

Polypoid changes of the middle turbinate as an indicator of atopic disease

Laura J. White, MD¹, Melissa R. Rotella, BSN, MSN, FNP-C² and John M. DelGaudio, MD¹

Background: High levels of local immunoglobulin E (IgE) have been demonstrated in nasal polypoid tissue; however, an association between nasal polyps and allergy has not been proven. The authors have observed that polypoid edema isolated to the leading edge of the middle turbinate (MT) is highly associated with allergic rhinitis. The objective of this study was to determine if there is an association between isolated MT polyps and inhalant allergy.

Methods: A single institution prospective study was performed. Twenty-five consecutive patients found to have isolated MT polyps on endoscopic exam were recruited. Nasal and allergy symptoms were documented on the intake form. Allergy testing was recommended to all patients.

Results: Of the 25 patients found to have isolated MT polypoid edema documented on endoscopic exam, 16 patients

underwent skin or in vitro allergy testing. All of the patients tested positive for inhalant allergy.

Conclusion: This small series provides strong evidence to support an association between isolated MT polypoid edema and allergy. We recommend allergy testing in all patients with isolated MT polyps or polypoid edema. © 2014 ARS-AAOA, LLC.

Key Words:

atopic disease; middle turbinate; polypoid edema; allergic rhinitis; Allergy; polyps

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Allergic rhinitis is caused by type I immunoglobulin E (IgE)-mediated hypersensitivity to foreign antigens. Classic symptoms of allergic rhinitis include sneezing, pruritis of the eyes/nose/throat, clear rhinorrhea, nasal congestion, and lacrimation that occur after exposure to the allergen. Diagnosis is confirmed with allergy testing, and treatment classically includes the triad of allergen avoidance, systemic or topical pharmacotherapy for symptom control, and immunotherapy.

The 2 types of allergy testing include skin testing and in vitro testing. Skin testing has been shown to be highly sensitive and specific in diagnosing inhalant allergy.¹ In vitro blood testing measures serum levels of specific IgE antibodies. In vitro testing is less sensitive than skin testing and is

used primarily in those patients at higher risk of developing anaphylaxis from traditional allergy skin testing.²

Polypoid edema of the nasal and sinus mucosa arises secondary to chronic mucosal inflammation.³ Associated symptoms may include rhinorrhea, nasal congestion, anosmia, facial pressure, and eye irritation. Although there is significant overlap in symptoms, the association between nasal polypoid edema and allergic rhinitis is controversial and has not been proven. However none of the studies investigating nasal polyps and allergy have differentiated the location or anatomic extent of the polypoid edema or polyps.

We have observed that polypoid edema or frank polyps isolated to the middle turbinate (MT) is highly associated with allergic rhinitis and positive allergy testing. Therefore, the aim of this study was to determine the association between isolated MT polypoid edema and allergy testing results.

Patients and methods

A prospective clinical study was performed between May of 2012 and July of 2013 at the Emory University Sinus, Nasal, and Allergy Center. Consecutive patients found to have isolated polyps or polypoid edema of the MT on endoscopic exam were enrolled in the study. If there was any

¹Department of Otolaryngology—Head and Neck Surgery, School of Medicine, Emory University, Atlanta, GA; ²Emory University Sinus, Nasal, and Allergy Center, Department of Otolaryngology—Head and Neck Surgery, Emory University, Atlanta, GA

Correspondence to: John M. DelGaudio, MD, Emory University School of Medicine, Department of Otolaryngology—Head and Neck Surgery, 550 Peachtree Street NE, Atlanta, GA 30308; e-mail: jdelgau@emory.edu

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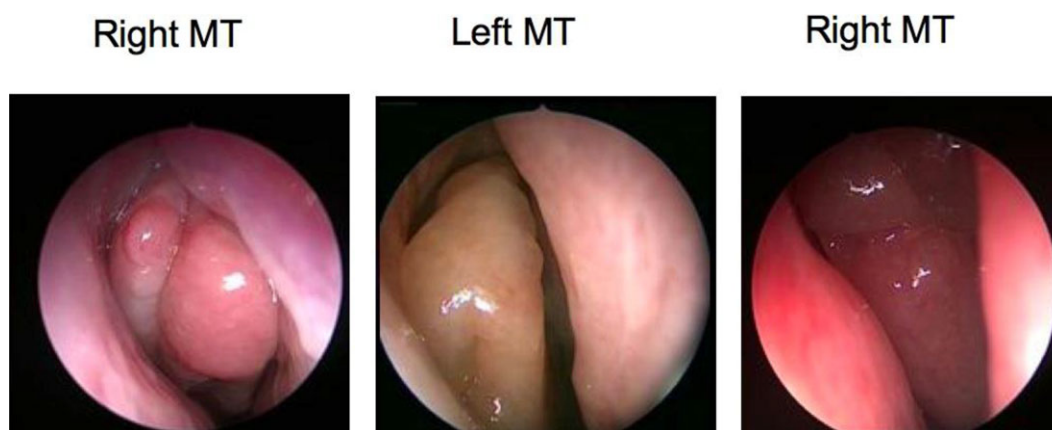


FIGURE 1. Photographs of 3 separate patients with isolated MT polypoid edema. MT = middle turbinate.

concern for extension beyond the MT based on endoscopic examination, a computed tomography (CT) scan of the sinuses was performed. Both new and returning patients were included. Emory University Institutional Review Board approval was obtained. Volunteers signed written informed consent prior to study participation. All patients were diagnosed after a comprehensive evaluation, including rigid nasal endoscopy by an experienced rhinologist.

Sinus and allergy symptoms were documented at the time of diagnosis using a standard patient intake form given to all new and returning patients at this practice. Polypoid edema or polyps isolated to the MT was documented by photo and video documentation during the endoscopic exam. Exclusion criteria included previous sinus surgery on the affected side, and polyps or polypoid edema extending beyond the MT based on endoscopic evaluation or CT.

All patients were recommended to undergo allergy testing. Allergy testing results were included if they had been performed at our institution or were documented from an outside institution. At our institution modified quantitative testing (MQT) for allergy is used unless there is a high concern for anaphylaxis, substantial medical comorbidities, needle-phobia, or if patients refuse skin testing, in which case in vitro blood testing is performed. Allergy testing is considered positive for MQT endpoints of 3 to 6. An endpoint of 6 is considered severe. Endpoints of less than 3 are considered negative. For in vitro testing, the outcome is recorded by the laboratory as class 0 to 6. Class 0 is considered anergy, class 1 to 3 is considered positive, and class 4 to 6 is considered strongly positive. No anaphylactic reactions or significant adverse reactions were noted in the study participants. Descriptive statistics were performed to determine if there was an association between isolated polypoid changes of the MT and allergy testing. Patient-documented symptoms of allergic rhinitis were also evaluated.

No control group was used because this was an observational study to determine if there is an association between isolated MT polyps and positive allergy testing, as this has not been described previously.

Results

Twenty-five patients were found to have isolated MT polypoid edema on endoscopic examination (Fig. 1). Three patients refused to participate in the study because they did not want to undergo allergy testing, and 6 had not undergone allergy testing at the time this article was submitted. Of the 16 patients who participated, the average age was 35 years, and 62% of patients were male (Table 1). The majority of MT polyps were bilateral (Table 1). Nine patients (56%) underwent CT of the sinuses to confirm that the polypoid edema did not extend beyond the MT (Table 2). All patients with isolated MT polypoid edema had allergic rhinitis symptoms. The most common presenting symptom was nasal congestion, and additional complaints included facial pain, sneezing, rhinorrhea, postnasal drip, cough, and itchy eyes (Table 3).

Of the 16 patients who underwent allergy testing, 2 patients had in vitro blood testing, and 14 underwent skin testing. Patients demonstrated allergy to both perennial and seasonal antigens (Table 2). All 16 (100%) patients

TABLE 1. Demographic information and site of polypoid edema for the 16 patients included in the study

	MT polyps (n = 16)
Gender, n (%)	
Male	10 (62.5)
Female	6 (37.5)
Age, years (mean $\pm$ SD)	35.25 $\pm$ 13.46
Site, n (%)	
Left	0 (0.0)
Right	5 (31.2)
Bilateral	11 (68.8)

MT = middle turbinate; SD = standard deviation.

TABLE 2. Allergy testing results

Patient ID	Type of allergy testing	Positive perennial allergens (n)	Positive seasonal allergens (n)	Total antigens tested (n)	CT needed to confirm isolated polyps
1	MQT	5	20	26	Yes
2	Skin prick	4	4	46	No
3	MQT	3	16	26	Yes
4	MQT	0	15	26	No
5	In vitro	4	18	27	Yes
6	MQT	5	15	26	Yes
7	In vitro	5	22	27	Yes
8	MQT	3	7	26	No
9	MQT	5	17	26	Yes
10	MQT	5	20	26	Yes
11	MQT	4	8	26	No
12	MQT	6	13	26	No
13	MQT	5	21	26	Yes
14	MQT	5	14	26	Yes
15	Skin prick	5	13	29	No
16	MQT	3	7	29	No

CT = computed tomography; MQT =

TABLE 3. Presenting symptoms

Patient ID	Nasal congestion	Rhinorrhea	Headache	Lacrimation	Sneezing	Itchy eyes	Epistaxis	Facial pain	Postnasal drip	Cough
1	+									
2	+						+	+		
3	+	+					+			
4	+	+			+					
5			+		+			+	+	+
6	+	+			+				+	
7	+									
8	+	+								
9	+									
10	+					+				
11	+									
12				+	+	+			+	
13	+									
14	+	+			+					
15	+	+				+				
16	+	+			+					
Total, n(%)	14 (87.5)	7 (43.8)	1 (6.3)	1 (6.3)	6 (37.5)	3 (18.8)	2 (12.5)	2 (12.5)	3 (18.8)	1 (6.3)



FIGURE 2. Patient with isolated polypoid edema of the middle turbinate before, during, and after conservative sculpting of the middle turbinate.

who underwent allergy testing tested positive for inhalant allergy.

Discussion

Researchers have been investigating the association between nasal polyps and allergy for decades. An early study in 1978 demonstrated that 39% of patients with nasal polyps had positive allergy testing.⁴ Another study demonstrated that the association between nasal polyps and asthma was strong, but not associated with atopic status demonstrated by skin-prick allergy testing.⁵ An additional prospective study could not associate atopy with nasal polyps.⁶ Newer research has shown that there is evidence of local production of IgE in polypoid tissue, but still no direct association with positive serum allergy testing has been shown.^{7–9} However, none of these studies differentiated between isolated MT polyps and generalized sinonasal polyps.

All of the patients with isolated MT polypoid edema presented with symptoms consistent with allergic rhinitis. Of the 16 patients included in the study, 100% had positive allergy testing and are now undergoing targeted, allergen-specific immunotherapy. Similar to what has been reported in previous studies on generalized nasal polyps, the majority (68%) of patients were found to have bilateral MT polyps.¹⁰ The average age for a patient to be diagnosed with nasal polyps is 45–50 years old.¹¹ The average age of diagnosis in this study population was 35 years old. This may be because patients tend to be diagnosed with allergic rhinitis at younger ages, with 80% of patients being diagnosed by age 20 years.¹² Additionally, males more commonly present with nasal polyps than females, and our study population of patients with isolated MT polypoid edema confirmed this.¹³

Nasal airflow occurs primarily between the inferior turbinate (IT) and the MT.¹⁴ Therefore, deposition of allergens is primarily along this tract. Previous studies in patients with nasal polyps have demonstrated similar mucosal inflammation, cellular proliferation, and eosinophilic infiltration in nasal polyp, MT, and IT tissue irrespective of the location of the nasal polyps.¹⁵ The etiology for the isolated

polypoid edema of the MT vs the IT may be due to embryological differences. It is possible that the IT is not prone to polyp formation despite allergen deposition. The MT develops from the ethmoid bone and the IT develops from the maxilla and lateral cartilaginous capsule, which may explain a developmental difference in propensity for polypoid degeneration of the MT. Additionally, the MT acts as a filter and may minimize allergens and irritants from reaching the sinuses and the nasopharynx, and therefore may act as a protective barrier from the formation of more extensive nasal polyps.

Treatment considerations for patients with isolated MT polypoid edema should begin with topical nasal steroid sprays and allergy testing. If the polypoid degeneration or polyps are obstructive and cause significant symptoms, such as nasal obstruction and/or recurrent sinusitis, we recommend a trial of systemic steroids. If the symptoms persist and endoscopy shows persistent polyps, we perform conservative sculpting of the MT. It is important, however, to maintain the normal anatomy and physiology of the MT, which includes the physical barrier as well as the filtering role of the intact mucosa. This sculpting can be performed in the office-based setting or the operating room (Fig. 2).

Given the significant impairment associated with allergic rhinitis, early diagnosis and treatment is important. This study provides preliminary evidence of an association between isolated MT polypoid edema and atopic disease. However, this is not to suggest that all patients with allergy will have polypoid changes to the MT. Additionally, given that there is no control group in this study, further study is warranted to elucidate these findings.

Conclusion

This study provides evidence to support an association between isolated MT polyps or polypoid edema and inhalant allergy. Allergy testing should be recommended in patients found to have isolated MT polyps or polypoid edema. This study does not provide evidence for a relationship between inhalant allergy and generalized nasal polyps. ④

References

- Bernstein IL, Li JT, Bernstein DI, et al. Allergy diagnostic testing: an updated practice parameter. *J Allergy Clin Immunol*. 2008;100:S2–S122.
- Hein EW. Radioallergosorbent test (RAST)—reliable tool or poor substitute? *Cleve Clin Q*. 1983;50:361–366.
- Georgy MS, Peters AT. Nasal polyps. *Allergy Asthma Proc*. 2012;1:22–33.
- Holopainen E, Makinen J, Paavolainen M, et al. Nasal polyposis: relationships to allergy and acetylsalicylic acid intolerance. *Acta Otolaryngol*. 1979;87:330–334.
- Pearlman AN, Chandra RK, Chang D. Relationships between severity of chronic rhinosinusitis and nasal polyposis, asthma, and atopy. *Am J Rhinol Allergy*. 2009;23:145–148.
- Busuttill A, Chandrachud H, Kerr AIG, et al. Simple nasal polyps and allergic manifestations. *J Laryngol Otol*. 1978;92:477–487.
- Wise SK, Ahn CN, Schlosser RJ. Localized immunoglobulin E expression in allergic rhinitis and nasal polyposis. *Curr Opin Otolaryngol Head Neck Surg*. 2009;17:216–222.
- Suh K, Park H, Nahm D, et al. Role of IgG, IgA, and IgE antibodies in nasal polyp tissue: their relationship with eosinophilic infiltration and degranulation. *J Korean Med Sci*. 2002;17:375–380.
- Sabirov A, Hamilton R, Jacobs J, et al. Role of local immunoglobulin E specific for *Alternaria alternata* in the pathogenesis of nasal polyposis. *Laryngoscope*. 2008;118:4.
- Hao J, Pang YT, Wang DY. Diffuse mucosal inflammation in nasal polyps and adjacent middle turbinate. *Otolaryngol Head Neck Surg*. 2006;134:267–275.
- Dudvarski Z, Pendjer I, Djukic V, Jaosevic L, Mikic A. The analysis of clinical characteristics of chronic rhinosinusitis: complicated and uncomplicated form. *Eur Arch Otorhinolaryngol*. 2008;265:923–927.
- Dykewicz MS, Fineman S, Skoner DP, et al. Diagnosis and management of rhinitis: complete guidelines of the Joint Taskforce on Practice Parameters in Allergy and Immunology. *Ann Allergy Asthma Immunol*. 1998;81:478–518.
- Deal RT, Kountakis SE. Significance of nasal polyps in chronic rhinosinusitis: symptoms and surgical outcomes. *Laryngoscope*. 2004;114:1932–1935.
- Chaaban M, Corey J. Assessing nasal air flow. *Proc Am Thorac Soc*. 2011;8:70–78.
- Wu CC, Lee TJ, Chang PH, et al. Similar cellular proliferation activities in nasal polyps and adjacent inferior turbinate. *Am J Otolaryngol*. 2012;33:14–19.
- Scheithauer MO. [Surgery of the turbinates and “empty nose” syndrome]. *Laryngorhinootologie*. 2010;89(Suppl 1):S79–S102. German
- Hildenbrand T, Weber RK, Brehmer D. Rhinitis sicca, dry nose and atrophic rhinitis: a review of the literature. *Eur Arch Otorhinolaryngol*. 2011;268:17–26.