Diagnostic Algorithm for Unilateral Sinus Disease

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Objectives

- Introduction
- Patients and Methods
- Results
- Algorithm
- Literature Review
- Conclusion
Introduction

- Nasal polyp condition is estimated to be present in roughly 1% to 4% of the population: more commonly among adults than in children, and among males rather than females. The vast majority of nasal polyps are bilateral and inflammatory in nature.
- Incidence of USD on routine CT PNS was 2.5-23%.
- However, USD is a common challenge faced by rhinologists worldwide.
Introduction

- Some authors suggest that any unilateral nasal mass should always be considered “neoplastic until proven otherwise”!
Diagnostic algorithm for unilateral sinus disease: a 15-year retrospective review

Marianella Paz Silva, MD, Jayant M. Finto, MD, Jacquelynne P. Corey, MD, Ernest E. Mhoon, MD, Fuad M. Baroody, MD and Robert M. Naciero, MD

Background: Patients presenting with unilateral sinus symptoms or nasal polyps raise concerns about sinister pathology. Yet despite the relatively common occurrence of this presentation, and its potential severity, an organized diagnostic approach to unilateral sinus disease (USD) has never been defined. The purpose of this work was to propose a diagnostic algorithm for managing patients with USD based on prior experience.

Methods: We performed a retrospective review of the medical records of all patients with USD who underwent surgical intervention and had pathological specimens during a 15-year period at an urban academic center. Nasal endoscopy and computed tomography (CT) scan findings, demographic characteristics, presenting symptoms, medical histories, and previous treatments were analyzed.

Results: A total of 191 patients met the inclusion criteria, 163 of whom were initially diagnosed at our center. Among the latter group, 51 (33%) presented with a nasal mass or polyp observed by endoscopy. Inverted papilloma was present in 16% of those cases, and malignant tumors comprised 14% of patients presenting without an obvious nasal polyp (n = 102), 9% had inverted papilloma and 1% had malignancies. Overall, chronic rhinosinusitis was the most common diagnosis both in patients with polyps (67%) and those without nasal polyps (59%).

Conclusion: Although USD is most likely to represent chronic inflammation, there exists a fair likelihood of finding malignant pathology, particularly in cases where patients have a unilateral poly. Based on this review, we propose a strategy for the management of new presentations of USD.

Key Words: sinusitis, CT, endoscopy, inverted papilloma, fungus, chronic, unilateral

How to Cite This Article: Silva MP, Finto JM, Corey JP, Mhoon EE, Baroody FM, Naciero RM. Diagnostic algorithm for unilateral sinus disease: a 15-year retrospective review. Int Forum Allergy Rhinol. 2015;5:590-596.

Unilateral sinus disease (USD) represents a common concern for otolaryngologists, and it is much more likely than bilateral disease to represent sinister pathology. Indeed, some authors suggest that any unilateral nasal mass should always be considered neoplastic until proven otherwise.1 Patients usually have unilateral symptoms such as nasal congestion/obstruction, anterior or posterior nasal drainage, purulent discharge, epistaxis, a foul odor, headaches, and facial or cheek swelling.2 Yet despite being relatively common—Lee3 argues that unilateral rhinosinusitis occurs in 23% of cases—this condition has not been extensively studied.

To date, several investigators have attempted to describe the general characteristics of USD. Shin4 studied the demographic characteristics and evolution of 450 cases of chronic rhinosinusitis (CRS) and showed that USD was more common in males (65.8%) than in females. Nasal polyps were present in 11.1% of the USD patients, and the maxillary sinus was the most commonly affected anatomic site in the USD group.4

To our knowledge there is no single management strategy for the workup of patients presenting with USD. Here, we review our 15-year experience with USD and suggest a diagnostic algorithm for the evaluation of patients with this presentation.
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Marianella Paz Silva, MD, Jayant M. Pinto, MD, Jacqueline F. Corey, MD, Ernest E. Mhoon, MD, Fuad M. Baroody, MD and Robert M. Nacerio, MD

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Methods: We performed a retrospective review of the medical records of all patients with USD who underwent surgical intervention and had pathological specimens during.

In contrast, of patients without an obvious nasal poly (n = 102), 3% had inverted papilloma and 5% had malignancies. Overall, chronic rhinosinusitis was the most common diagnosis both in patients with polyps (67%) and those without nasal polyps (59%).

Conclusions: Although USD is most likely to represent chronic inflammation, there exists a fair likelihood of finding malignant pathology, particularly in cases where patients have a unilateral poly. Based on this review, we propose a strategy for the management of new presentations of USD.

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To date, several investigators have attempted to describe the general characteristics of USD. Shin1 studied the demographic characteristics and evolution of 640 cases of chronic rhinosinusitis (CRS) and showed that USD was more common in males (65.8%) than in females. Nasal polyps were present in 11.1% of the USD patients, and the maxillary sinus was the most commonly affected anatomic site in the USD group.

To our knowledge there is no single management strategy for the workup of patients presenting with USD. Here, we review our 15-year experience with USD and suggest a diagnostic algorithm for the evaluation of patients with this presentation.
Patients and Methods

- Retrospective review of the medical records of patients who presented with USD at the University of Chicago Section of Otolaryngology–Head and Neck Surgery and underwent surgical intervention (with pathologic specimens taken) over a 15-year period.
- To identify patients with USD, we reviewed all sinus CT scans of patients undergoing sinus surgery and included only subjects who had normal sinuses on 1 side.
Results

- Those diagnosed at the University of Chicago Medical Center were 153 adult patients.
- Ages of 18 and 77 years (mean, 49 years).
- Ninety-seven (63%) were female.
## Results

**TABLE 1. Pathology: new presentations at UCMC***

<table>
<thead>
<tr>
<th>Final pathology</th>
<th>Total</th>
<th>With polyps</th>
<th>Without polyps</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS</td>
<td>104 (68)</td>
<td>34 (66.7)</td>
<td>70 (68.6)</td>
</tr>
<tr>
<td>Fungal</td>
<td>26 (17)</td>
<td>1 (2)</td>
<td>25 (24.5)</td>
</tr>
<tr>
<td>IP</td>
<td>10 (7)</td>
<td>8 (15.7)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Malignant tumors</td>
<td>10 (7)</td>
<td>7 (13.7)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>Others(^a)</td>
<td>3 (2)</td>
<td>1 (2)</td>
<td>2 (2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>153</td>
<td>51</td>
<td>102</td>
</tr>
</tbody>
</table>

*Values are n (%).
\(^a\)Others: 1 encephalocele; 1 foreign body; 1 dentigerous cyst.
CRS = chronic rhinosinusitis; IP = inverted papilloma; UCMC = University of Chicago Medical Center.
Results

**TABLE 2.** Comparison and $p$ values of cases presenting with polyps vs without polyps among different pathologies.

<table>
<thead>
<tr>
<th>Pathology</th>
<th>With polyps (%) vs without polyps (%)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS</td>
<td>66.7 vs 68.6</td>
<td>0.855</td>
</tr>
<tr>
<td>Fungal</td>
<td>2 vs 24.5</td>
<td>0.0002</td>
</tr>
<tr>
<td>IP</td>
<td>15.7 vs 2</td>
<td>0.0025</td>
</tr>
<tr>
<td>Malignant tumors</td>
<td>13.7 vs 2.9</td>
<td>0.0164</td>
</tr>
</tbody>
</table>

CRS = chronic rhinosinusitis; IP = inverted papilloma.
### TABLE 3. Unilateral sinonasal complaints*

<table>
<thead>
<tr>
<th>Sinonasal complaints</th>
<th>CRS (n = 104)</th>
<th>Fungal (n = 26)</th>
<th>IP (n = 10)</th>
<th>Malignancies (n = 10)</th>
<th>Others (n = 3)&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal obstruction</td>
<td>81 (77.8%)</td>
<td>20 (76.9%)</td>
<td>9 (90%)</td>
<td>6 (60%)</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Postnasal drip</td>
<td>36 (34.6%)</td>
<td>10 (38.5%)</td>
<td>3 (30%)</td>
<td>3 (30%)</td>
<td>1 (33.3%)</td>
</tr>
<tr>
<td>Rhinorrhea</td>
<td>38 (36.5%)</td>
<td>8 (30.8%)</td>
<td>2 (20%)</td>
<td>5 (50%)</td>
<td>2 (66.6%)</td>
</tr>
<tr>
<td>Epistaxis</td>
<td>3 (2.8%)</td>
<td>1 (3.8%)</td>
<td>1 (10%)</td>
<td>1 (10%)</td>
<td>0</td>
</tr>
<tr>
<td>Sinus pressure</td>
<td>61 (58.6%)</td>
<td>14 (53.8%)</td>
<td>1 (10%)</td>
<td>4 (40%)</td>
<td>1 (33.3%)</td>
</tr>
<tr>
<td>Headaches</td>
<td>24 (23%)</td>
<td>7 (26.9%)</td>
<td>3 (30%)</td>
<td>3 (30%)</td>
<td>0</td>
</tr>
</tbody>
</table>

*Values are n (%).

<sup>a</sup>Others: 1 encephalocele; 1 foreign body; 1 dentigerous cyst.
CRS = chronic rhinosinusitis; IP = inverted papilloma.
## Results

### TABLE 4. Symptomatic vs asymptomatic patients per group

<table>
<thead>
<tr>
<th>Final pathology</th>
<th>Total (n)</th>
<th>Asymptomatic&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Symptomatic&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS</td>
<td>104</td>
<td>26 (25)</td>
<td>78 (75)</td>
</tr>
<tr>
<td>Fungal</td>
<td>26</td>
<td>4 (15)</td>
<td>22 (85)</td>
</tr>
<tr>
<td>IP</td>
<td>10</td>
<td>2 (20)</td>
<td>8 (80)</td>
</tr>
<tr>
<td>Malignant tumors</td>
<td>10</td>
<td>2 (20)</td>
<td>8 (80)</td>
</tr>
<tr>
<td>Others&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3</td>
<td>0 (0)</td>
<td>3 (100)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>153</strong></td>
<td><strong>34 (22)</strong></td>
<td><strong>119 (78)</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup>Values are n (%).

<sup>b</sup>Others: 1 encephalocele; 1 foreign body; 1 dentigerous cyst.

CRS = chronic rhinosinusitis; IP = inverted papilloma.
Results

- The 51 subjects who presented with a unilateral polyp or mass, 16 (31.4%) showed evidence of lateral maxillary sinus wall, orbital, or intracranial bone erosion on CT scan or they demonstrated neurologic involvement upon clinical examination, such as severe facial pain, numbness, swelling, or cranial nerve involvement.

- Among the 102 patients without a nasal polyp or mass, 26 (25.5%) had the same above findings.

- In the group of patients without polyps, 2 were found to have malignancies. In contrast, among the group with polyps, 6 were found to have malignancies and 1 was diagnosed as having IP.
Results

- Numbness was present in \(20 \ (13\%)\) of the 153 patients, and, of those, \(4 \ (20\%)\) had malignant disease demonstrated in the final pathology.
Results

- In our review, we found that analysis of **26 frozen** sections was performed.
  - **18** led to the **correct** diagnosis
  - **1** was **inconclusive**
  - **7** showed a result that was **different** than in the final pathology report
    - 4 cases were diagnosed as chronic inflammation ~ fungal disease on final pathology
    - 1 SCC was interpreted as IP on frozen section
    - 1 adenocarcinoma was interpreted as CRS
    - 1 CRS was interpreted as IP
Diagnostic algorithm

1. Medical History
2. Physical Exam
3. Nasal Endoscopy
4. CT scan

- Unilateral Mass/Polyp without bone erosion in skull base, lateral walls, or Orbits/CNS involvement
  - Suspicious for Malignancy
    - In-office Biopsy
      - Malignant
        - Oncology Evaluation
      - Benign/Inconclusive
  - Non-suspicious for Malignancy

- Unilateral Mass/Polyp - Bone erosion in skull base, lateral walls - Orbits/CNS involvement
  - MRI
    - Appropriate Consult
    - ESS +/- Frozen Section
      - Malignant
      - Benign Inflammatory
        - De-bulk & discuss further management
      - Standard ESS

- Unilateral Disease W/o Mass or Polyp
  - Bone erosion in skull base/lateral walls/Orbits/CNS involvement
  - No bone erosion in skull base/lateral walls/Orbits/CNS involvement
Their Recommendation!

- Do not recommend in-office biopsies their use in standard cases (without evidence of bone erosion on CT or neurologic abnormalities on physical exam). Our reasoning is based on the following:
Their Recommendation!

1. Negative results for malignancy must still be confirmed with an operative biopsy, requiring additional investments of cost and time.

2. Positive results for malignancy will generally necessitate surgical debulking regardless, for symptomatic relief, obviating the need for an in-office biopsy. The only exception to this statement is cases in which there is a clinical suspicion for a malignancy, which would require more radical resection that would not be feasible endoscopically.

3. In our whole series, we performed in-office biopsies in only 1.5% of the patients, and the results did not affect the clinical management.
Literature Review
Literature Review

- Shin studied the demographic characteristics and evolution of 640 cases of chronic rhinosinusitis (CRS) and showed that USD was more common in males (65.8%) than in females. Nasal polyps were present in 11.1% of the USD patients, and the maxillary sinus was the most commonly affected anatomic site in the USD group.
Literature Review

- Tritt et al. did a retrospective review of 44 patients identified with unilateral nasal polyps who underwent ESS in order to correlate the clinical presentation with the pathology of the disease; they concluded that:
  - most common symptoms were unilateral sinus congestion (65%), epistaxis (18%) and headaches (12%)
  - Most common symptom for AFS was unilateral congestion (93%), followed by epistaxis (7%)
  - **Mucoceles** and human papillomavirus (HPV)-related papilloma both presented with congestion without epistaxis in 100% of the cases
  - Patients with neoplastic processes presented with epistaxis (45%) and with congestion, headache, seizures, or other symptoms (55%).
Rudralingam et al. recommended that MRI be ordered every time bone erosion/destruction is found on a CT scan.

Harvey and Dalgorf stated that both CT and MRI should be done in most cases because the studies are complementary and can offer the physician more information regarding the likely pathology than either one would on its own.
Literature Review

Harvey and Dalgorf recommended that an in-office biopsy should be performed whenever malignant pathology is suspected. They considered this to be a critical step prior to any therapeutic decisions, but only after a CT scan and MRI have been obtained to avoid biopsy of encephaloceles, aneurysms, or nasal angiofibromas. They also recommend avoiding in-office biopsies for masses located beyond the middle turbinate.
Literature Review

Conclusion

- Patients with polyps compared to those without polyps were more likely to have malignancies and IPs and were less likely to have fungal disease.
- It is their view that in-office biopsies are nearly always unnecessary because they do not change subsequent management.
- MRI scans can provide useful information in cases of bony erosion or examination findings consistent with extrasinus extension, but should be used sparingly because, in the majority of cases, they will not alter the approach.
Thank You