
Nasal septal perforation, n (%)	12 (50.0)	2 (11.1)	1 (6.7)	1 (10.0)	2 (20.0)	1 (11.1)	19 (22.1)	0.002*
Synechiae, n (%)	9 (37.5)	2 (11.1)	1 (6.7)	3 (30.0)	1 (10.0)	1 (11.1)	17 (19.8)	0.048*
Hyponasal voice, n (%)	6 (25.0)	3 (16.7)	2 (13.3)	4 (40.0)	3 (30.0)	2 (22.2)	20 (23.3)	0.486
Mean SNOT-22 score (mean ± SD)	52.4 ± 18.6	28.6 ± 14.2	22.4 ± 12.8	46.8 ± 16.4	38.2 ± 15.6	26.4 ± 13.8	37.8 ± 18.2	<0.001*

Table 3: Findings of Endoscopic and Radiological Stratified by Underlying Rheumatologic Disease (N=86)

Endoscopic Findings	GPA (n=24)	SLE (n=18)	RA (n=15)	EGPA (n=10)	RP (n=10)	Sarcoidosis (n=9)	Total (N=86)	p-value
Mucosal erythema/edema, n (%)	23 (95.8)	12 (66.7)	10 (66.7)	9 (90.0)	8 (80.0)	7 (77.8)	69 (80.2)	0.062
Mucosal crusting, n (%)	22 (91.7)	9 (50.0)	7 (46.7)	8 (80.0)	7 (70.0)	6 (66.7)	59 (68.6)	0.006*
Granulation tissue, n (%)	16 (66.7)	2 (11.1)	1 (6.7)	4 (40.0)	3 (30.0)	6 (66.7)	32 (37.2)	<0.001*
Mucosal ulceration, n (%)	14 (58.3)	3 (16.7)	1 (6.7)	2 (20.0)	2 (20.0)	2 (22.2)	24 (27.9)	0.001*
Nasal polyps, n (%)	3	1 (5.6)	1 (6.7)	9 (90.0)	1	5 (55.6)	20	<0.0

Publisher: SARC Publisher

	(12.5)				(10.0)		(23.3)	01*
Septal perforation, n (%)	12 (50.0)	2 (11.1)	1 (6.7)	1 (10.0)	2 (20.0)	1 (11.1)	19 (22.1)	0.002*
Turbinate hypertrophy, n (%)	8 (33.3)	7 (38.9)	5 (33.3)	8 (80.0)	4 (40.0)	4 (44.4)	36 (41.9)	0.098
Synechiae, n (%)	9 (37.5)	2 (11.1)	1 (6.7)	3 (30.0)	1 (10.0)	1 (11.1)	17 (19.8)	0.048*
Lund-Kennedy score (mean ± SD)	8.6 ± 3.2	4.2 ± 2.4	3.4 ± 2.1	7.8 ± 2.8	5.6 ± 2.6	5.2 ± 2.8	5.9 ± 3.2	<0.001*
Radiological Findings (CT)								
Lund-Mackay score (mean ± SD)	14.8 ± 4.2	6.4 ± 3.8	4.8 ± 3.2	13.6 ± 3.8	8.2 ± 4.1	7.6 ± 3.6	9.6 ± 5.4	<0.001*
Maxillary sinus opacification, n (%)	20 (83.3)	10 (55.6)	7 (46.7)	9 (90.0)	6 (60.0)	6 (66.7)	58 (67.4)	0.036*
Ethmoid sinus opacification, n (%)	21 (87.5)	8 (44.4)	5 (33.3)	9 (90.0)	5 (50.0)	7 (77.8)	55 (64.0)	<0.001*
Frontal sinus opacification, n (%)	12 (50.0)	4 (22.2)	2 (13.3)	6 (60.0)	3 (30.0)	3 (33.3)	30 (34.9)	0.038*
Sphenoid sinus opacification, n (%)	14 (58.3)	3 (16.7)	2 (13.3)	5 (50.0)	3 (30.0)	2 (22.2)	29 (33.7)	0.004*
Bony erosion/destruction, n (%)	10 (41.7)	0 (0)	0 (0)	1 (10.0)	3 (30.0)	1 (11.1)	15 (17.4)	<0.001*
Ostiomeatal complex obstruction, n (%)	16 (66.7)	8 (44.4)	5 (33.3)	8 (80.0)	4 (40.0)	5 (55.6)	46 (53.5)	0.062

Table 4: Describe results according to Histopathological Findings of Nasal Mucosal Biopsies Stratified by Underlying Rheumatologic Disease (n=72 biopsied patients)

Histopathological Finding	GPA (n=23)	SLE (n=12)	RA (n=10)	EGPA (n=10)	RP (n=9)	Sarcoidosis (n=8)	Total (n=72)	p-value
Primary Histological Pattern								
Necrotizing granulomatous inflammation, n (%)	18 (78.3)	0 (0)	0 (0)	1 (10.0)	0 (0)	0 (0)	19 (26.4)	<0.001*
Non-necrotizing granulomas, n (%)	2 (8.7)	0 (0)	0 (0)	0 (0)	0 (0)	7 (87.5)	9	<0.0

Publisher: SARC Publisher

							(12.5)	01*
Eosinophilic infiltration (>20 eos/HPF), n (%)	1 (4.3)	1 (8.3)	0 (0)	9 (90.0)	0 (0)	1 (12.5)	12 (16.7)	<0.001*
Small-vessel vasculitis, n (%)	10 (43.5)	2 (16.7)	0 (0)	4 (40.0)	0 (0)	0 (0)	16 (22.2)	0.003*
Fibrinoid necrosis, n (%)	8 (34.8)	1 (8.3)	0 (0)	2 (20.0)	0 (0)	0 (0)	11 (15.3)	0.01*
Chondritis/perichondritis, n (%)	0 (0)	0 (0)	0 (0)	0 (0)	7(77.8)	0 (0)	7 (9.7)	<0.001*
Non-specific chronic inflammation, n (%)	2 (8.7)	8 (66.7)	9 (90.0)	1 (10.0)	2 (22.2)	1 (12.5)	23 (31.9)	<0.001*
Mucosal atrophy, n (%)	6 (26.1)	4 (33.3)	5 (50.0)	1 (10.0)	2 (22.2)	1 (12.5)	19 (26.4)	0.186
Immunohistochemistry								
CD68+ macrophage predominance, n (%)	16 (69.6)	3 (25.0)	2 (20.0)	3 (30.0)	2 (22.2)	7 (87.5)	33 (45.8)	<0.001*
CD3+ T-lymphocyte predominance, n (%)	14 (60.9)	8 (66.7)	6 (60.0)	5 (50.0)	6 (66.7)	5 (62.5)	44 (61.1)	0.942
IgG4+ plasma cells (>10/HPF), n (%)	3 (13.0)	1 (8.3)	1 (10.0)	0 (0)	0 (0)	0 (0)	5 (6.9)	0.624
Eosinophil count/HPF (mean ± SD)	6.2 ± 4.8	4.1 ± 3.2	3.2 ± 2.4	42.6 ± 18.4	4.8 ± 3.6	5.4 ± 4.2	11.8 ± 15.6	<0.001*
Diagnostic Yield								
Biopsy consistent with systemic diagnosis, n (%)	20 (87.0)	3 (25.0)	1 (10.0)	9 (90.0)	7 (77.8)	7 (87.5)	47 (65.3)	<0.001*

Table 5: Final Correlation Between Disease Activity Indices and Sinonasal Severity Measures (N=86)

Disease Group	Disease	Mean	Mean	Correlation	p-	Mean	Correlation	p-	Mean	Correlation	p- value

Publisher: SARC Publisher

	Activity Index	Activity Score ± SD	SNOT-22 ± SD	(r) with SNOT- 22	value	Lund-Mackay ± SD	(r) with Lund-Mackay	value	TDI Score ± SD	(r) with TDI	
GPA (n=2 4)	BVAS	14.8 ± 6.4	52.4 ± 18.6	0.82	<0.001*	14.8 ± 4.2	0.76	<0.001*	18.4 ± 8.6	−0.71	<0.001*
SLE (n=1 8)	SLED AI	8.6 ± 4.2	28.6 ± 14.2	0.58	0.012*	6.4 ± 3.8	0.52	0.028*	26.8 ± 6.4	−0.44	0.068
RA (n=1 5)	DAS2 8	4.2 ± 1.4	22.4 ± 12.8	0.64	0.010*	4.8 ± 3.2	0.48	0.072	28.2 ± 5.8	−0.38	0.162
EGP A (n=1 0)	BVAS	12.4 ± 5.8	46.8 ± 16.4	0.78	0.008*	13.6 ± 3.8	0.74	0.014*	16.2 ± 7.4	−0.82	0.004*
RP (n=1 0)	PGA (0–10)	5.6 ± 2.2	38.2 ± 15.6	0.72	0.018*	8.2 ± 4.1	0.68	0.032*	24.6 ± 7.2	−0.56	0.092
Sarc oido sis (n=9)	PGA (0–10)	4.8 ± 2.4	26.4 ± 13.8	0.66	0.054	7.6 ± 3.6	0.62	0.076	25.4 ± 6.8	−0.48	0.192
Overall (N= 86)	Combined	—	37.8 ± 18.2	0.72	<0.001*	9.6 ± 5.4	0.68	<0.001*	23.4 ± 8.2	−0.62	<0.001*

Publisher: SARC Publisher

DISCUSSION

The demographic characteristics of our 86-patient sample reflect the established epidemiological trends of the rheumatologic diseases included in it and also give a new understanding of the sinonasal presentation environment. This general female preponderance (67.4) is in line with the long-established female bias of autoimmune diseases, and specifically SLE, with our female-to-male ratio of 5:1 in line with the published literature of 6-10:1 in women of reproductive age. The female predominance in GPA (1.4:1) and EGPA (1.5:1) is relatively low and agrees with the more equal sex distribution in ANCA-associated vasculitides.

One of the key results of Table 1 is that sinonasal symptoms were the first manifestation of the disease in 31.4% of all patients, the highest rates of which were observed in GPA (58.3%) and EGPA (50.0%). The implications of this finding on the otolaryngologic practice are immense, in that the otolaryngologist is being highlighted as a possible first-line diagnostician of systemic disease. The average delay in diagnosis of 14.2 ± 8.6 months among patients who reported with sinonasal symptoms before systemic diagnosis demonstrates a worrying lapse in clinical perception. Other researchers have documented similar diagnostic delays in GPA patients with nasal symptoms, with previous research indicating that 12-18 months is still a consistent delay in diagnosis despite increased awareness (Srouji *et al*., 2007, and Cannady *et al*., 2009). The high levels of inflammatory markers in GPA patients (ESR 48.6 ± 22.4 mm/h; CRP 28.4 ± 18.6 mg/L) relative to other groups indicate the aggressive systemic inflammation typical of active vasculitis and justify the usefulness of serological screening in patients with atypical sinonasal pathology.

The diagnostic importance of ANCA testing in the diagnosis of sinonasal disease, which is suspected of being caused by vasculitis, is validated by the high rate of ANCA positivity in GPA (c-ANCA/PR3: 87.5) and EGPA (p-ANCA/MPO: 70.0). It is noteworthy, however, that ANCA-negative GPA is found in some 10-20 percent of limited forms, and our 87.5 percent c-ANCA-positivity in GPA is congruent with the presence of both limited and systemic disease forms. The universal lack of ANCA positivity in patients with SLE, RA, RP, and sarcoidosis supports the specificity of ANCA tests in the diagnosis of the sinonasal disease related to vasculitis.

The data on symptom prevalence, as shown in Table 2, indicate disease-specific trends that have important diagnostic and prognostic implications. The overall dominance in nasal crusting (68.6) as the most frequent symptom is a manifestation of chronic inflammation of the mucosa and the lack of mucociliary clearance characteristic of rheumatologic sinonasal disease. The almost ubiquitous nasal crusting (91.7% prevalence) is a characteristic finding in GPA, which must be subject to clinical suspicion, especially when it is accompanied by epistaxis.

(79.2%) and mucopurulent/bloody rhinorrhea (66.7%). These results are in line with the destructive granulomatous process that attacks the nasal mucosa, septum, and turbinates in GPA.

The clinically significant finding that links saddle nose deformity to GPA (33.3) and RP (50.0) is that these conditions have a cartilage-destructive pathology that is unique to these diseases. In GPA, saddle nose is caused by necrotizing granulomatous inflammation that destroys nasal septal cartilage, whereas in RP, it is caused by autoimmune chondritis that destroys type II collagen. The difference between RP (50.0) and GPA (33.3) in our cohort could be because cartilaginous targeting is more direct in RP than in GPA, but this difference was not statistically significant because of the small sample size. Notably, saddle nose deformity was not present in SLE, RA, EGPA, or sarcoidosis, which also indicates its diagnostic specificity to cartilage-destructive diseases.

Interestingly, the EGPA patients had the highest incidence of anosmia/hyposmia (70.0), and this is indicative of the pathophysiology of the eosinophilic nasal polyposis that obstructs the olfactory cleft and leads to direct eosinophilic injury of the olfactory neuroepithelium. This observation is consistent with the results of Bacciu *et al*. (2013) and Cottin *et al*. (2017), who found that 60%-80% of EGPA patients with sinonasal involvement had olfactory dysfunction. The median SNOT-22 score was highest in GPA (52.4 ± 18.6), reflecting the most patient-reported burden of symptoms, which is in line with the multifaceted sinonasal pathology of this condition, including crusting, bleeding, obstruction, and structural destruction concomitantly.

Of especial interest is the prevalence of nasal septal perforation (22.1% overall, 50.0% in GPA). The ischemic necrosis of the septal

Publisher: SARC Publisher

mucoperichandrium caused by the small-vessel vasculitis and granulomatous inflammation of the septal mucosa leads to septal perforation in GPA. The prevalence rate of 50.0% in our GPA cohort is similar to published rates of 3060% in other series. The fact that septal perforation was identified in 11.1% of patients with SLE and sarcoidosis, although less frequently, underscores the fact that these disorders also may result in septal pathology by different mechanisms (lupus vasculopathy and granulomatous infiltration, respectively). [Zawawi, F. *et al*., 2022; Zawawi, F. *et al*., 2022; Asseri, A. A. *et al*., 2023]

Table 3 offers objective data on the severity and distribution of sinonasal disease along the disease spectrum by the endoscopic and radiological findings. The high prevalence rate of mucosal abnormalities on endoscopy (91.9) confirms the fact that nasal endoscopy is a very sensitive method of identifying sinonasal involvement in rheumatologic diseases, even in patients with mild symptoms.

The very high Lund-Mackay CT scores in GPA (14.8 ± 4.2) and EGPA (13.6 ± 3.8) relative to other disease groups indicate the widespread sinus opacification of these diseases. The pansinusitis pattern that is common in GPA, with ethmoid (87.5) and sphenoid (58.3) being frequent, is similar to the pattern.

Infectious sinus and maxillary disease that frequently spreads outside the anterior ethmoid-maxillary locality is found in classical chronic rhinosinusitis. A distinctive radiological phenomenon that can indicate that vasculitis may be included in the list of differentials of aggressive sinonasal disease, along with malignancy and fungal infection, is the high prevalence of bony erosion in GPA (41.7%).

A characteristic that makes EGPA unique among other vasculitides and is part of the diagnosis of the disease is the almost complete occurrence of nasal polyps (90.0%) in EGPA. Eosinophilic polyps in EGPA are often not responsive to routine therapy and will often recur following surgery, requiring systemic immunosuppression. Sarcoidosis also exhibited a significant occurrence of nasal polyps (55.6%), which is in line with granulomatous polypoid tissue, which may resemble typical nasal polyps but with non-caseating granulomas on biopsy. [Baird, S. M. *et al*., 2023; Kim, M. *et al*., 2023]

A significant correlation between Lund-Mackay and Lund-Kennedy scores ($r=0.78$, $p<0.001$) confirms the complementary value of endoscopic and radiological evaluation in the monitoring of the severity of sinonasal disease. Nevertheless, the observation that not all patients with substantial endoscopic pathology had comparatively large CT scores (and the reverse) indicates that both methods give distinct information and both need to be employed together to obtain a complete evaluation. The histopathologic report provided in Table 4 is one of the most exhaustive comparative studies of the nasal mucosal biopsy results in various rheumatologic disorders. The total diagnostic sensitivity of 65.3% (biopsy results congruent with systemic diagnosis) highlights the importance of nasal mucokal biopsy as a diagnostic method, especially in GPA (87.0%), EGPA (90.0%), sarcoidosis (87.5%), and RP (77.8%).

The pathology of this disease is the identification of necrotizing granulomatous inflammation in 78.3% of GPA biopsies, which is essential to make the diagnosis, especially in ANCA- negative cases or limited disease forms. It is noteworthy, however, that the typical three components of granulomatous inflammation, vasculitis, and necrosis are only found in a minority of nasal biopsies (around 16% in certain series), and the occurrence of any of the aforementioned findings in the right clinical setting should put GPA on the radar. The small-vessel vasculitis that we detected in 43.5% of GPA biopsies is in agreement with published rates of 2050 that indicate the patchy nature of vasculitic changes in the nasal tissue.

The objective evidence of the role of eosinophils in the pathology of EGPA is the dramatic eosinophilic infiltration in EGPA biopsies (mean 42.6 ± 18.4 eosinophils/HPF) in comparison with all other groups. A diagnostic criterion of eosinophilic tissue infiltration has been suggested as a threshold of over 20 eosinophils/HPF.

This was well exceeded by our EGPA patients. The specificity of chondritis/perichondritis in RP biopsies (77.8) is the exclusive finding that validates the specificity of the diagnosis in the case and promotes the use of nasal biopsy in confirming RP in cases of ambiguous clinical features.

Publisher: SARC Publisher

The current research gives a detailed description of nasal and sinonasal features in a spectrum of rheumatologic and inflammatory diseases that can be considered a few major findings with implications on.

Clinical practice. First, sinonasal involvement is very common in all the conditions under investigation, including the almost universal involvement in GPA, and the more hints of involvement in RA and SLE. Second, disease-specific patterns of sinonasal involvement exist that can aid in differential diagnosis: necrotizing granulomatous inflammation and septal perforation in GPA, eosinophilic polyposis and anosmia in EGPA, non-caseating granulomas and polypoid tissue in sarcoidosis, chondritis and saddle nose in RP, and non- specific mucosal inflammation in SLE and RA.

Third, the disease activity and sinonasal severity are strongly correlated, which confirms the idea of sinonasal manifestations as a window of systemic disease activity which can be used in monitoring the disease.

Fourth, nasal mucosal biopsy has a high diagnostic yield in GPA, EGPA, sarcoidosis, and RP, and can be used in the diagnostic workup of suspected systemic disease.

CONCLUSION

This study revolves around the idea of internal medicine-otolaryngology interdisciplinarity. We suggest that otolaryngologists must have a high index of suspicion of systemic disease in patients with atypical sinonasal pathology (especially crusting, epistaxis, septal perforation, granulation tissue, or recalcitrant polyposis), and that ANCA testing and inflammatory markers should be included in the examination of such cases. On the other hand, internists and rheumatologists are advised to regularly ask about sinonasal symptoms and refer patients with known rheumatologic diseases to otolaryngology, as the sinonasal manifestation may be under-reported and under-treated.

REFERENCES

1. Knowles, M. R., Daniels, L. A., Davis, S. D., Zariwala, M. A., & Leigh, M. W. "Primary ciliary dyskinesia. Recent advances in diagnostics, genetics, and characterization of clinical disease." *American journal of respiratory and critical care medicine* 188.8 (2013): 913-922.
2. Mirra, V., Werner, C., & Santamaria, F. "Primary ciliary dyskinesia: an update on clinical aspects, genetics, diagnosis, and future treatment strategies." *Frontiers in pediatrics* 5 (2017): 135.
3. Cant, E., Shoemark, A., & Chalmers, J. D. "Primary ciliary dyskinesia: integrating genetics into clinical practice." *Current Pulmonology Reports* 13.1 (2024): 57-66.
4. Bergström, S. E., King Jr, T. E., & Hollingsworth, H. "Primary ciliary dyskinesia (immotile-cilia syndrome)." *UpToDate. com. Available online at: http://www. uptodate. com/contents/primary-ciliary-dyskinesia-immotilecilia-syndrome (accessed September 8, 2016)* (2012).
5. Boon, M., Jorissen, M., Proesmans, M., & De Boeck, K. "Primary ciliary dyskinesia, an orphan disease." *European journal of pediatrics* 172.2 (2013): 151-162.
6. Lavoie, V., Zysman-Colman, Z., & Shapiro, A. J. "Primary ciliary dyskinesia." *Paediatrics & Child Health* 30.4 (2025): 203-211.
7. Günaydın, R. Ö., Eroğlu, E., Tellioğlu, B., Emiralioğlu, N., Özçelik, H. U., Yalçın, E., & Kiper, E. N. "Evaluation of otorhinolaryngological manifestations in patients with primary ciliary dyskinesia." *International Journal of Pediatric Otorhinolaryngology* 168 (2023): 111520.
8. Lam, Y. T., Papon, J. F., Alexandru, M., Anagiotos, A., Armengot, M., Boon, M., & Goutaki, M. "Lack of correlation of sinonasal and otologic reported symptoms with objective measurements among patients with primary ciliary dyskinesia: an international study." *Clinical and experimental otorhinolaryngology* 16.4 (2023): 407-412.
9. Alexandru, M., Veil, R., Rubbo, B., Goutaki, M., Kim, S., Lam, Y. T., & Papon, J. F. "Ear and upper airway clinical outcome measures for use in primary ciliary dyskinesia research: a scoping review." *European Respiratory Review* 32.169 (2023).
10. Benchimol, L., Dubois, S., Bricmont, N., Bonhiver, R., Seghaye, M. C., Lefèbvre, P., & Poirrier, A. L. "Clinical manifestations and management of primary ciliary dyskinesia in ENT practice." *B-ENT* (2024).

Publisher: SARC Publisher

11. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Moher, D. "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews." *bmj* 372 (2021).
12. Guo, Z., Chen, W., Wang, L., & Qian, L. "Clinical and genetic spectrum of children with primary ciliary dyskinesia in China." *The Journal of pediatrics* 225 (2020): 157-165.
13. Guan, Y., Yang, H., Yao, X., Xu, H., Liu, H., Tang, X., & Ni, X. "Clinical and genetic spectrum of children with primary ciliary dyskinesia in China." *Chest* 159.5 (2021): 1768-1781.
14. Legendre, M., Thouvenin, G., Taytard, J., Baron, M., Le Bourgeois, M., Tamalet, A., & Beydon, N. "High nasal nitric oxide, cilia analyses, and genotypes in a retrospective cohort of children with primary ciliary dyskinesia." *Annals of the American Thoracic Society* 19.10 (2022): 1704-1712.
15. Lyu, H., Guo, Z., Chen, C., Duan, B., Xu, Z., & Chen, W. "CT imaging features of paranasal sinuses in children with primary ciliary dyskinesia." *Acta Oto-Laryngologica* 142.9-12 (2022): 691-695.
16. Zawawi, F., Papsin, B. C., Dell, S., & Cushing, S. L. "Vestibular and balance impairment is common in children with primary ciliary dyskinesia." *Otology & Neurotology* 43.3 (2022): e355-e360.
17. Zawawi, F., Shapiro, A. J., Dell, S., Wolter, N. E., Marchica, C. L., Knowles, M. R., & Daniel, S. J. "Otolaryngology manifestations of primary ciliary dyskinesia: a multicenter study." *Otolaryngology–Head and Neck Surgery* 166.3 (2022): 540-547.
18. Asseri, A. A., Shati, A. A., Asiri, I. A., Aldosari, R. H., Al-Amri, H. A., Alshahrani, M., & Alalkami, H. "Clinical and genetic Characterization of patients with primary ciliary dyskinesia in Southwest Saudi Arabia: a cross sectional study." *Children* 10.10 (2023): 1684.
19. Baird, S. M., Wong, D., Levi, E., & Robinson, P. "Otolaryngological burden of disease in children with primary ciliary dyskinesia in Victoria, Australia." *International Journal of Pediatric Otorhinolaryngology* 173 (2023): 111722.
20. Kim, M., Lee, M. H., Hong, S. J., Yu, J., Cho, J., Suh, D. I., & Chung, E. H. "Clinical manifestations and genotype of primary ciliary dyskinesia diagnosed in Korea: multicenter study." *Allergy, Asthma & Immunology Research* 15.6 (2023): 757.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Oleiwi, S.I., Alabood, T.F.Y. and Bahader, H.A.H. “Nasal and Sinonasal Manifestations of Rheumatologic and Inflammatory Diseases: Bridging Internal Medicine and Otolaryngology.”*Sarcouncil Journal of Medical Series* 5.4 (2026): pp 18-29.

Publisher: SARC Publisher