

and how do they compare with titanium osteosynthesis? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;101:419–425

9. Sanger C, Soto A, Mussa F, et al. Maximizing results in craniofacial surgery with bioresorbable fixation devices. *J Craniofac Surg* 2007;18:926–930
10. Agarwal S, Gupta A, Grevious M, et al. Use of resorbable implants for mandibular fixation. *J Craniofac Surg* 2009;20:331–339

## Unilateral Sinonasal Symptoms

Tulay Erden Habesoglu, MD,\* Mehmet Habesoglu, MD,\*  
Mehmet Surmeli, MD,\* Taskin Uresin, MD,† Erol Egeli, MD\*

**Objective:** The aim of the study was to describe the pathology in patients with unilateral sinonasal symptoms and to identify variables that may predict neoplastic pathology.

**Study Design:** Retrospective chart review.

**Methods:** A retrospective analysis was completed on 207 consecutive patients with sinonasal symptoms, most of whom underwent functional endoscopic sinus surgery from 2005 to 2008. Of the charts reviewed, 63 patients had unilateral sinonasal symptoms with unilateral opacification of paranasal sinus computed tomography scans. Presenting symptoms and radiographic, surgical, and pathologic findings were analyzed.

**Results:** All 63 patients underwent surgical management for their symptoms, and specimens were sent for pathologic evaluation. There were 12 cases of antrochoanal polyp, 14 of nasal polyposis, 8 of chronic rhinosinusitis, 7 of concha bullosa, 4 of retention cyst in maxillary sinus, 2 of mucocele, 3 of oroantral originated cyst, and 13 cases of benign or malign neoplastic diseases, some of which were extremely rare cases such as pleomorphic adenoma, ameloblastoma, schwannoma, myxoma, and non-Hodgkin lymphoma. Nasal discharge was more common in inflammatory than neoplastic disease. However, epistaxis was more common in neoplastic disease.

**Conclusions:** A wide variety of pathologic findings present with unilateral sinonasal symptoms. A careful history, examination, and radiographic studies can often determine the responsible disease process. Histologic confirmation remains obligatory for diagnosis. There are also some rare cases, which should be considered in differential diagnosis of unilateral polyp or mass lesion on nasoendoscopy.

**Key Words:** Nasal mass, sinonasal opacity, unilateral sinonasal symptoms

From the Departments of \*Otolaryngology–Head and Neck Surgery and †Pathology, Haydarpasa Numune Education and Research Hospital, Istanbul, Turkey.

Received April 28, 2010.

Accepted for publication June 20, 2010.

Address correspondence and reprint requests to Tulay Erden Habesoglu, MD, Haydarpasa Numune Education and Research Hospital, Istanbul, Turkey; E-mail: tulayhabesoglu@yahoo.com

The authors report no conflict of interest.

Copyright © 2010 by Mutaz B. Habal, MD

ISSN: 1049-2275

DOI: 10.1097/SCS.0b013e3181f5389a

The unilateral sinonasal symptoms such as unilateral facial pain and swelling, numbness, orbital symptoms, and blood-stained discharge should always alert the physician to look for neoplastic pathology. A unilateral polyp or mass lesion on nasoendoscopy should always be considered as neoplastic until proven otherwise.<sup>1</sup>

Computed tomography (CT) scanning of the paranasal sinuses is now a routine investigation for patients with sinonasal symptoms that may require surgical intervention.<sup>2</sup> Clinical and radiologic differentiation between different pathologic findings such as chronic rhinosinusitis, inverted papilloma (IP), squamous cell carcinoma, lymphoma, and so on, can be difficult. The presence of unilateral opacification on CT scanning is regarded as suspicious and demands further investigation such as biopsy for accurate diagnosis especially in differentiation of malignant disease.<sup>3</sup>

The aim of this study was to describe the diagnosis in patients with unilateral sinonasal symptoms who had unilateral sinonasal symptoms with unilateral opacification of paranasal sinus CT scans and to analyze subjective symptoms and radiographic and pathologic findings to establish patterns for specific disease etiologies.

## PATIENTS AND METHODS

This study was a retrospective (institutional review board approved) analysis of data collected from patients presenting to Haydarpasa Numune Education and Research Hospital having undergone functional endoscopic surgery or maxillectomy because of unilateral sinonasal symptoms from 2005 to 2008, except 1 patient with a diagnosis of lymphoma referred to the Oncology Clinic for chemotherapy. Sixty-three of 207 patients who had both unilateral sinonasal symptoms and unilateral CT findings were selected. Data were collected from the case records and included presenting symptoms and endoscopic, radiologic, and histopathologic findings.

## Statistical Analysis

All statistical calculations were performed with NCSS 2007/PASS 2008 Statistical Software (Kaysville, UT), and a biostatistician reviewed the results. Besides standard descriptive statistical calculations (mean, median, and SD), a  $\chi^2$  test was used for analyzing the parameters of univariate assessments, and logistic regression analysis was used to analyze the parameters of multivariate assessments. The statistical significance level was established at  $P < 0.05$ , and confidence interval was 95%.

## RESULTS

Of the 207 patients who were operated on in Haydarpasa Numune Education and Research Hospital, we identified 63 patients (30.4%) with unilateral sinonasal symptoms and unilateral paranasal sinus CT opacification. Ages ranged between 15 and 77 years with mean age of 34.06 (SD, 16.31) years.

Thirteen patients (20.6%) had neoplastic disease, 43 (68.3%) had inflammatory disease, and 7 (11.1%) had anatomic variation. Of those with neoplastic disease 2 (15.4%) were malignant. Patients' diagnoses included nasal polyposis (NP) (22.2%), antrochoanal polyp (19%), chronic rhinosinusitis (12.7%), concha bullosa (11.1%), retention cyst (6.3%), mucocele (3.2%), and cyst of oroantral origin (4.8%). Among neoplastic diseases, IP was the most common pathologic diagnosis found in 4 patients (6.3%). Fibrous dysplasia was the second most common pathologic diagnosis, found in 3 patients (4.8%). Schwannoma, ameloblastoma, pleomorphic adenoma, non-Hodgkin lymphoma (NHL), and squamous cell carcinoma were the least common findings, each seen in 1 (1.6%) of 63

**TABLE 1.** Diagnoses of the Patients

	Pathologic Findings	n	% Ratio	
Nonneoplastic	Nasal polyposis	14	22.2	
	Antrochoanal polyp	12	19	
	Chronic rhinosinusitis	8	12.7	
	Concha bullosa	7	11.1	
	Retention cyst	4	6.3	
	Oroantral originated cyst	3	4.8	
	Mucocele	2	3.2	
	Inverted papilloma	4	6.3	
	Fibrous dysplasia	3	4.8	
	Lymphoma	1	1.6	
	Schwannoma	1	1.6	
	Ameloblastoma	1	1.6	
	Pleomorphic adenoma	1	1.6	
	Myxoma	1	1.6	
	Neoplastic	Squamous carcinoma	1	1.6

patients (Table 1). Presenting symptoms included unilateral nasal obstruction (58.7%), discharge (28.6%), pain (36.5%), epistaxis (12.7%), anosmia (17.5%), and swelling of the face (7.9%) (Table 2). Discharge was seen in inflammatory than neoplastic disease. However, epistaxis and swelling of face were more common in neoplastic disease. Also, of those patients with neoplastic pathology, 7 (53.8%) had bone erosion on paranasal CT scans, which were significantly different from inflammatory diseases with bone erosion in only 4 cases (9.3%) (Table 3).

**PATIENTS**

**Patient 1**

Pleomorphic adenoma is the most common salivary gland tumor. Although parotid gland constitutes 60% of all pleomorphic adenomas, minor salivary glands constitute only 8% of them.<sup>4</sup> Pleomorphic adenomas of the nasal cavity differ histologically from those found elsewhere, in that there is increased myoepithelial cellularity and little or no stromal component.<sup>5</sup> In this study, there was a rare case of pleomorphic adenoma of the nasal septum with left-sided nasal obstruction and epistaxis for about 1 year. Histopathologic examination revealed that mature respiratory epithelium was covering the surface of a well-circumscribed tumoral lesion that had biphasic nature composed of neoplastic epithelium and stroma (Fig. 1). Our case differs histologically from other intranasal pleomorphic adenomas in that the epithelial element of this tumor has no predominance over its stromal elements. No additional treatment was needed for our

**TABLE 2.** Presenting Symptoms of the Patients

	n	% Ratio
Unilateral nasal obstruction	37	58.7
Discharge	18	28.6
Pain	23	36.5
Epistaxis	8	12.7
Swelling of face	5	7.9
Anosmia	11	17.5

**TABLE 3.** Assessments According to Neoplastic Pathologic Findings of the Patients

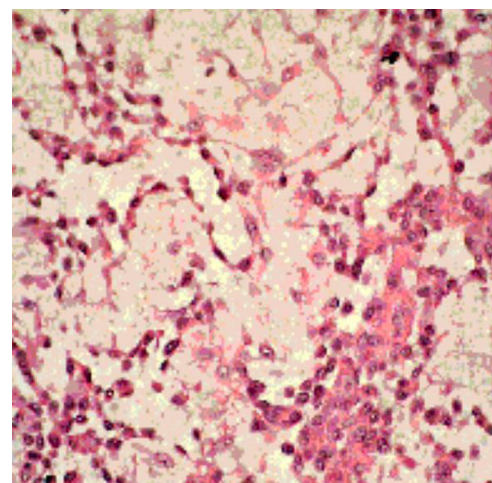
Pathology	Neoplasia		P*	Odds Ratio	95% Confidence Interval
	Present	Absent			
	n = 13, n (%)	n = 50, n (%)			
Nasal obstruction	9 (69.2)	28 (56)	0.388	1.768	0.48–6.50
Discharge	0	18 (36)	0.010†	—	—
Pain	3 (23.1)	20 (40)	0.259	0.450	0.11–1.84
Epistaxis	5 (38.5)	3 (6)	0.002†	9.792	1.94–42.26
Swelling of face	3 (23.1)	2 (4)	0.050†	7.200	1.06–48.84
Anosmia	0	11 (22)	0.063	—	—
Bone destruction	7 (53.8)	4 (8)	0.001‡	13.417	3.01–59.78

\* $\chi^2$  Test.  
 † $P < 0.05$ .  
 ‡ $P < 0.01$ .

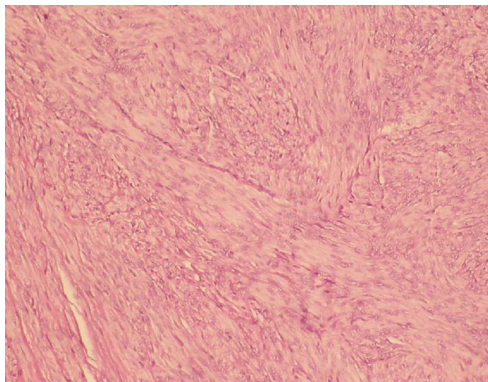
patient. But, because our case was different from other intranasal pleomorphic adenomas histopathologically, close follow-up is important for recurrence.

**Patient 2**

Schwannomas have been reported to occur throughout the body, with the highest incidence in the head and neck region,<sup>6</sup> but only approximately 4% are found in the nose and paranasal sinuses.<sup>7</sup> A 27-year-old man presented with a right-sided nasal obstruction and epistaxis. A soft polypoidal mass was noted within the right nasal cavity above the inferior turbinate. Histological examination of the specimen revealed the stroma to be composed of fairly uniform spindle cells arranged in a loose myxoid pattern (Fig. 2). The appearance was consistent with a benign schwannoma (Antoni type A), and immunocytochemical staining supported the diagnosis



**FIGURE 1.** Microscopic view of tumor showing myxoid appearance of stroma (hematoxylin-eosin stain, original magnification  $\times 40$ ).



**FIGURE 2.** Histopathologic aspect of schwannoma rich in Antoni type A cells (hematoxylin-eosin stain, original magnification  $\times 10$ ).

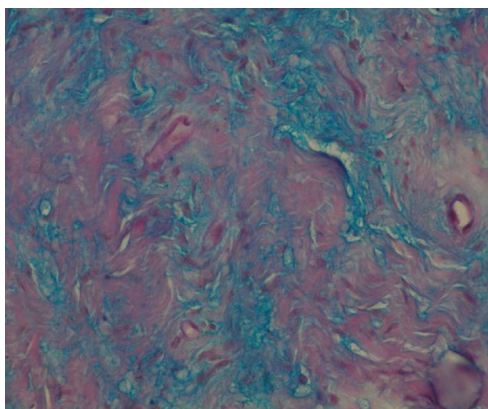
by showing positive immunoreactivity for S-100 protein. One year postoperatively, the patient was asymptomatic with no evidence of recurrence.

### Patient 3

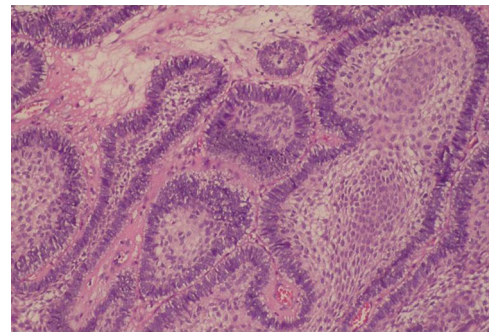
Myxomas are benign, slow-growing, mesenchymal-stemmed, and locally aggressive neoplasias.<sup>8</sup> They are benign connective tissue tumors composed of stellate and spindle-shaped cells with benign-appearing nuclei lying in a myxoid stroma. They are usually found in the heart, soft tissues, and bones. Myxomas of the nasal cavity and paranasal sinuses are rare. They are benign but of a locally invasive nature. Recurrence rate is high because of the difficulty to excise them completely.<sup>9</sup> Here, there was a case of myxoma of the nasal cavity with a history of 10-year left-sided nasal obstruction. A well-circumscribed soft mass was observed on the lateral wall of the nasal vestibule on anterior rhinoscopic examination. In its histological aspect, it has abundant intercellular substance, made up of eosinophilic lax connective tissue; immersed in its stroma, there are spindle-like cells with elongated cytoplasm (Fig. 3).

### Patient 4

Ameloblastomas are epithelial-derived odontogenic tumors that typically originate in jaw bones, primarily involving the mandible and less often the maxilla.<sup>10</sup> A case of ameloblastoma of the left



**FIGURE 3.** Histopathologic aspect of myxoma, dyed in periodic acid-Schiff-Alcian blue stain, original magnification  $\times 40$ .



**FIGURE 4.** Plexiform pattern of ameloblastoma (hematoxylin-eosin stain, original magnification  $\times 10$ ).

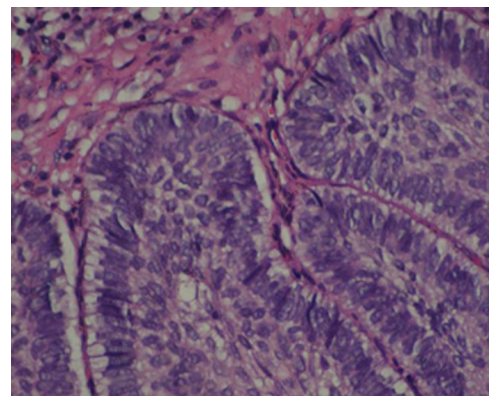
sinonasal tract in a 77-year-old man presented to our clinic. The tumor presented as a radiographically solid mass filling the left nasal cavity and sinuses, which was diagnosed as ameloblastoma on histopathologic examination. By light microscopic examination, the plexiform pattern is composed of a network of long anastomosing cords of odontogenic epithelium. The epithelial strands are bounded at the periphery by a layer of columnar cells exhibiting hyperchromatic, palisaded, and reverse polarized nuclei, along with subnuclear cytoplasmic vacuolization (Figs. 4 and 5).

### Patient 5

Lymphomas comprise 3% to 5% of all malignancies, with NHL accounting for 60% of cases.<sup>11</sup> The nasal cavities and paranasal sinuses are rarely affected by primary NHL.<sup>12</sup> A 22-year-old woman presented with a right-sided nasal obstruction, epistaxis, and proptosis. Histological examination of the specimen revealed diffuse large B-cell malignant NHL. There was no evidence of distant or systemic disease, other malignancies, or immunosuppression. The patient was sent to oncology clinic, and after chemotherapy, the tumor completely disappeared.

## DISCUSSION

It is well known that unilateral sinus opacification merits increased suspicion of neoplasia.<sup>13</sup> A careful preoperative workup is essential in identifying expected pathologic findings. A wide variety of



**FIGURE 5.** The columnar peripheral cells with reserve polarity of their nuclei-palisaded pattern in ameloblastoma (hematoxylin-eosin stain, original magnification  $\times 40$ ).



pathologic findings can present with unilateral sinus opacification on CT scanning, although the majority of the findings were benign.<sup>14</sup> Chronic rhinosinusitis was the most common underlying diagnosis found in the population of patients with unilateral maxillary sinus opacification.<sup>15</sup> In our study, chronic rhinosinusitis was also among the common causes of unilateral paranasal sinus disease.

Patients with NP may present clinically with complaints of nasal obstruction, congestion, hyposmia, rhinorrhea, epistaxis, post-nasal drip, headaches, and snoring.<sup>16</sup> Patients with NP often have asymmetric involvement of the paranasal sinuses. In our series, there were 14 patients who had completely unilateral involvement. Nasal masses of other histologic origins can be difficult to differentiate from nasal polyps on the basis of symptoms, nasal endoscopy, and CT. Nasal polyps typically present bilaterally but can present unilaterally.<sup>16</sup>

Mucoceles may grossly resemble a polyp but are typically formed by sinus ostial obstruction that results in accumulation of secretions.<sup>16</sup> They are most commonly found in the frontoethmoidal region but are also seen within maxillary sinuses,<sup>15</sup> as in our cases. Retention cysts, on the other hand, are cysts located entirely within a sinus cavity and most often result from gland duct obstruction.<sup>15</sup>

Patients with unilateral nasal masses present clinically with signs and symptoms similar to unilateral NP: nasal obstruction, congestion, hyposmia, epistaxis, and pain.<sup>17</sup> Evidence of invasion and destruction suggests aggressive and possibly neoplastic disease and dictates more urgent management.<sup>16</sup> In our series, patients with neoplastic disease were more likely to have epistaxis and swelling of the face and less likely to have discharge. Bony erosion on CT scan was associated with malignant disease.

The most common neoplastic cause of unilateral nasal mass is an IP, which typically originates in the middle meatus and extends through the maxillary antrum<sup>18</sup> and comprises approximately 4% of all nasal polyps.<sup>16</sup> Among neoplastic diseases, IP was also the most common pathologic diagnosis in our study. But also, there were some rare neoplastic cases in our series who presented with unilateral sinonasal complaints.

## CONCLUSIONS

Previous studies<sup>14,16</sup> that looked at unilateral paranasal sinus diseases identified a lower incidence of unilateral pathologic findings than that found in our study. Therefore, we think that patients present with unilateral symptom higher than expected, and it is worth investigating. Also, other than common pathologic findings, in our series there are rare cases that present as unilateral nasal masses. As a result, the initial history and physical examination are useful, and the addition of nasal endoscopy and CT scanning aids in the diagnosis. But it is advisable that tissue be submitted for histopathologic examination in all cases of unilateral opacification of paranasal sinus CT scans. A unilateral polyp or mass lesion on nasoendoscopy should always be considered as neoplastic until proven otherwise; therefore, a biopsy specimen is essential for diagnosis.

## REFERENCES

- Ikeda K, Tanno N, Suzuki H, et al. Unilateral sinonasal disease without bone destruction. Differential diagnosis using diagnostic imaging and endonasal endoscopic biopsy. *Arch Otolaryngol Head Neck Surg* 1997;123:198–200
- Mason JD, Jones NS, Hughes RJ, et al. A systematic approach to the interpretation of computed tomography scans prior to endoscopic sinus surgery. *J Laryngol Otol* 1998;112:986–990
- Eichel BS. The medical and surgical approach in management of the unilateral opacified antrum. *Laryngoscope* 1977;87:737–750
- Cho KJ, el-Naggar AK, Mahanupab P, et al. Carcinoma ex-pleomorphic adenoma of the nasal cavity: a report of two cases. *J Laryngol Otol* 1995;109:677–679
- Jackson LE, Rosenberg SI. Pleomorphic adenoma of the lateral nasal wall. *Otolaryngol Head Neck Surg* 2002;127:474–476
- Enzinger FM, Weiss SW. Benign tumors of the peripheral nerves. In: *Soft Tissue Tumors*. 2nd ed. St Louis, MO: CV Mosby Company, 1988:725–735
- Shugar JM, Som PM, Biller HF, et al. Peripheral nerve sheath tumors of the paranasal sinuses. *Head Neck Surg* 1981;4:72–76
- Wachter BG, Steinberg MJ, Darrow DH, et al. Odontogenic myxoma of the maxilla: a report of two pediatric cases. *Int J Pediatr Otorhinolaryngol* 2003;67:389–393
- Hunchaisri N. Myxoma of the nasal cavity and paranasal sinuses: report of a case. *J Med Assoc Thai* 2002;85:120–124
- Waldron CA. Odontogenic cysts and tumors. In: Neville DW, Damm DD, Allen CM, et al, eds. *Oral and Maxillofacial Pathology*. Philadelphia, PA: WB Saunders Co, 1995:493–540
- Boring CC, Squires TS, Tong T, et al. Cancer statistics, 1994. *CA Cancer J Clin* 1994;44:7–26
- Quraishi MS, Bessell EM, Clark D, et al. Non-Hodgkin's lymphoma of the sinonasal tract. *Laryngoscope* 2000;110:1489–1492
- Romashko AA, Stankiewicz JA. Routine histopathology in uncomplicated sinus surgery: is it necessary? *Otolaryngol Head Neck Surg* 2005;132:407–412; discussion 413
- Ahsan F, El-Hakim H, Ah-See KW. Unilateral opacification of paranasal sinus CT scans. *Otolaryngol Head Neck Surg* 2005;133:178–180
- Kaplan BA, Kountakis SE. Diagnosis and pathology of unilateral maxillary sinus opacification with or without evidence of contralateral disease. *Laryngoscope* 2004;114:981–985
- Tritt S, McMains KC, Kountakis SE. Unilateral nasal polyposis: clinical presentation and pathology. *Am J Otolaryngol* 2008;29:230–232
- Savy L, Lloyd G, Lund VJ, et al. Optimum imaging for inverted papilloma. *J Laryngol Otol* 2000;114:891–893
- Dammann F, Pereira P, Laniado M, et al. Inverted papilloma of the nasal cavity and the paranasal sinuses: using CT for primary diagnosis and follow-up. *AJR Am J Roentgenol* 1999;172:543–548

## External Laryngopyoceles: A Rare Cause of Upper Airway Obstruction

Cengiz Özcan, MD,\* Yusuf Vayisoglu, MD,\*  
Nilgün Güner, MD,† Serkan Türküli, MD,\* Kemal Görür, MD\*

**Abstract:** Laryngocele is generally defined as abnormal dilatations of the laryngeal saccule. Its etiology is not well known but probably caused by congenital and acquired causes. It is uncommon and

From the \*Department of Otorhinolaryngology, School of Medicine, Mersin University; and †Department of Otorhinolaryngology, Mardin State Hospital.

Received April 20, 2010.

Accepted for publication June 19, 2010.

Address correspondence and reprint requests to Cengiz Özcan, MD, Fındıkpınarı Caddesi, Bugi Sitesi, No. 28 Kuyuluk, 33200 Mersin, Turkey; E-mail: cozcan@mersin.edu.tr

The authors report no conflicts of interest.

Copyright © 2010 by Mutaz B. Habal, MD

ISSN: 1049-2275

DOI: 10.1097/SCS.0b013e3181f53845