Antrochoanal polyp: a review of 57 patients
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Objectives
To detect the site of attachment of the antral part of the polyp and the prevalence of coexisting sinonasal anatomical variations in the antrochoanal polyp (ACP) side.

Patients and methods
A retrospective study of 57 patients treated for ACP was conducted between 2018 and 2020 in the Department of Otolaryngology of Kasr Alainy Hospital, Cairo University. All patients underwent a complete history, head and neck examination, nasal endoscopy, and computed tomography. Factors, including age, gender, associated symptoms, imaging findings, surgical approach, and the site of attachment of the antral part of the polyp, were recorded.

Results
This study included a total of 57 patients (33 males and 24 females). The mean age of the patient was 22±12.9 (range, 9–59) years. Mean age was 21.8 years for males and 23.6 for females. The major symptoms seen were constant and unilateral nasal obstruction in 34 (59.6%) patients. The exact origins of the polyps were located in different positions within the maxillary sinus and were able to be detected in 39 sides. It was detected in the anteroinferior antral wall on 16 sides, in the inferior antral wall on six sides, in the medial antral wall on six sides, in the lateral antral wall on six sides, and in the posterior antral wall on five sides.

Conclusion
Endoscopic approach for complete removal of the choanal polyps is an extremely safe and effective procedure. Despite the different approaches of ACP excision, the recurrence rates are still high.

Keywords:
antrochoanal polyp, computed tomography, endoscopic, recurrence

Introduction
The antrochoanal polyp (ACP) is an inflammatory solitary polyp that mostly originates in the maxillary antrum with posterior extension to the nasopharynx. The antral portion of these polyps is cystic, and the intranasal portion is usually solid [1]. In 1906, Killian described the ACPs in detail, however, it was described first by Palfijn in 1753 [2].

Thirty percent of pediatric sinonasal polyps are ACP. Histologically, the ACPs missed the inflammatory and eosinophil cells seen in inflammatory polyps [1].

Endoscopically, the ACP appears as unilateral nasal growth coming from the maxillary sinus extending posteriorly to the choana. Computed tomography (CT) of the paranasal sinuses can help to assess its nature and differentiate it from other unilateral nasal masses [3].

The Caldwell–Luc operation was used to be performed to remove the cystic antral portion. This is not commonly performed today due to increased morbidities [4].

Nowadays, the method of choice is endoscopic sinus surgery with the help of angled telescopes and instruments [5]. Local recurrence is still common following surgical removal, likely because of persistence of inciting pathogenetic factors and incomplete removal [2,6–8].

The aim of the current study was to detect the site of attachment of the intramaxillary part of the polyp to minimize the recurrence of the ACP and the prevalence of coexisting sinonasal anatomical variations on the ACP side.

Patients and methods
This research studied 57 patients retrospectively who were admitted and treated for ACPs in the Otolaryngology Department at our tertiary-care institute in a duration of 2 years between 2018 and 2020.

All participants in this research underwent a full history, head and neck examination, nasal endoscopic examination, and CT of paranasal sinuses.

Demographic data of the participants, associated symptoms, and imaging data were recorded...
preoperatively. Endoscopic approach and the site of attachment of the intramaxillary part of the polyp were recorded intraoperatively. Postoperatively, 2-year follow-up was done.

One of the following treatment strategies was applied: (a) endoscopic polypectomy with middle meatal antrostomy (MMA), (b) endoscopic polypectomy with simultaneous MMA and inferior meatal window, or (c) prelacrimal recess approach.

**Ethical approval**

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board (permit number 28-2017-10988).

**Results**

This clinical research studied 57 patients (33 men and 24 women). The mean age of the patient was 22±12.9 (range, 9–59) years. Mean age was 21.8 years for males and 23.6 for females (as shown in Fig. 1). There is no statistical difference between male and female patients regarding age.

ACP was presented on the right side in 32 (56.14%) cases and on the left side in 25 (43.85%) cases \( (P=0.04) \) (as shown in Fig. 2).

The major symptoms seen in this present investigation were complete unilateral nasal obstruction in 34 (59.6%) patients, purulent discharge in 16 (28%), snoring and facial pain in nine (15.8%) patients, and epistaxis in four (7%); also, bilateral nasal obstruction; halitosis and headache in two patients; and muffled voice, nasal pruritus, and hyposmia in one patient (as shown in Fig. 3).

CT of the paranasal sinuses revealed maxillary sinus total opacity in all participants (100%), ethmoidal sinusitis in 42 (56%) patients, contralateral maxillary sinusitis in 14 (18.6%) patients, septal deviation on the ACP side in 29 (50.8%) patients, concha bullosa in 18 (13.5%) patients, and paradoxical middle turbinate in six (10.5%) patients (as shown in Table 1).

As to the surgical approaches used in this study, 32 (56%) patients underwent endoscopic removal of ACP with MMA, 16 (28%) patients underwent endoscopic removal of ACP with simultaneous MMA and inferior meatal window, and nine (16%) patients underwent prelacrimal recess approach.

The site of attachment of the polyps was detected in discrete sites within the maxillary sinus and was able to be detected on 39 sides. It was located in the...
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anteroinferior antral wall in 16 cases, in the inferior antral wall in six cases, in the lateral antral wall in six cases, and in the posterior antral wall in five cases (as shown in Table 2).

Follow-up was completed endoscopically for a period ranging from 9 to 42 months, with a mean of 24 months.

Recurrence of ACPs was detected in three patients who underwent MMA and two patients who underwent combined MMA with inferior meatal window. No recurrence was detected in the prelacrimal recess approach. Patients with recurrence were managed using the prelacrimal recess approach.

Discussion

The ACPs are a nonneoplastic sinonasal lesion that herniates from the antrum of maxillary sinus. Cook et al. [9] revealed the male predominance of ACP. In this study, 57.8% of patients were men and 42.2% were women. However, some researches, such as Yuca et al. [10], Gendeh et al. [11], and Kaushal et al. [12] stated ACPs to be more frequent in women with a men/women ratio of 1:1.5.

Unilateral constant nasal blockade is the most persistent symptom of ACPs (59.6%). This finding was consistent with the previous study by Franche et al. [13].

The classic finding of the ACP in CT scan is hypodense mass arising from the enlarged maxillary sinus protruding into the nasal cavity and nasopharynx [3]. In the present study, CT of the paranasal sinuses revealed maxillary sinus total opacity in all patients (100%), ethmoidal sinusitis in 42 (56%) patients, and contralateral maxillary sinusitis in 14 (18.6%) patients.

The contribution of anatomical variations of the paranasal sinuses in ACPs had been reviewed by many studies. This principle depends on the ostiomeatal complex crowdedness causing increased pressure in the maxillary sinus and protrusion of mucosal structures into the nasal cavity. Hekmatnia et al. [14] and Balikci et al. [15] stated nasal variations in ACP as septal deviation, turbinate hypertrophy, and concha bullosa. Frosini et al. [16] also reported concha bullosa as the most repeated anatomical variation sharing in ACP formation.

In the current study, anatomical variations were as follows: a septal deviation on the ACP side in 29 (50.8%) cases, concha bullosa in 18 (13.5%) patients, and paradoxical middle turbinate in six (10.5%) patients. The relationship between anatomical variation presence and ACP formation was statistically significant compared with the non-ACP nasal side (P=0.003).

ACP can be redivided, depending on its origin within the wall maxillary sinus. Kaushal et al. [12] and Berg et al. [17] concluded that the inferolateral aspect of the antrum is the most common site of attachment of ACP. Deka [6] found that 45% of the patients had an attachment to the posteromedial aspect of the maxillary sinus, 40% of the polyps attached in the anteroinferior wall of the maxillary sinus, and, in 15%, the site of origin could not be examined precisely.

In this study, in 31.5% of patients, the site of origin cannot be examined, 28% originated from the anteroinferior wall, 10.5% from each of inferior wall, lateral wall, and medial wall, and 8.8% originated from the posterior wall.

Many endoscopic approaches for managing ACPs have been raised to decrease the local recurrence with minimal morbidities. All approaches are based on detection of the site of attachment [2,18].

Atighechi et al. [19] analyzed 19 (21%) patients with ACP managed through endoscopic MMA with postoperative recurrence. Sato and Nakashima [7] analyzed 25 patients of ACP managed through endoscopic MMA with postoperative recurrence in 16 (64%) patients. Comoglu et al. [8] have recently stated that endoscopic prelacrimal recess approach showed high success rate (83%) in patients with recurrent ACPs. In this study, local recurrence of ACPS was detected in 9.3% of patients who underwent MMA and 12.5% of patients who underwent combined MMA with inferior meatal access. No recurrence was detected in the prelacrimal recess approach.

<table>
<thead>
<tr>
<th>Site of attachment (n%)</th>
<th>Total number of patients</th>
</tr>
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<tbody>
<tr>
<td>Anteroinferior Wall</td>
<td>16</td>
</tr>
<tr>
<td>Inferior Wall</td>
<td>6</td>
</tr>
<tr>
<td>Lateral Wall</td>
<td>6</td>
</tr>
<tr>
<td>Posterior Wall</td>
<td>5</td>
</tr>
<tr>
<td>Medial Wall</td>
<td>6</td>
</tr>
<tr>
<td>Uncertain</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 1 Preoperative computed tomography findings of patients with antrochoanal polyp

Preoperative CT findings | Patients [n (%)] |
<table>
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<tr>
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<tbody>
<tr>
<td>Maxillary sinus opacity</td>
<td>57 (100)</td>
</tr>
<tr>
<td>Ethmoidal sinusitis</td>
<td>42 (56)</td>
</tr>
<tr>
<td>Maxillary sinusits of the contralateral side</td>
<td>14 (18.6)</td>
</tr>
<tr>
<td>Septal deviation</td>
<td>29 (50.8)</td>
</tr>
<tr>
<td>Concha bullosa</td>
<td>18 (13.5)</td>
</tr>
<tr>
<td>Paradoxical middle turbinate</td>
<td>6 (10.5)</td>
</tr>
</tbody>
</table>

CT, computed tomography.

Table 2 Site of attachment of the antral part of the polyp
Conclusion
Despite the different approaches of ACP excision, the recurrence rates are still high. The surgeon must focus on the detection of the site of origin of the polyp to prevent local recurrence after surgery. Improved knowledge of the role of radiology to detect the site of origin of ACP could be valuable in order to minimize the postoperative local recurrence of ACP.

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Conflicts of interest
There are no conflicts of interest.

References