Review Article

Antrochoanal Polyp: A Narrative Review

Santosh Kumar Swain

Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, Bhubaneswar, Odisha, India

Abstract

Antrochoanal polyp (ACP) is a benign lesion that originates from the mucosal lining of the maxillary sinus, growing through the accessory ostium into the middle meatus, and protruding posteriorly to the choana and nasopharynx. The etiopathogenesis of ACP is not clear. These are found more commonly in children and young adults. ACPs are almost always unilateral. The incidence of ACP is higher among children than in the adult population. Diagnostic nasal endoscopy and computed tomography scans are important investigations for the diagnosis of ACPs. During diagnostic nasal endoscopy, ACPs are typically seen as smooth, bluish, or yellowish mass extending posteriorly exiting from the ostium of the maxillary sinus. Simple polypectomy, Caldwell-Luc procedure, and functional endoscopic sinus surgery may be employed for the surgical removal of the ACPs. Simple avulsions of the ACPs have a high rate of recurrence, whereas the Caldwell-Luc procedure is often associated with injury to the maxillary and dental growth centers. Currently, functional endoscopic sinus surgery along with the use of powered instruments is used for the surgical removal of the ACPs. Incomplete excision of the ACP leads to the recurrence of the polyp. There are very smaller number of research articles describing the etiopathogenesis, clinical presentations, and current management protocol for ACPs, so this morbid clinical entity is not well known to most clinicians. This review article discusses the epidemiology, etiopathogenesis, clinical features, diagnosis, and current treatment of ACPs.

Keywords: Antrochoanal polyp, Caldwell-Luc procedure, functional endoscopic sinus surgery, maxillary sinus

Introduction

The antrochoanal polyp (ACP) is a single polypoidal mass that arises from the mucosal lining of the maxillary sinus and enters the nasal cavity through the ostium of the sinus, extending toward the choana and nasopharynx.[1] The exact etiopathogenesis of ACPs is still not clear.[2] Chronic infection and allergy are reported as possible etiological factors for the development of ACPs.[2] Some authors reported that allergy is an important cause of ACPs and others noted an increased incidence of ACPs in a patient with chronic sinusitis.[3] Diagnostic nasal endoscopy and CT scan are the gold standard investigations for the diagnosis of ACPs.[4] The treatment of choice for ACPs is surgery with complete removal of the polyp from the maxillary sinus and nasal cavity.[5] Functional endoscopic sinus surgery with powered instrumentation is an effective method for removing ACPs and their antral portion.[4] Although there are many research articles are available for sinonasal polyposis, little is known about the pathophysiological mechanisms and management of ACPs. The purpose of this review article is to discuss the epidemiology, etiopathology, clinical presentations, investigations, and treatment of ACPs.

Access this article online

Quick Response Code:

Website: www.matrixscipharma.org

DOI: 10.4103/mtsp.mtsp_18_22_1

Methods of Literature Search

Multiple systematic methods were used to find current research publications on the (ACP) and its etiopathology, clinical manifestations, and management. We started by searching the Scopus, PubMed, Medline, and Google Scholar databases online. A search strategy using Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines was developed. This search strategy recognized the abstracts of published articles, while other research articles were discovered manually from the citations. Randomized controlled studies, observational studies, comparative studies, case series, and case reports were evaluated for eligibility. There were a total number of articles 68 (22 case reports; 18 cases series; and 28 original articles) [Figure 1]. This paper focuses only

Address for correspondence: Prof. Santosh Kumar Swain, Department of Otorhinolaryngology and Head and Neck Surgery, IMS and SUM Hospital, Siksha "O" Anusandhan University, K8, Kalinga Nagar, Bhubaneswar - 751 003, Odisha, India.
E-mail: santoshvoltaire@yahoo.co.in

How to cite this article: Swain SK. Antrochoanal polyp: A narrative review. Matrix Sci Pharma 2022;6:81-5.

Received: 31-08-2022, **Revised:** 14-10-2022,
Accepted: 25-10-2022, **Published:** 04-05-2023

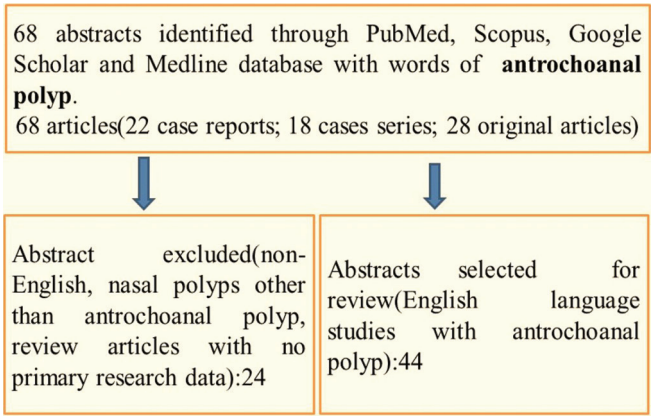

Figure 1: Flow chart showing the methods of literature search

on the details of the ACP. This review article describes the epidemiology, etiopathology, clinical presentations, investigations, and treatment of ACP. This analysis provides a better understanding of ACP and its clinical profile along with its management. It will also serve as a catalyst for further study of the etiopathogenesis of ACPs and the development of a newer surgical technique for the management of this polyp.

Epidemiology

Professor Gustav Killian was the first to document the ACP in 1906.[6] ACPs are uncommon, solitary, benign polyps, and constitute 4%–6% of all nasal polyps.[7] ACPs are found in 8%–10% of the population.[8] ACPs are almost 33% of all nasal polyps in pediatric populations.[9] ACPs constitute 28%–33% of the nasal polyps in the pediatric age group, although these are seen infrequently in the adult age groups.[10] Bilateral ACPs are extremely uncommon. Some proposed that ACPs occur due to complications of chronic inflammatory diseases in the maxillary sinuses in cases of pediatric populations, whereas Chen *et al*. revealed that 50% of the patients in their series had allergic etiology for ACPs.[10] There are almost always ACPs are unilateral but very few cases reported as bilateral ACPs. In 92% of cases of the ACPs, the site of origin was the posterior wall of the maxillary sinus.[11] There is no preponderance of gender in ACP patients.[10] However, bilateral nasal polyposis is more common in males.[12] Nasal polyposis associated with aspirin-induced asthma is more common in females.[13]

Etiopathology

The exact etiology of ACPs is still unclear. Chronic rhinosinusitis, cystic fibrosis, and allergy have been thought to be associated with ACP.[14] Look *et al*. documented that 24% of the ACP had the aspirin-sensitive asthma triad.[15] Although the etiology of ACP remains unknown, allergy has been implicated.[16] On the other hand, many authors have claimed that allergy plays no role in the etiology of ACP.[17] However, patients with ACP have the sinonasal disease.[18] Further investigations are needed to establish the relationship between chronic sinusitis and ACPs. Chen *et al*. suggested that chronic sinusitis can result in ACPs.[10] As a high rate of ACPs has been seen in children with chronic rhinosinusitis, it has also been documented that ACPs can be caused by acinar mucous gland blockage in the recovery period of chronic infection. Furthermore, the bacterial flora in ACPs is often similar to the other inflammatory nasal polyps.[19] More research is required to investigate the role of inflammatory mediators (histamine, IgE, adhesion molecules, platelet-activating factor, as well as metalloproteases and nasal remodeling and tumor marker) expression in ACPs.[20] ACPs are more commonly seen in patients with cystic fibrosis.[21] It has been suggested that the development of a cystic component of ACP can be caused by acinar mucous gland blockage due to chronic pathology like allergy or infections.[10] Piquet *et al*. documented that the antral cyst of ACP occurs due to obstruction of the lymphatic duct following inflammation of the mucosa lining the maxillary sinus.[22] It is important to keep in mind that concomitant development of the antral cysts and maxillary ostium blockage could be occurred by the same chronic inflammation (infectious or allergic) conditions.[23] Hence, simultaneous complete blockage of the accessory ostium of the maxillary sinus, obstructed by the medial surface of an antral cyst, and the partial blockage of the natural ostium of the maxillary sinus could be possible. That air that enters into the maxillary sinus through narrowed natural ostium would be unable to release during breathing out due to mucosal edema or swelling at the osteomeatal complex or middle meatus. As per the Bernoulli theory, the rate of flow is higher at the narrowed area, making a pressure drop perpendicular to the wall of the stricture, so complete blockage of the natural ostium during breathing out is more likely to happen. The obstruction of the natural and accessory ostium simultaneously contributes to an increase in the pressure level in the maxillary sinus.[24] Hence, raised pressure level inside the maxillary sinus, an intramural cyst could be forced to herniate outside, via the accessory ostium, thus resulting in the development of ACP.[6] This pathophysiology for the development of ACP may be enhanced by certain anatomical abnormalities that lead to alteration in the pressure gradient between the middle meatus and maxillary sinus such as septal deviation, alteration in uncinate process, bulla ethmoidalis, concha bullosa, and hypertrophy of inferior turbinate.[6]

Clinical Presentations

ACPs are commonly found among males, mostly in children and young adults.[25] The most common clinical presentation is unilateral nasal obstruction. Other symptoms include nasal discharge, sleep, mouth breathing, postnasal discharge, nasal bleeding, and hyposmia.[25] In severe cases, patients with ACP may present with dyspnea, dysphagia, and weight loss.[26] If ACP is a very large one, it may obstruct the Eustachian tube opening in the nasopharynx and result in secretory otitis media.[1] ACP is nearly always unilateral and bilateral ACP is extremely rare.[27] Left-sided ACPs are more common

than the right side.[18] A study showed a male predominance of ACPs whereas others noted a female preponderance.[20,28] Epistaxis, snoring and obstructive sleep apnea is more common in children than adult patients with ACPs.[28] Patients of ACPs presenting with epistaxis should be excluded from angiofibroma in male pediatric age and malignancy in adult and elderly age groups.[28] Obstructive sleep apnea is uncommon at an early stage of ACPs among children in contrast to the adult age group. There are three explanations for this issue. First, the higher mean age of pediatric patients has a significantly larger size of the nasopharynx in comparison to the younger age group with adenoid enlargement. Second, there is incomplete obstruction of the nose by ACPs. The third explanation is that ACPs of pediatric age present less often with apnea than adult age groups.[29] Anterior rhinoscopy shows a smooth, pale, polypoidal mass in the nasal cavity.[30] The choana and nasopharynx are often occupied with the posterior part of the ACP.

Investigations

Diagnostic nasal endoscopy and imaging are important investigations for diagnosis of the ACPs.[31] In ACP, diagnostic nasal endoscopy reveals an intranasal pale-colored polypoidal mass that extends into the choana and nasopharynx.[19] CT scan is helpful to evaluate the ACP [Figure 2]. In CT scan, ACP is seen as soft tissue mass in the maxillary sinus and extends through the accessory maxillary ostium or natural ostium of the maxillary sinus into the nasal cavity between the middle turbinate and lateral nasal wall, without evidence of bone erosion or expansion, and it extends posteriorly toward the choana.[19] In magnetic resonance imaging (MRI), ACP appears as hypointense on T1 images with enhanced T2 signals in MRI. In the case of intravenous gadolinium-enhanced MRI, the intrasinusal cystic part of the ACP is only peripherally enhanced, whereas the nasal and choanal parts show hyperintense images.[32] Biopsy and histopathological studies are helpful for confirmation of the diagnosis.[33] In children, the differential diagnosis of ACPs includes mucoceles and mucopyocele. These show a characteristic enhanced ring with the use of intravenous contrast. A retention cyst arising from a salivary or mucous gland can also be a differential diagnosis in this location. However, this usually shows a crescent moon air density that helps to differentiate it from an ACP. The sphenochoanal polyp is an important differential diagnosis of ACP. The sphenochoanal polyp shows its stalk arising from the sphenoid sinus and passing through the ostium into the posterior choana. A sphenochoanal polyp is less common than ACP. Other less common differential diagnoses are adenoid hypertrophy, ethmoid-choanal polyp, turbinate hypertrophy, Tornwaldt's cyst, angiofibroma, and olfactory neuroblastoma.[31,34]

Histopathology

Grossly, ACPs have a cystic intramaxillary part and a solid intranasal part [Figure 3]. Microscopically, ACPs are similar to a maxillary cyst of the lining mucosa. Histopathological study of the ACP is usually confirmatory for establishing the diagnosis. Histological examination of ACP shows the absence of basement membrane thickening with less edematous stroma and more fibrotic than inflammatory polyps and large vascular spaces may be seen.[35] Microscopically, the ACP shows a central cavity surrounded by a homogenous edematous stroma bearing few cells. The surface of the polyp is lined with respiratory epithelium. Based on histology, nasal polyps can be classified into four types such as:[1] edematous or eosinophilic or allergic;ductal type;fibrous type and polyps with stromal atypia. Allergic type is the most common type, formed by edematous connective tissue and isolated glands, without the development of cysts along with a rich eosinophilic infiltrate and goblet cell hyperplasia.[2] Ductal type is formed by glandsand cysts.[3] The fibrous or fibroinflammatory, with a great proliferation of fibroblasts and collagen, and a lymphocyte inflammatory infiltrate.[4] The polyps with stromal atypia, which are very rare and differentiated from a genuine neoplasm by the lack of mitosis.[36]

Figure 2: CT scan of the nose and paranasal sinus showing left ACP. CT: Computed tomography, ACP: Antrochoanal polyp

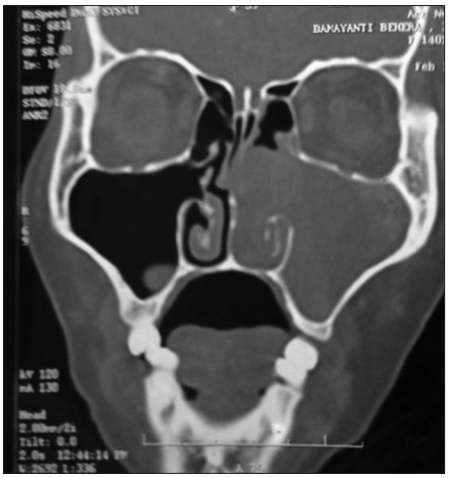

Figure 3: Gross appearance of ACP after its removal. ACP: Antrochoanal polyp

Treatment

Surgery is the treatment of choice in case of symptomatic ACPs. Historically, surgical treatments such as simple avulsion of the polyp and the Caldwell-Luc procedure were used for ACPs. Simple avulsion of the ACP has a high rate of recurrence.[37] The Caldwell-Luc procedure may be associated with damage to the maxillary and dental growth centers.[16] In the past, the Caldwell-Luc procedure was used for the treatment of ACP. The Caldwell-Luc approach provides good exposure and ensures complete removal of the polyp and associated mucosa lining the maxillary sinus.[18] The Caldwell-Luc procedure may result in side effects such as anesthesia and swelling over the check and affect the development of teeth in children.[38] Currently, Functional endoscopic sinus surgery is a very popular technique for the treatment of ACPs. If functional endoscopic sinus surgery is performed properly, there is no chance of recurrence with very few complications.[39] Functional endoscopic surgery making large middle meatal antrostomy combined with transcanine sinuscopy is an effective procedure to ensure complete removal of ACPs.[40] Endoscopic removal of the antral part of the ACP by powered instrumentation, is an important method for the complete removal of this polyp.[41] In endoscopic surgery, the natural and accessory ostia of the maxillary sinus are connected with a large maxillary antrostomy through which the inferior base of the antral polyp is well visualized and cleaned out with an angulated Blakesley forceps or antral blade of microdebrider.[42] The use of powered instrumentation along with endoscopic sinus surgery is associated with excellent outcomes and minimal morbidities.[17] Microdebrider have been documented to facilitate removal and decrease the limitation of conventional endoscopic surgery. If there is broad-based attachment to the inferior or anterior walls of the maxillary sinus, a transcanine fossa approach is often combined with an endoscopic complete excision of the ACP.[43] In children, endoscopic sinus surgery is a safe and effective surgical technique for ACP. Early diagnosis and treatment of ACPs are very important as secondary rhinosinusitis can complicate the disease and surgery is more difficult.[23]

From a histopathological point of view, there is essentially no difference between ACPs and inflammatory nasal polyps. One study showed a significant association between ACPs and allergic status that was confirmed by patient history and *in vivo* and *in vitro* diagnostic tests.[11] Histopathologically, the specimens of ACPs showed that allergic polyps (abundant eosinophils) are significantly more common than inflammatory polyps (abundant neutrophils) among children. In adults, inflammatory polyps are more common than allergic polyps.[11] The recurrence rate by endoscopic surgical treatment for ACPs is usually low.[44]

Conclusion

(ACPs) are thought to represent hypertrophied mucosa of the maxillary sinus prolapsing into the nasal cavity through the natural or accessory ostium. Diagnostic nasal endoscopy and imaging are two important investigations for diagnosis of the ACPs. The treatment of choice is surgery and includes complete removal of the polyp from both the nose and maxillary sinus. Functional endoscopic sinus surgery along with the use of powered instrument is highly effective for the treatment of ACPs. The maxillary antrum should be always carefully inspected intraoperatively and complete removal of the polyp help prevent a recurrence. Clinicians should find out the exact origin and extent of the ACP to prevent a recurrence.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Freitas MR, Giesta RP, Pinheiro SD, Silva VC. Antrochoanal polyp: A review of sixteen cases. Braz J Otorhinolaryngol 2006;72:831-5.
2. Aydın S, Taskin U, Orhan I, Altas B, Oktay MF, Toksöz M, *et al.* The analysis of the maxillary sinus volumes and the nasal septal deviation in patients with antrochoanal polyps. Eur Arch Otorhinolaryngol 2015;272:3347-52.
3. Woolley AL, Clary RA, Lusk RP. Antrochoanal polyps in children. Am J Otolaryngol 1996;17:368-73.
4. Swain SK, Sahu MC, Baisakh MR. Nasal myiasis in clinical practice. Apollo Med 2018;15:128-31.
5. Choudhury N, Hariri A, Saleh H. Endoscopic management of antrochoanal polyps: A single UK Centre's experience. Eur Arch Otorhinolaryngol 2015;272:2305-11.
6. Frosini P, Picarella G, De Campora E. Antrochoanal polyp: Analysis of 200 cases. Acta Otorhinolaryngol Ital 2009;29:21-6.
7. Galluzzi F, Pignataro L, Maddalone M, Garavello W. Recurrences of surgery for antrochoanal polyps in children: A systematic review. Int J Pediatr Otorhinolaryngol 2018;106:26-30.
8. Berg O, Carenfelt C, Silfverswärd C, Sobin A. Origin of the choanal polyp. Arch Otolaryngol Head Neck Surg 1988;114:1270-1.
9. Schramm VL Jr., Effron MZ. Nasal polyps in children. Laryngoscope 1980;90:1488-95.
10. Chen JM, Schloss MD, Azouz ME. Antro-choanal polyp: A 10-year retrospective study in the pediatric population with a review of the literature. J Otolaryngol 1989;18:168-72.
11. Lee TJ, Huang SF. Endoscopic sinus surgery for antrochoanal polyps in children. Otolaryngol Head Neck Surg 2006;135:688-92.
12. Settipane GA, Chafee FH. Nasal polyps in asthma and rhinitis. A review of 6,037 patients. J Allergy Clin Immunol 1977;59:17-21.
13. Szczeklik A, Nizankowska E, Duplaga M. Natural history of aspirin-induced asthma. AIANE investigators. European network on aspirin-induced asthma. Eur Respir J 2000;16:432-6.
14. Yilmaz YF, Titiz A, Ozcan M, Tezer MS, Ozlugedik S, Unal A. Bilateral antrochoanal polyps in an adult: A case report. B-ENT 2007;3:97-9.
15. Myatt HM, Cabrera M. Bilateral antrochonanal polyps in a child: A case report. J Laryngol Otol 1996;110:272-4.
16. Maldonado M, Martínez A, Alobid I, Mullol J. The antrochoanal polyp. Rhinology 2004;42:178-82.
17. Swain SK. Sphenoid sinus mucocele: A review. Int J Otorhinolaryngol Head Neck Surg 2022;8:431-6.
18. Aktaş D, Yetişer S, Gerek M, Kurnaz A, Can C, Kahramanyol M. Antrochoanal polyps: Analysis of 16 cases. Rhinology 1998;36:81-5.
19. Składzień J, Litwin JA, Nowogrodzka-Zagórska M, Wierzchowski W. Morphological and clinical characteristics of antrochoanal polyps: Comparison with chronic inflammation-associated polyps of the maxillary sinus. Auris Nasus Larynx 2001;28:137-41.
20. Chen CL, Wang YT, Yao Y, Pan L, Guo B, Zhu KZ, *et al.* Inflammatory endotypes and tissue remodeling features in antrochoanal polyps.

Allergy Asthma Immunol Res 2021;13:863-81.
21. Zheng H, Tang L, Song B, Yang X, Chu P, Han S, *et al.* Inflammatory patterns of antrochoanal polyps in the pediatric age group. Allergy Asthma Clin Immunol 2019;15:39.
22. Piquet JJ, Chevalier D, Leger GP, Rouquette I, Leconte-Houcke M. Endonasal microsurgery of antro-choanal polyps. Acta Otorhinolaryngol Belg 1992;46:267-71.
23. Cook PR, Davis WE, McDonald R, McKinsey JP. Antrochoanal polyposis: A review of 33 cases. Ear Nose Throat J 1993;72:401-2, 404-10.
24. Swain SK, Samal R, Sahu MC. Isolated nasal septal neuroglial heterotopia – A case report. Pediatr Pol 2015;90:323-7.
25. Jmeian S. Bilateral Antrochoanal polyps in a child: An extremely rare case. JRMS 2006;13:57-8.
26. Salib RJ, Sadek SA, Dutt SN, Pearman K. Antrochoanal polyp presenting with obstructive sleep apnoea and cachexia. Int J Pediatr Otorhinolaryngol 2000;54:163-6.
27. Chung SK, Chang BC, Dhong HJ. Surgical, radiologic, and histologic findings of the antrochoanal polyp. Am J Rhinol 2002;16:71-6.
28. Al-Mazrou KA, Bukhari M, Al-Fayez AI. Characteristics of antrochoanal polyps in the pediatric age group. Ann Thorac Med 2009;4:133-6.
29. Brausewetter F, Hecht M, Pirsig W. Antrochoanal polyp and obstructive sleep apnoea in children. J Laryngol Otol 2004;118:453-8.
30. Swain SK, Samal S, Mohanty JN. Cartilaginous choristoma at nasopharynx. J Anat Soc India 2020;69:113-5.
31. Swain SK, Sahu MC. An unusual giant isolated mucosal malignant melanoma of nasal cavity – A case report. Egypt J Ear Nose Throat Allied Sci 2017;18:151-3.
32. De Vuysere S, Hermans R, Marchal G. Sinochoanal polyp and its variant, the angiomatous polyp: MRI findings. Eur Radiol 2001;11:55-8.
33. Swain SK, Dattatreya K. A giant nasal septal schwannoma – A case report. Int J Curr Res Rev 2021;13:70-2.
34. Swain SK, Debta P, Samal S, Mohanty JN, Debta FM, Dani A. Endoscopic treatment of sinonasal ossifying fibroma: A case report. Indian J Public Health 2019;10:1697-700.
35. Jin P, Zi X, Charn TC, Liu J, Yan Y, Shi L, *et al.* Histopathological features of antrochoanal polyps in Chinese patients. Rhinology 2018;56:378-85.
36. Hellquist HB. Histopathology. In: Settipane GA editor. Nasal Polyps: Epidemiology, Pathogenesis and Treatment. Providence (RI): Oceanside Publications; 1997; p. 31-39.
37. Swain SK, Das A, Samal R, Behera IC, Sahu MC. An unusually giant frontoethmoidal mucopyocele in a child – A case report. Pediatr Pol 2015;90:511-4.
38. Bajan A, Sarafoleanu C, Melinte VG, Decuseara R. Indications of the Caldwell-Luc procedure in the era of endoscopic sinus surgery. RomJ Rhinol 2020;10:78-84.
39. Swain SK. Middle turbinate concha bullosa and its relationship with chronic sinusitis: A review. Int J Otorhinolaryngol Head Neck Surg 2021;7:1062-67.
40. el-Guindy A, Mansour MH. The role of transcanine surgery in antrochoanal polyps. J Laryngol Otol 1994;108:1055-7.
41. Swain SK, Behera IC, Sahu MC. Primary sinonasal tuberculosis: Our experiences in a tertiary care hospital of Eastern India. Egypt J Ear Nose Throat Allied Sci 2017;18:237-40.
42. Jena A, Swain SK. A study of anatomical variations in chronic rhinosinusitis with special reference to deviated nasal septum. IJAR 2019;5:15-7.
43. Hong SK, Min YG, Kim CN, Byun SW. Endoscopic removal of the antral portion of antrochoanal polyp by powered instrumentation. Laryngoscope 2001;111:1774-8.
44. Kamel R. Endoscopic transnasal surgery in antrochoanal polyp. Arch Otolaryngol Head Neck Surg 1990;116:841-3.