Polypoid Change of the Middle Turbinate and Paranasal Sinus Polyposis Are Distinct Entities

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Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Abstract

Objectives. Polypoid change of the middle turbinate (PCMT) is a finding on intranasal examination whose significance is not well understood. We present a comparison of the clinical characteristics of PCMT with paranasal sinus polyposis (PSP), a common condition with potentially similar appearance.

Study Design. Parallel case series.

Setting. Tertiary rhinology clinic.

Subjects and Methods. Data were prospectively compiled from consecutive patients during a 12-month period with either PSP arising from the middle meatus or PCMT limited to the middle turbinate as identified on nasal endoscopy. Recorded data included comorbidities, the 22-item Sinonasal Outcome Test (SNOT-22), Nasal Obstruction Symptom Evaluation (NOSE), Lund-Mackay score from computed tomography (CT) imaging, and total eosinophil levels.

Results. Of 593 patients, 23 (3.9%) had PCMT and 44 (7.4%) had PSP. The PSP group was predominantly male (75% vs 52%, \(P < .001\)) with an older mean age (53.4 vs 35.4 years, \(P < .0001\)). PCMT was more often associated with allergic rhinitis (83% vs 34%, \(P < .001\)), whereas PCMT was rarely associated with chronic rhinosinusitis (10% vs 100%, \(P < .0001\)). Mean eosinophil count (7.1 vs 3.1, \(P = .096\)) was not significantly different between groups, whereas mean Lund-Mackay score was higher in PSP (14.9 vs 2.8, \(P < .0008\)). Mean NOSE score was greater in PSP (65.3 vs 46.8, \(P = .025\)), whereas SNOT-22 score was comparable between groups (40.6 vs 34.6, \(P = .29\)).

Conclusion. PCMT is a unique physical finding with clinical associations that distinguish it from PSP. PCMT has greater association with allergic rhinitis than chronic rhinosinusitis, and both PCMT and PSP are associated with impaired quality of life.

Keywords
nasal polyposis, nasal turbinate, allergic rhinitis, chronic rhinosinusitis, nasal endoscopy

Background

Polyposis of the nasal cavity is a hallmark of chronic sinusonal disease. In clinical practice, large polyps may be readily visualized without specialized equipment, whereas smaller polyps may be seen only on nasal endoscopy. In most cases, nasal polyps arise from within the middle meatus or the sphenoid recess, where they extend from chronically inflamed paranasal sinus ostia (Figure 1). Nasal polyposis has an estimated incidence of 2% to 4%, typically occurring in the setting of chronic rhinosinusitis (CRS).1,3 In this setting, management of polyposis is directed by the diagnosis of underlying CRS.

Polypoid changes may also affect other structures within the nasal cavity, including the nasal turbinates (Figure 2). Edema and polypoid changes of the middle turbinate (PCMT) have been occasionally noted in the literature,4,5 although little evidence has been reported to distinguish this process from paranasal sinus polyposis (PSP). It is also unclear to what extent PCMT is associated with CRS and other conditions. Recent reports have identified PCMT as a possible indicator for allergic rhinitis (AR),4,5 although additional clinical features are not well understood. Moreover, the general categorization of PSP and PCMT as “nasal polyps” may fail to capture potential differences in disease extent, workup, and management. We sought to distinguish these 2 entities with regard to clinical manifestations and the effect on patient-reported sinonasal quality of life (QOL).

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Materials and Methods

Parallel case series were prospectively compiled from all new patients presenting to a tertiary rhinology practice with rhinologic complaints and undergoing nasal endoscopy between November 2015 and October 2016. In addition to nasal endoscopy, complete history and physical examination was obtained from all patients. Patients were assessed for inclusion in 1 of 2 study groups: those with frank sinonasal polyposis arising from the middle meatus (PSP group) and those with polypoid changes directly affecting the middle turbinate (PCMT group).

All patients completed 2 patient-reported QOL measures: the 22-item Sinonasal Outcome Test (SNOT-22) and the Nasal Obstruction Symptom Evaluation (NOSE) score. Diagnoses of CRS and AR were assigned according to published guidelines from the American Academy of Otolaryngology—Head and Neck Surgery. A diagnosis of CRS was made when a patient presented with 2 major symptoms or 1 major and 2 minor symptoms of sinusitis over a period of 3 months or longer, with confirmation by endoscopy showing polyps or mucopurulent exudate in the middle meatus or positive computed tomography (CT) findings. A diagnosis of AR was made when a patient presented with 1 or more symptoms of nasal congestion, runny nose, itchy nose, or sneezing, with confirmation of specific immunoglobulin E (IgE) reactivity to 1 or more environmental allergens on either cutaneous or serologic testing. Asthma was diagnosed when a patient presented with a history of wheezing and a reversible obstructive pattern on spirometry or empiric relief with a β2-adrenergic agonist. Aspirin-exacerbated respiratory disease (AERD) was defined as a syndrome of diffuse sinus inflammation, reactive lower airway disease, and acute exacerbation associated with ingestion of aspirin or other nonsteroidal anti-inflammatory drugs. CT of the paranasal sinuses was obtained in cases where significant paranasal sinus disease was expected based on clinical symptoms. CT images were graded by 2 independent reviewers and scored according to the Lund-Mackay system. Recorded data included demographics, comorbidities, and laboratory evaluation of serum eosinophil count and total serum IgE. This study was approved by the institutional review board of Ochsner Clinic Foundation.

Statistical comparisons were made between the PCMT and PSP groups. SNOT-22 scores were analyzed using a 2-tailed t test, and NOSE and Lund-Mackay scores were analyzed using the Kruskal-Wallis test. Categorical variables were evaluated using a χ² or Fisher exact test. All significance levels were fixed at an α level of .05.

Results

A total of 593 patients were prospectively screened with nasal endoscopy during the study period (Table 1). Of these, 23 (3.9%) were identified with PCMT and 44 (7.4%) were identified with PSP. When comparing the demographics between both groups, PSP patients were predominantly male (75% vs 52%, P < .001) with an older mean age (53.4 vs 35.4 years, P < .0001). Inhalant allergy was confirmed by either cutaneous or serologic testing in 20 patients in the PCMT group and 20 patients in the PSP group. A greater association was noted between PCMT and AR (83% vs 34%, P < .001), whereas PCMT was rarely associated with CRS (9% vs 100%, P < .0001). Among all sensitized patients, the most common aeroallergens were dust mites (47.5%), grasses (45.0%), trees (27.5%), and weeds (25.0%). No difference in the incidence of asthma was noted between study groups (34% vs 22%, P = .21). AERD was present in 14% of PSP patients but was not seen in the PCMT group (P = .024). No significant difference was found in the incidence of smoking between groups (9% vs 9%, P = .92).
Table 1. Patient Demographics and Comorbidities.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PSP Group</th>
<th>PCMT Group</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>44</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>53.4 (16.4)</td>
<td>35.4 (12.5)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Male, No. (%)</td>
<td>33 (75)</td>
<td>12 (52)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CRS, No. (%)</td>
<td>44 (100)</td>
<td>2 (9)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>AR, No. (%)</td>
<td>15 (34)</td>
<td>19 (83)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>AERD, No. (%)</td>
<td>6 (14)</td>
<td>0 (0)</td>
<td>.024</td>
</tr>
<tr>
<td>Asthma, No. (%)</td>
<td>17 (34)</td>
<td>6 (22)</td>
<td>.21</td>
</tr>
<tr>
<td>Smoking history, No. (%)</td>
<td>4 (9)</td>
<td>2 (9)</td>
<td>.64</td>
</tr>
</tbody>
</table>

Abbreviations: AERD, aspirin-exacerbated respiratory disease; AR, allergic rhinitis; CRS, chronic rhinosinusitis; PCMT, polypoid change of the middle turbinate; PSP, paranasal sinus polyposis; SD, standard deviation.

*Bolded values indicate statistical significance.

Table 2. Patient-Reported Quality of Life Scores and Objective Measures.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PSP Group</th>
<th>PCMT Group</th>
<th>P Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOT-22 score</td>
<td>44</td>
<td>23</td>
<td>.14</td>
</tr>
<tr>
<td>NOSE score</td>
<td>44</td>
<td>23</td>
<td>.008</td>
</tr>
<tr>
<td>Lund-Mackay score</td>
<td>36</td>
<td>5</td>
<td>.0008</td>
</tr>
<tr>
<td>Eosinophil %</td>
<td>41</td>
<td>19</td>
<td>.08</td>
</tr>
<tr>
<td>Total serum IgE</td>
<td>14</td>
<td>7</td>
<td>.56</td>
</tr>
</tbody>
</table>

Abbreviations: IgE, immunoglobulin E; NOSE, Nasal Obstruction Symptom Evaluation; PCMT, polypoid change of the middle turbinate; PSP, paranasal sinus polyposis; SD, standard deviation; SNOT-22, 22-item Sinonasal Outcome Test.

*Bolded values indicate statistical significance.

Data on patient-reported QOL, imaging, and laboratory values are shown in Table 2. The mean NOSE score was greater in PSP (65.3 vs 44.3, P = .025), signifying a higher degree of nasal obstruction. SNOT-22 score was comparable between groups (40.6 vs 32.6, P = .29), with mean scores exceeding the minimum that would predict improvement from surgical management.11 The Lund-Mackay score was significantly higher in the PSP group compared with the PCMT group (14.9 vs 2.4, P < .0008), although CT was infrequently indicated and therefore not often performed in the PCMT group. The mean percentage of eosinophils in peripheral blood was not significantly different between groups (PSP 7.1 vs PCMT 3.1, P = .906). No difference was observed in mean total serum IgE, although this information was obtained for only 21 of the 61 patients, that result may be difficult to interpret.

Discussion

Polypoid change of the middle turbinate has been rarely discussed in the literature. Despite this, we have found a prevalence of nearly 4% for PCMT among patients presenting to a tertiary center with rhinologic complaints. The present study identifies positive associations of PCMT with AR and negative associations with CRS, AERD, and high-grade CT opacification. The impact on patient-reported sinonasal-related QOL is comparable between patients with PCMT and PSP, although nasal obstruction is more pronounced among patients with PSP. These findings suggest that PCMT and PSP are clinically distinct entities that should not be grouped together under the blanket diagnosis of nasal polypsis.

The relationship between PCMT and allergy is poorly understood. PSP has been strongly associated with asthma but has unclear associations with nasal allergy.12-14 Investigators have recently begun to examine the relationship between PCMT and inhalant allergy, noting an association between these 2 conditions and recommending allergy testing for patients with such findings.4 Middle turbinate edema has been described as highly specific for the presence of inhalant allergy, with a good positive predictive value and likelihood ratio for diagnosing atopic sensitization.5 Notably, middle turbinate edema may occur over a spectrum of severity, with unifocal or multifocal edema at the turbinate head occurring without overt polypoid change (Figure 3). In the present series, patients with nonpolypoid edema were not included for analysis in the PCMT group.

Sex distribution was nearly equal among patients with PCMT, which reflects the sex distribution of AR.15 In comparison, 75% of PSP patients were male with a significantly older mean age, which is consistent with previous reports of nasal polyposis.12-14 The association with asthma was similar among the 2 groups, which reflects the known associations of asthma with both AR and nasal polyposis.12-14 Conversely, the association of PSP (but not PCMT) with AERD aligns with the near-universal presence of CRS in that condition. Smoking was not significantly associated with either PSP or PCMT, although the small prevalence of smoking in the study population may preclude a significant association.

To the unaided eye, PCMT and PSP may appear similar (Figures 1 and 2), particularly when viewed with a headlight via anterior rhinoscopy. A diagnosis of “nasal polyp” may then be assigned, which could prompt treatment with steroids and/or antibiotics and further evaluation with CT imaging. However, as suggested by the current findings, this course of management may be unnecessary for those patients who actually have PCMT rather than a true sinonasal polyp. Where PSP is highly suggestive of CRS, PCMT may benefit more fruitfully from an initial evaluation for inhalant allergy and treatment accordingly. Selecting the better management course would help to avoid unnecessarily empiric use of antibiotics, adverse effects of steroids, and unwarranted diagnostic radiation exposure.

Another implication of correctly assessing the identity of a newly discovered “nasal polyp” is that anterior rhinoscopy may be insufficient for the complete physical examination of the patient with sinonasal symptoms. Nasal endoscopy provides a superior view of the middle turbinate...
and middle meatus and allows the examiner to differentiate, based on clinical inspection alone, whether a patient has PSP or PCMT. For this reason, polyps that are newly diagnosed by a primary care practitioner or other nonotolaryngologist should be referred to an otolaryngologist for further evaluation. During the course of that evaluation, the otolaryngologist should strongly consider nasal endoscopy. Given the direct and indirect costs of CT imaging and empiric medical treatment with steroids or antibiotics, upfront nasal endoscopy may be more cost-effective. This hypothesis warrants further investigation.

One potential limitation of this study is the reliance on single-observer interpretation of findings from nasal endoscopy. Although nasal endoscopy (and, more generally, physical examination) is widely regarded as an objective assessment, previous studies have shown that interobserver agreement on endoscopic findings varies significantly. Nonetheless, the reliability of middle turbinate and middle meatus assessment by unaided anterior rhinoscopy is likely to be even lower. Another limitation is the relatively small sample size, which may have failed to detect a true difference in certain parameters. For example, mean serum eosinophil levels were numerically higher in patients with PSP, but this was not statistically significant, even though eosinophilia has a known association with nasal polyposis. Future study should include larger scale multicenter data on endoscopic examination and associated clinical and biochemical factors.

Conclusion

Polypoid change of the middle turbinate is a distinct entity that is associated with AR but not CRS. In contrast, PSP is associated with CRS, male sex, older age, and high-grade sinus CT opacification. Sinonasal QOL is impaired in both PCMT and PSP, with PSP resulting in more significant nasal obstruction. Nasal endoscopy is an essential component of the diagnostic evaluation that may differentiate PCMT from PSP and assist in guiding the subsequent workup.

Author Contributions

Jacob P. Brunner, study design, data acquisition, data analysis and drafting, review, final approval and accountability for all aspects of the work; Basit A. Jawad, drafting, data collection, review, final approval and accountability for all aspects of the work; Edward D. McCoul, study design, data acquisition, data analysis and drafting, review, final approval and accountability for all aspects of the work.

Disclosures

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References


