Middle Turbinate Edema as a Diagnostic Marker of Inhalant Allergy

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Objectives

- Introduction
- Patients and methods
- Results
- Discussion
- Conclusion
Middle turbinate edema as a diagnostic marker of inhalant allergy
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Background: Middle turbinate edema could be a characteristic feature of sernallergen sensitization. In this study, we sought to determine the diagnostic characteristics of middle turbinate edema as a marker of inhalant allergy.

Methods: A cross-sectional diagnostic study was performed on patients who had undergone nasal endoscopy and allergy testing. Allergy status was determined by positive serology or epicutaneous testing. Endoscopy was reviewed by blinded assessors for middle turbinate head edema. Appearance was graded as either normal, focal, multifocal, diffuse, or polypoid edema. Receiver-operator (ROC) analysis, likelihood ratio (LR), sensitivity, specificity, and positive predictive value (PPV) were determined.

Results: One hundred eighty-seven patients representing 304 nasal cavities were assessed (52% female, age 39.3 ± 14.7 years, 57% allergic). Diffuse edema (PPV 91.7%/LR = 8) and polypoid edema (PPV 88.9%/LR = 6.2) demonstrated the strongest association with inhalant allergy. Multifocal edema was used as a cut-off to represent inhalant allergy from ROC analysis, which demonstrated 94.7% specificity and 23.4% sensitivity. The PPV for multifocal was 85.1% and LR = 4.4.

Conclusion: Middle turbinate edema is a useful nasal endoscopic feature to predict presence of inhalant allergy and, although not sensitive, has excellent PPV. © 2016 ARS-AAA, LLC.

Key Words: allergic, atopy, endoscopy, middle turbinate; nasal polyposis; rhinitis; turbinate


Al}lergic and nonallergic rhinitis are differentiated by systemic evaluation using either a skin prick test or serology: test for specific immunoglobulin E (IgE). It remains unclear whether these atopic markers are responsible for the symptoms of rhinitis. These systemic tests for atopy, although sensitive, do not detect local allergic inflammation in the nose. This localized form of allergic rhinitis is termed eosinophilic or local allergic rhinitis. A simple and specific test is needed for this.

Nasal endoscopy is a simple procedure that allows easy visualization of the nasal cavity. The presence of a pale, hypertrophied inferior turbinate head, clefting and mcosa, and congestion are hallmark endoscopic features of allergic rhinitis. However, their diagnostic characteristics are not well described. Recently, edema on the leading edge of the middle turbinate head was found to be a promising endoscopic feature of allergic rhinitis. The head of the middle turbinate head is the most anterior portion of the middle turbinate and is a likely site for allergen deposition. In allergic patients, inhaled allergens are deposited onto the head of the middle turbinate, which trigger local allergic inflammation and lead to mucosal edema. White et al.1 found middle turbinate polypoid edema to be completely associated with inhalant allergy. Among 18 patients with middle turbinate polypoid edema not involving the ethmoid, all had a positive allergy test to aeroallergen. Therefore, middle turbinate head edema could be a specific diagnostic feature that differentiates between allergic and nonallergic
Middle turbinate edema as a diagnostic marker of inhalant allergy

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Background. Middle turbinate edema could be a characteristic feature of sensitization. In this study, we sought to determine the diagnostic characteristics of middle turbinate edema as a marker of inhalant allergy.

Methods. A cross-sectional diagnostic study was performed on patients who had undergone nasal endoscopy and allergy testing. Allergy status was determined by positive serology or epicutaneous testing. Endoscopy was reviewed by blinded assessors for middle turbinate edema. Appearance was graded as either normal, focal, multifocal, diffuse, or polypoid edema. Receiver-operator (ROC) analysis, likelihood ratio (LR), sensitivity, specificity, and positive predictive value (PPV) were determined.

Results. One hundred eighty-seven patients representing 397 nasal cavities were assessed (24 females, age 19-75 years).

Although sensitive, do not detect local allergic inflammation in the nose. This localized form of allergic rhinitis is termed etiologic or local allergic rhinitis. A simple and specific test is needed for this.

Nasal endoscopy is a simple procedure that allows easy visualization of the nasal cavity. The presence of a pale, hypertrophied inferior turbinate head, cobblestoning of mucosa, and congestion are hallmark endoscopic features of allergic rhinitis. However, their diagnostic characteristics are not well described. Recently, edema on the leading edge of the middle turbinate head was found to be a promising endoscopic feature of allergic rhinitis.1 The head of the middle turbinate or the most anterior portion of the middle turbinate is a likely site for allergen deposition. In allergic patients, inhaled allergens are deposited onto the head of the middle turbinate, which triggers local allergic inflammation and leads to mucosal edema. White et al.4 found middle turbinate polypoid edema to be completely associated with inhalant allergy. Among 18 patients with middle turbinate polypoid edema not involving the ethmoid, all had a positive allergy test to aerollegers. Therefore, middle turbinate head edema could be a specific diagnostic feature that differentiates between allergic and nonallergic
Introduction

- Allergic and nonallergic rhinitis are differentiated by systemic evaluation using either a skin prick test or serologic test.
- Unclear whether these atopic markers are responsible for the symptoms of rhinitis. ~ Entopy
- White et al. found middle turbinate polypoid edema to be completely associated with inhalant allergy.

Patients and methods

- A cross-sectional diagnostic study
- Diagnosed with rhinitis
- Negative CT scan
- Had both endoscopy and allergy assessment within 6 months.
- Exclude:
  - Prior middle turbinate surgery
  - Conditions believed to affect mucosa
Middle turbinate edema grading

- Normal
- Focal
- Multi-focal
- Diffuse
- Polypoid
Inferior turbinate hypertrophy

Normal tail

mulberry tail
Results

TABLE 1. Comparison of baseline characteristics between allergic and nonallergic groups

<table>
<thead>
<tr>
<th></th>
<th>Nonallergic</th>
<th>Allergic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (n)</td>
<td>81</td>
<td>106</td>
<td>—</td>
</tr>
<tr>
<td>Age (mean ± SD)</td>
<td>44.31 ± 14.94</td>
<td>36.25 ± 13.64</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>20.3</td>
<td>21.9</td>
<td>0.26</td>
</tr>
<tr>
<td>Smokers (%)</td>
<td>1.6</td>
<td>5.3</td>
<td>0.16</td>
</tr>
<tr>
<td>Asthma (%)</td>
<td>5.9</td>
<td>21.9</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Medication use

<table>
<thead>
<tr>
<th></th>
<th>Nonallergic</th>
<th>Allergic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intranasal corticosteroids</td>
<td>4.3</td>
<td>9.7</td>
<td>0.22</td>
</tr>
<tr>
<td>Oral corticosteroids</td>
<td>2 (1.1)</td>
<td>1 (0.5)</td>
<td>0.57</td>
</tr>
<tr>
<td>Immunosuppressants</td>
<td>1 (0.5)</td>
<td>0 (0.0)</td>
<td>0.41</td>
</tr>
<tr>
<td>Reflux medications</td>
<td>4 (2.1)</td>
<td>6 (3.2)</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Results

**TABLE 2. Comparison of middle turbinate head edema grades between allergic and nonallergic groups**

<table>
<thead>
<tr>
<th></th>
<th>Nonallergic</th>
<th>Allergic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal cavities (n)</td>
<td>133</td>
<td>171</td>
</tr>
<tr>
<td>Normal (%)</td>
<td>33.9</td>
<td>37.5</td>
</tr>
<tr>
<td>Focal edema (%)</td>
<td>7.6</td>
<td>5.6</td>
</tr>
<tr>
<td>Multifocal edema (%)</td>
<td>1.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Diffuse edema (%)</td>
<td>0.01</td>
<td>4.6</td>
</tr>
<tr>
<td>Polypoid edema (%)</td>
<td>0.03</td>
<td>2.6</td>
</tr>
</tbody>
</table>
Results

- **Middle turbinate edema**
  - Sensitivity was poor ~ 25%
  - Specificity was high ~ 97%
  - Excellent PPVs ~ 90%

- **Inferior turbinate mulberry tails (15.9%)**
  - No significant association with allergic status (6.8% vs 9.1%)
  - Sensitivity ~ 13.3%
  - Specificity ~ 81%
  - PPV ~ 42.9%
Discussion

- Overall incidence of middle turbinate head edema was demonstrable in only 28.6%
- Why MT mucosa develops polyps Vs ITH?
Discussion

- White et al. described a complete association between isolated polypoid middle turbinate without any ethmoid involvement to inhalant allergy.
Conclusion

- Middle turbinate edema, although not a sensitive marker, is highly specific for the presence of inhalant allergy, with excellent PPV for making the diagnosis of allergy sensitization. It has potential for use as a marker for local inhalant allergy as it is both simple and reliable.
Thank You