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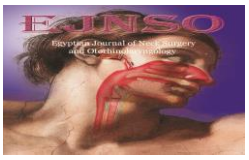

# Choanal polyps: Variant sites of origin

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**Abstract:**

**Introduction:** Choanal polyps (CPs) are benign inflammatory lesions that arise from the mucosa of the nasal cavity and paranasal sinuses and migrate through the choana to the nasopharynx.

**Objectives:** All patients with choanal polyps (CPs) operated upon over 10 years were retrospectively recorded to draw attention to such cases and their management.

**Patients and Methods:** This study was conducted on 117 patients presented with choanal polyps based on a detailed history, physical examination, and necessary investigation (CT nose and paranasal sinuses axial and coronal cuts).

**Results:** We faced 117 patients with CPs. Antrochoanal polyp (ACP) was the commonest variety, occurring in 94/117 (80.3%) of cases, 5 of them were simultaneously occurring bilateral ACPs. Choanal polyps with unusual sites of origin occurred in 23/117 (19.7%) of cases; 9/23 were ethmochoanal polyps (ECPs) with a free maxillary sinus in CT; 9/23 were sphenochoanal polyps (SCPs); 5/23 were turbinochoanal polyps (TCPs) arising from the inferior and middle turbinates. Endoscopic sinus surgery was done in all cases, with alleviation of symptoms. Recurrence occurred in 2 cases with ACPs.

**Conclusion:** ACP is the usual and most common variety of CPs; yet, CPs with unusual sites of origin occurred in 19.7% of cases. Nasal endoscopy, CT scanning, and endoscopic examination under anesthesia are essential to identify the site of CP origin. Thus, complete removal of the polyp with its fixation site(s) could be done and unnecessary surgery on unaffected sinuses could be avoided. Histopathological confirmation of the diagnosis should be considered in suspicious cases.

**Key words:** Choana, Antrochoanal polyp, Computed tomography, Histopathology, Endoscopic sinus surgery.

## Introduction

Choanal polyps (CPs) are benign inflammatory lesions that arise from the nasal cavity and paranasal sinuses mucosa and migrate through the choana to the nasopharynx. Antrochoanal polyps (ACPs) are the most prevalent kind of CPs, which arise from the maxillary sinus mucosa [1,2]. They emerge from the maxillary antrum's inner wall and expand slowly, passing through the accessory or, in rare cases, the natural ostium. The nasal septum, middle, and inferior turbinates, as well as the ethmoid and sphenoid sinuses, are possible sources of CP. [3]

Typically, these polyps are unilateral lesions, but there are a few reports of

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CPs presenting bilaterally in the literature. [4,5]

The pathogenesis and etiology of CPs are yet unknown. It is believed that atopy, chronic lymphatic obstruction, and chronic inflammation all contribute to the development of CPs [6,7]. In the general population, these lesions account for 4–6% of all nasal polyps, while in children, the proportion is closer to 33% 8.

Anterior rhinoscopy is the key diagnostic method and the foundation for therapeutic options, together with endoscopic examination of the nose, the paranasal sinuses computed tomography (CT) and endoscopic excision being the preferred treatment. [9]

The goal of this study was to assess all cases of CPs presenting to our institute, with special emphasis on those with unusual sites of origin to draw attention to their variant clinical presentations, and confirm the role of endoscopic sinus surgery and computed tomography in these cases.

## Patients and methods:

A retrospective study was carried out from 2012 to 2022 and 117 patients presented with choanal polyps based on a detailed history, physical examination, and necessary investigation (CT nose and paranasal sinuses axial and coronal cuts).

The local ethics committee approved the study with No. Soh-Med-22-09-19. All patients gave their informed consent. In all of the cases, the treatment of choice was endoscopic sinus surgery (ESS).

The duration of the follow-up was varied, although it was at least 24 months following the surgical procedure.

A histopathological examination was done for any suspicious lesion to exclude possible neoplasm.

## Statistical analysis

The SPSS software (version 17) was used to conduct the statistical analysis. Mean & standard deviation is shown for continuous variables, while absolute numbers and percentages are shown for categorical variables.

Categorical variables were examined using either the chi-square test or the Fisher's exact test, depending on the circumstance.

A p-value of less than 0.05 was deemed statistically significant.

## Results

The study included 117 patients with an age range of cases were from 8 to 43 years with a mean age of 19±10.8 years old. The highest prevalence of the disease (72/117 (61.5%) was in the adult age group than pediatric patients (45/117 (38.5%). Among all patients, CPs were more common in males 61 (52.1%) than females 56 (47.9%), and more common on the left side 57 patients (48.7%) than on the right side 55 cases (47%) (Table 1).

In 94/117 (80.3%) of the cases, the maxillary sinus was the most frequent site of origin, followed by the ethmoid and sphenoid sinuses, 9 patients in each of them (7.7%). Preoperatively, all of the patients had paranasal sinus computed tomography imaging. 5 patients had bilateral choanal polyps, one of these 5 cases had a larger left-sided ACP that extended through the right choana into the right nasal fossa and presented bilaterally (Figure 1). All of them were treated accordingly.

CPs with unusual sites of origin occurred in 23/117 (19.7%) of cases. In 9 patients (9/23=39.1%), the pedicle was found to be attached to the ethmoid forming ethmochoanal polyp (ECP), arising from the uncinate process (UP) in 7 cases, and the bulla ethmoidalis in

two, with clear maxillary sinus ostium (MSO) of polyp attachment, and free maxillary sinus in CT (**Fig. 2**).

The sphenoid sinus was the sinus of CP origin with the pedicle arising from the sphenoid sinus ostium forming a sphenochoanal polyp (SCP) in 9 patients (9/23=39.1%); 2 of them presented with bilateral nasal obstruction due to polyp extension into the contralateral side (Fig.3). The inferior turbinate (IT) posterior end and the anterior face of the middle turbinate (MT) was the site of CP origin (Figure 4), forming a turbinochoanal polyp (TCP) in five cases (5/23=21.7%).

In both adult and pediatric patients, unilateral ESS was the most common surgical technique (Table 1). None of the patients experienced any complications. The average follow-up period was 22.4 ±12.6 months. (Range, 10 - 60 months).

During follow-up, recurrent CPs constituted 1.7% (2/117). Recurrence was seen in one pediatric ACP patient after one year and one adult patient after 3 years with the ethmoido-choanal polyp. All of the recurrences that occurred were treated with endoscopic technique, without any further recurrences, with excellent outcomes.

**Table 1.** Patients' characteristics

| Variable | Mean±SD |
|---|---|
| Age | 19±10.8(8-43) |
| Children | 45 (38.5%) |
| Adults | 72 (61.5%) |
| Sex | |
| Male | 61 (52.1%) |
| Female | 56 (47.9%) |
| Side | |
| Right | 55 (47%) |
| Left | 57 (48.7%) |
| Bilateral | 5 (4.3%) |
| Recurrence | 2 (1.7%) |
| Site of origin: | |
| Maxillary sinus | 94 (80.3%) |
| Ethmoid sinus | 9 (7.7%) |
| Uncinate process | 7 (6%) |
| Bulla ethmoidalis | 2 (1.7%) |
| Sphenoid sinus | 9 (7.7%) |
| Middle turbinate | 2 (1.7%) |
| Inferior turbinate | 3 (2.6%) |
| Endoscopic surgery | All of the cases |
| Complication after surgery | None |
| Follow up period | 22.4 ±12.6 months |

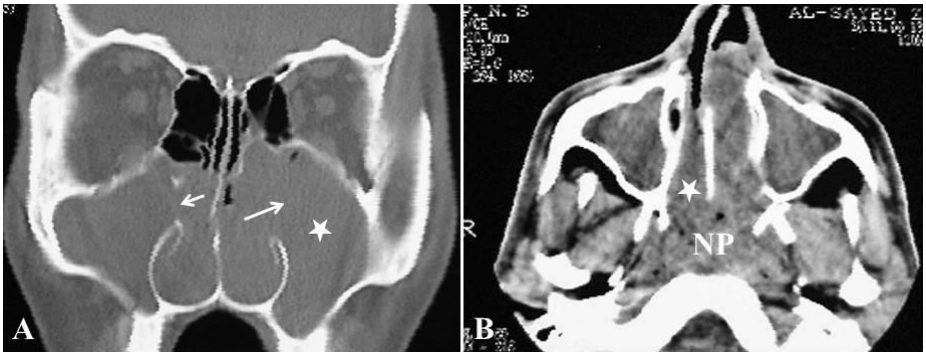


**Figure 1**: (A) CT scan with coronal bone widow cut showing soft tissue density masses filling both maxillary antra and nasal fossae more marked on the left side (white asterisk), with a mild expansion of the left antral roof, and widened maxillary sinus ostia on both sides (white arrows). (B) CT scan with axial soft tissue cut showing soft tissue density masses filling both maxillary antra, with a soft tissue density mass filling the left nasal fossa, extending through the left choana into the postnasal space (NP), then through the right choana into the right nasal fossa (white asterisk).

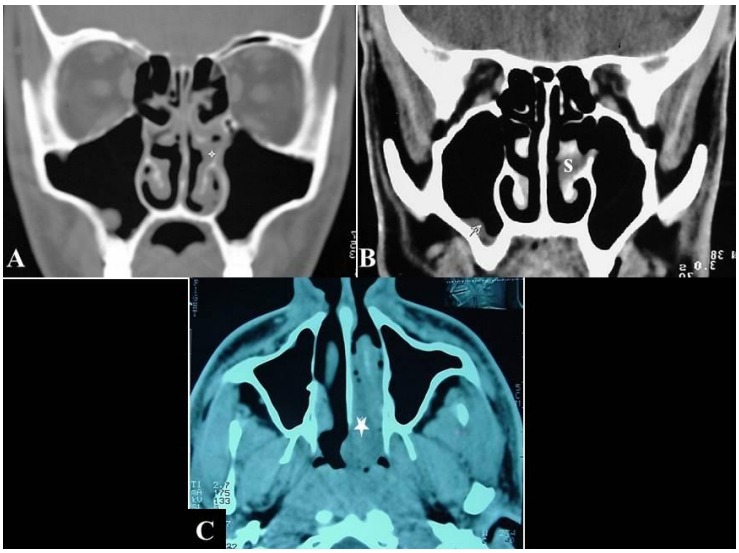


**Figure 2**: (A, B) CT scan with coronal bone window and soft tissue cuts showing a soft tissue density mass appeared attached to the uncinate process (white cross in A), and seen in the middle meatus in the region of the left maxillary sinus ostium (s in B) with clear paranasal sinuses on that side. Localized mucosal thickening of the right maxillary sinus was seen (white arrow in B). (C) CT scan with axial soft tissue cut shows that this soft tissue density mass fills most of the posterior part of the left nasal fossa (white asterisk) and projects through the choana into the nasopharynx, with a clear maxillary sinus on that side.

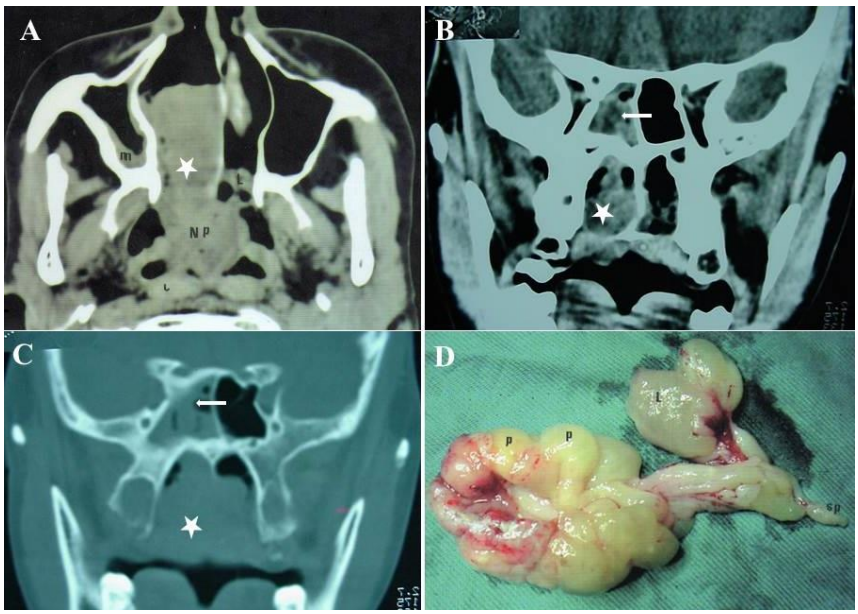


**Figure 3**: (A) CT scan with axial soft tissue window cut showing a soft tissue density mass filling most of the right nasal fossa (white asterisk), extending through the right choana into the nasopharynx (NP), then through the left choana into the posterior part of the left nasal fossa (L), with underdeveloped right maxillary sinus with concentric mucosal thickening (m). (B, C) CT scan with coronal soft tissue (B) and bone window (C) cuts showing a soft tissue density mass in the right sphenoid sinus (white arrows), filling the right choana (white asterisk in B) and nasopharynx (white asterisk in C). (D) A photograph demonstrating a freshly removed bi-lobed SCP with multiple polypoid projections on the surface (P), a narrow long pedicle of the polyp arising from the right sphenoid sinus (sp), and the part of the polyp that passed into the left nasal fossa (L in A and D).


**Figure 4**: CT scan with coronal (A, B), axial (C) bone window cuts, and axial soft tissue cut (D) showing a soft tissue density mass arising from the posterior end of the inferior turbinate, and extending through the right choana into the nasopharynx (white arrows).

## ***Discussion :***

Choanal polyps grow from inside the paranasal sinus and migrate through the choana to the nasopharynx, with a narrow portion that corresponds to the ostium of the sinus. [10] Their etiologic link to allergies, on the other hand, is debatable; some reports claim that 15% to 40% of patients have a history of allergy. The most frequent type of CPs is the ACP which is developed from the maxillary antrum that coincides with our results. In the literature, the inferior and middle turbinates, nasal septum, and anterior ethmoid sinus have all been identified as unusual sites of origin for choanal polyps. CPs are isolated swellings that aren't frequently linked to other types of sinusitis. [11] ACPs typically originate from the posterolateral wall of the maxillary sinus and enter the middle meatus through either the native ostium or an accessory ostium without causing bone damage or distortion. Typically, the polyp extends posteriorly to the choana and fills the middle meatus between the middle turbinate and the lateral nasal wall. ACPs on both sides are quite uncommon. **Sinha and Kumar** [12] reported the first such instance in 1980. Since then, a few more have been reported. We discovered 5 cases of bilateral ACPs that occurred at the same time in this study.

The ethmoid was the site of CP origin and attachment in 9/117 (7.7%) of our cases. Different parts of the ethmoid bone including the uncinate process, bulla, and middle meatus could be possible sites of CP attachment. Yet; we didn’t record CPs originating from ethmoid air cells or superior turbinate. Ku et al. reported CPs arising from the right superior turbinate. [13]

The nasal turbinates were sites for unusual CP attachment in 5/117 (4.3%) patients, with solitary pedicle attached to inferior in 3 patients and middle turbinates in 2 patients. **Yariktaş et al** [14] presented a patient who had a choanal

polyp that developed in the inferior turbinate and was identified with nasal polyposis after endoscopic surgery. Yumoto et al. reported a CP arising from the posterior portion of the MT in a girl of 12 years old 5.

An instance of sphenochoanal polyp with nasal polyps was reported by **Tysome and Saleh** [15] .

**Klausen et al.,** [16] described a case of nasal solid oncocytoma that appeared as a choanal polyp. It's crucial to avoid misdiagnosing these additional swellings as choanal polyps. Preoperative MRI and biopsies may be beneficial. A sphenochoanal polyp is an uncommon form of choanal polyp that develops in the sphenoid sinus, as the name suggests. Because most sphenochoanal polyps are tiny, asymptomatic growths, and some spontaneously resolve, they believe they are more prevalent than previously thought. An asymptomatic sphenochoanal polyp spontaneously regressed in a 3-year-old girl, according to **Lim and Sdralis** [17]. The sphenoid sinus was involved by CPs in 9/117 cases (7.7%) in our series forming an SCP, in one of them a bi-lobed SCP presented bilaterally.

Up to our knowledge, our series included the largest reported number of CPs with unusual sites of origin (23/117=19.7%). **Lopatin et al.** reported ACPs, SCPs, and ECPs in 11, 3, and 6 patients respectively in their series of 20 patients with CPs. [3] CPs with unusual sites of origin presented similarly to the more common type of ACP, both clinically and histologically. [18,19]

The most prevalent symptom among those with choanal polyps was nasal obstruction, while headaches, snoring, and postnasal discharge were more common than in previous studies. [20]

Nasal endoscopic examination and imaging techniques, such as paranasal sinus (CT) are commonly used to diagnose a CP and should be considered before any definitive treatment. In patients with any suspicious findings, additional measures should be done like punch biopsy and histopathologic examination or further imaging techniques (such as MRI) to avoid any missed diagnosis, especially in instances with an atypical site of origin of CPs. [3]

A heterogeneous or red coloration of the swelling, quick symptoms development, and abnormal signs and symptoms on computed tomography scans like epistaxis, bone disintegrations, and front cranial base deformities are all warning signs. Anomalies of development like intranasal gliomas and encephaloceles, juvenile angiofibromas, and inverted papillomas, mucoceles, unilateral polyps associated with chronic rhinosinusitis, and other sinonasal neoplasms should be considered in the differential diagnosis of CPs. The use of computed tomography can be useful for differential diagnosis, finding the attachment of the polyp, deciding the size of the polyp, and diagnosis of concurrent sinusitis, all of which are crucial for therapeutic effectiveness.[21]

For CPs, surgery is the sole treatment option. Steroid medications have little effect on CPs, unlike nasal polyposis. Before the development of endoscopic nasal surgery, the Caldwell-Luc approach and simple polyp avulsion were the two most frequently used surgical techniques for many years. [22]

Modern rhinology practise has proven that a high rate of recurrence is associated with simple removal. Prior to the ESS era, the Caldwell-Luc approach was the recommended procedure; nevertheless, it offers significant risks to growing teeth and the bone growth foci in the maxilla. Aside from these dangers, the high rate of facial discomfort and pain in the postoperative

period and made this invasive procedure undesirable.[22] The ESS gained popularity in the mid-1980s, and in the early 1990s, there was developed a technique for direct endoscopic excision of ACP. 21. Complete excision of the polypoid part and its connection is required to reduce CP regrowth. ESS is currently a widely used and successful approach for treating CP. [23]

Although every affected sinus can be easily treated, however, the fundamental idea of functional ESS is creating sufficient sinus airflow and drainage while allowing the damaged mucosa to heal on its own, is incorrect. The reported recurrence rates after endoscopic excision of ACPs range from 4.3-21.1 %[20,22,23] but in our study the recurrence rate was 1.7%. In patients with recurrent ACP, an opening into the anterior face of maxilla to resect the antral part along with middle meatal antrostomy, if necessary.[24] A mini-Caldwell technique also allows an endoscope to be readily passed for a greater view of the sinus cavity. This method was not used in patients with recurrent ACP in this study without any other recurrences, as well as in first surgery. [22]

Sphenochoanal polyps were treated by endoscopic excision by widening the natural ostium directly or, if necessary, after removing the posteroinferior part of the middle turbinate to increase exposure. [25] A limited excision of the polyp and the pedicle attachment point is indicated for the treatment of CPs generated from the inferior concha and posterior nasal septum or in order to reduce significant morbidities like atrophic rhinitis. [26] We favored a restricted excision of the site of origin combined with CP in those arising from the uncinate process and bulla ethmoidalis because there were no recurrences or problems.

## ***Conclusion:***

It is generally crucial to rule out choanal polyp in patients with a history of one nostril being blocked. Nevertheless, antrochoanal polyps are the most frequent type; other sites of origins like sphenoid and ethmoidal sinuses, and the lateral wall of the nose can all produce choanal polyps and should be remembered. A thorough endoscopic examination is required to determine the location of attachment and the path of the polyp to reach a correct diagnosis that helps to avoid inappropriate surgery.

The use of CT can be useful for differential diagnosis, finding the attachment of the polyp, deciding the size of the polyp, and diagnosis of concurrent sinusitis, all of which are crucial for therapeutic effectiveness. Biopsy and histopathologic examination or further imaging techniques (such as MRI) to avoid any missed diagnosis, especially in instances with an atypical site of origin of CPs. The most effective treatment is endoscopic removal of all cases of CPs.

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