

Study of recurrent antrochoanal polyps: causes and how to minimize recurrence

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Objectives

To conduct a prospective study investigating the causes of repeated recurrences of antrochoanal polyps (ACPs) in an attempt to minimize recurrence.

Materials and methods

Twenty-two patients, with an established diagnosis of a recurrent ACP, were included in the study. A subjective visual analogue scale, endoscopic examination, and computed tomography, both coronal and axial, were performed preoperatively. Endoscopic sinus surgery was performed in all cases, combined with transcanine antrostomy in some cases, aiming at the complete removal of the polyp. Postoperatively, improvements in clinical symptoms and endoscopic findings were evaluated using visual analogue scale and endoscopic examination.

Results

The study included 22 patients with recurrence of an ACP one to five times (a total of 38 previous surgeries). The endoscopic transnasal approach was used in 14 cases, whereas a combined endoscopic transcanine approach was used in eight cases. The success rate was 85.7% in the endoscopic transnasal approach and 100% in the combined endoscopic transcanine approach. All patients showed a subjective improvement after surgery but endoscopic recurrence was detected only in two cases after 18–24 months of follow-up.

Conclusion

The main cause of recurrence of ACPs is incomplete removal. Every effort should be made to completely remove the polyp (especially antral part) to avoid recurrence. Endoscopically, this can be performed using 30–45 and 70° telescopes, angled forceps, and performing a very wide middle meatal antrostomy and may be assisted with a canine fossa puncture. The operation preserves healthy antral mucosa and promotes epithelization and mucociliary clearance of the antrum.

Keywords:

antrochoanalnasal polyp, endoscopic, prospective, recurrence

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Introduction

Antrochoanal polyp (ACP) was first described by Killian in 1906 [1]. It is composed of a cystic part filling the maxillary sinus and a solid part emerging through an enlarged accessory maxillary ostium [2].

It is more frequent in children and young adults, usually unilateral, and can be diagnosed easily with the nasal endoscope [3]. Patients with an ACP generally have unilateral nasal obstruction, postnasal discharge, and a hyponasal voice [4]. Imaging with computed tomography is important to confirm the clinical impression of an ACP by showing opacification of the maxillary sinus extending through the accessory ostium into the middle meatus and the posterior choana and rarely associated opacification of the ethmoid sinuses [5].

It is most important that the antral part of the polyp is removed completely, as simple avulsion polypectomy results in a high recurrence rate of up to 25% [5,6]. There is controversy regarding the route of removal of the antral

part. The Caldwell–Luc operation provides wide exposure and ensures complete removal of the antral part of the polyp as well as the sinus mucosa, with a low incidence of recurrence, but it does pose significant risks to the developing teeth (particularly the canine and bicuspid teeth) and bone growth centers of the maxilla in children, in addition to other morbidities, particularly in children, including postoperative swelling of the cheeks, a long recovery time, long-lasting neuralgic pain, and numbness of the cheeks [7].

Currently, the role of endoscopy in the treatment of ACPs is known as this is the most conservative treatment modality, with little functional impairment. With this technique, the intranasal part can be removed under direct vision by using endoscopes and the antral part is removed through a wide middle meatal antrostomy, particularly when the ACP is attached by a broad base to the antral mucosa or when it is attached in a difficult and an inaccessible location such as the anterior or the inferior portion of the maxillary sinus. Sufficient exposure

of the surgical field is essential for complete removal of the polyp, which is possible using 30, 45, and 70° endoscopes. The combination of transcanine sinuscopy for the complete removal of the antral part of polyps in an unfavorable location may be a good alternative when endoscopy fails to remove the pathology completely [8].

In this study, 22 cases of recurrent ACP were treated using endoscopic sinus surgery, in an attempt to minimize recurrence and determine its causes.

Patients and methods

Twenty-two patients, with an established diagnosis of a recurrent ACP, were recruited from the outpatient clinic of Tanta University Hospital during the period from March 2008 to February 2011 and included in the study. The study protocol and consent forms were approved by the Research Review Committee. The exclusion criteria included pregnancy, lactation, significant psychological problems, inability to comply with the study protocol, and inability to tolerate surgery with general anesthesia because of concurrent medical conditions, medical, and/or surgical treatments influencing the study. All patients, after a detailed history taking, were asked to complete a subjective visual analogue scale (VAS) for overall nasal difficulty, nasal obstruction, and nasal discharge [9]. The improvement in the endoscopic findings of the 22 maxillary sinuses was evaluated postoperatively at the last visit. The sinus mucosa was observed through the enlarged natural ostium, using a 4-mm 30, 45, and 70° endoscopes. Endoscopic findings were graded using a three-point scale ranging from 0 to 2 (0, normal; 1, partially edematous; and 2, recurrence of ACP). Complete nasal examination including diagnostic nasal endoscopy was performed in all cases.

Operative procedure

All patients were operated under general endotracheal anesthesia using the hypotensive total intravenous anesthesia technique, with a propofol and remifentanyl infusion, to minimize intraoperative bleeding. A standard Messerklinger technique described by Stammberger and Posawetz [10] was used with conventional endoscopic sinus surgery instruments. Surgery started with the precise removal of the posteroinferior part of the uncinate process using a sickle knife and back-biting forceps. This procedure is important because it allows complete exposure of the middle meatus and the natural maxillary ostium, which will ultimately be connected to the accessory ostium. The ostium is sufficiently enlarged (creating a large opening into the antrum, providing wide access to all aspects of the maxillary sinus). The nasal part of the polyp was removed with a straight Blakesley's forceps and its antral part was then resected with a curved Blakesley's forceps under control of a 30° endoscope. If the polyp emerged from the maxillary sinus through the accessory ostium, both ostia were connected to each other. Examination of the sinus with 30, 45, and 70° endoscopes

confirmed complete polyp removal and visualization of the lateral maxillary wall. Any remaining cysts were ruptured and their contents and walls were aspirated with curved suction tips. Hiwise forceps was used to facilitate the removal of intrasinus remnants of the polyp. The intact mucosa was preserved as much as possible. Combined transcanine anrostomy was used in difficult cases where the ACP is attached by the broad base to the antral mucosa or when it is attached in a difficult and inaccessible location such as the anterior or the inferior portion of the maxillary sinus. ACPs must be completely excised to avoid recurrence. At the end of surgery, Merocel nasal packs (Medtronic, USA) were inserted into the nasal cavity for 1 day. Follow-up of the patient was carried out after 1, 3, 7, and 14 days postoperatively and then monthly for 24–36 months (mean follow-up 18 months).

Improvements in clinical symptoms and endoscopic findings were evaluated postoperatively. VAS was carried out at each visit to assess the degree of subjective postoperative improvements. All symptom scores before surgery were compared with those at the last postoperative visit.

The analysis was carried out using SPSS for Windows statistics software package (IBM Company, USA). Data were expressed as mean \pm SD. *P*-values of less than 0.05 were considered significant. Parametric tests such as a *t*-test were applied for data that followed a normal distribution.

Results

This study included 22 patients (15 men and seven women) ranging in age from 12 to 45 years. A left-sided ACP was found in 10 patients, whereas a right-sided ACP was observed in 12 cases. Factors including age, sex, presenting complaints, associated symptoms, physical findings, surgical procedure, follow-up, and management of recurrence were studied.

The procedure was carried out for the removal of ACP in 13 patients with recurrence after one surgical procedure (primary surgery), five patients with recurrence after two surgical procedures, two patients with recurrence after three surgical procedures, one patient with recurrence after four surgical procedures, and one patient with recurrence after five surgical procedures, Table 1.

The recurrence of ACPs occurred 26 times after endoscopic sinus surgery, seven times after the Caldwell–Luc operation, and five times after a simple polypectomy, Table 2.

Most of the ACPs were multitudinous (70%) and the distributions of the ACPs' origin in the maxillary sinus

Table 1 Number of recurrences in each case

| Number of previous operations | Number of patients (total 22) |
|-------------------------------|-------------------------------|
| 1 | 13 |
| 2 | 5 |
| 3 | 2 |
| 4 | 1 |
| 5 | 1 |

Total number of previous operation in 22 patients was 33.

Table 2 Type of previous surgeries

| Number of previous operations | Surgical modalities |
|-------------------------------|--------------------------|
| 26 | Endoscopic sinus surgery |
| 7 | Caldwell–Luc operation |
| 5 | Simple polypectomy |

were as follows: posterior wall (90%), lateral wall (60%), and inferior wall (40%). Thus, some polyps originated from both the lateral and/or the posterior and/or inferior walls, some from the three walls, and others from only one wall of the maxillary sinus (30%).

The endoscopic transnasal approach was used in 14 cases, whereas the combined endoscopic transcanine approach was used in eight cases. The success rate was 85.7% in the endoscopic transnasal approach and 100% in the combined endoscopic transcanine approach. Two patients treated with the transnasal approach showed recurrence and both of them had concomitant rhinosinusitis. Recurrence was detected over the course of their follow-ups, which ranged from 18 to 24 months. One recurrence was found among the 13 patients who were subjected to previous primary surgery, and nasal endoscopy revealed the presence of a cyst around the middle meatus and the other case of recurrence occurred in a patient with recurrence who had undergone surgery four times. A combined endoscopic and transcanine approach was performed successfully in both cases.

Subjective evaluation

Preoperative and postoperative assessments of patient symptoms including nasal obstruction, nasal, and post-nasal discharge were carried out according to the VAS.

Preoperative symptom scores of overall nasal difficulty (67.9 ± 11.5), nasal obstruction (72.1 ± 12.2), and nasal discharge (54.8 ± 21.3) improved to 19.0 ± 9.0 , 13.1 ± 11.1 , and 18.3 ± 9.2 , respectively, after surgery. These improvements were all statistically significant ($P < 0.05$, paired *t*-test). Before surgery, all 22 patients had complained of nasal obstruction and 15 of the 22 patients had complaints of reported nasal discharge. Twenty (90.9%) of the 22 patients with nasal obstruction and 14 (93.3%) of the 15 patients with nasal discharge showed symptomatic improvements postoperatively. Overall, nasal difficulty improved in 20 (90.9%) of the 22 patients.

Objective evaluation

Thirteen (59.1%) of the 22 maxillary sinuses showed an endoscopic improvement of grade 0 and seven (31.8%) improved to grade 1 (Fig. 1). ACP recurred in two patients. The improvement rate was 90.9% (20 of 22 sinuses) when grades 0 and 1 were defined as endoscopically improved.

Discussion

An ACP is a benign lesion of soft tissue originating from the maxillary sinus [11]. ACPs (Killian polyps) tend to be dumbbell shaped, with a constriction at the natural or the

accessory ostium of the sinus [12]. ACP that arises from inflamed, edematous mucosa of the maxillary antrum consists of two components: the antral one is almost always cystic and the other is solid. In most cases, the cystic component that originates from a number of anatomic sites, including the lateral wall of the maxillary antrum, posterior wall, and superior wall, attaches to the solid polyp with a pedicle in the nasal cavity [13].

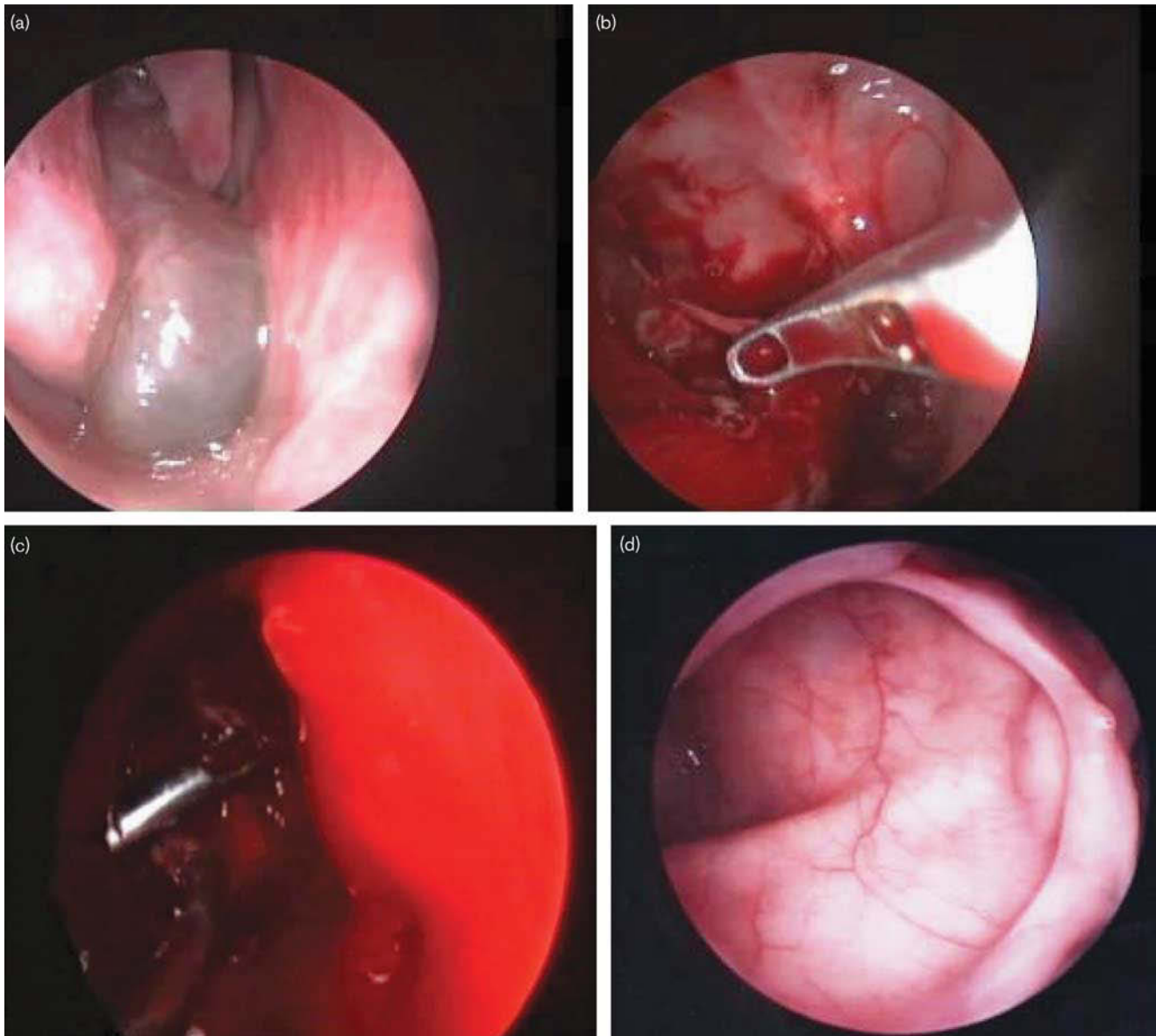
Many surgical options to treat ACPs have been suggested to reduce the incidence of postoperative recurrence. ACPs should be completely excised (especially antral part of the polyp) to avoid recurrence. Simple polyp removal is associated with a 25% polypoid recurrence [10]. Although the Caldwell–Luc approach offers a good exposure and ensures complete removal of the polyp and the associated antral mucosa, ACP occurs most commonly in children and young adults, and the Caldwell–Luc procedure poses significant risks to the developing teeth and the bone growth centers of the maxilla in children [5]. Because endoscopic sinus surgery has been reported to be useful in the surgery of ACP, radical surgery of the maxillary sinus has recently been replaced by endoscopic sinus surgery. Successful outcomes have been reported using endoscopic surgery of ACP, with a low incidence of recurrence [14]. Endoscopically, this can sometimes be performed exclusively endonasally; however, even with 30 and 70° telescopes, it is often necessary to also approach the maxillary sinus component through a canine fossa puncture [15].

Compared with the Caldwell–Luc operation, endoscopic sinus surgery avoids swelling of the cheeks, minimizes the adverse effects on teeth and facial growth in children, and has a shorter recovery time. The operation preserves healthy antral mucosa and promotes epithelization and mucociliary clearance of the antrum [16].

In our technique, instrumentation by forceps and visualization with endoscopes are usually performed through the enlarged sinus ostium. The nasal component can easily be removed endoscopically. A maximal maxillary antrostomy allows a full view of the sinus component and usually the stalk, which has a variable location within the sinus. The usage of curved Blakesley's forceps, Hiwise forceps, and combined transcanine and middle meatal antrostomy was made in difficult cases where the ACP was attached by the broad base to the antral mucosa or when it was attached in a difficult and inaccessible location such as the anterior or the inferior portion of the maxillary sinus.

Our technique allows complete removal of the base of the ACP with preservation of the intact mucous membrane around the ACP origin without stripping the adjacent intact mucous membrane. In our study, symptom scores of overall nasal difficulty, nasal obstruction, and nasal discharge were all significantly reduced postoperatively. Twenty patients showed improvements in their endoscopic findings during the follow-up period; only two patients showed recurrence of an ACP, with an overall improvement rate of 90.9% (20 of 22 patients). Our study found no significant complications associated with this technique.

Figure 1



(a) Preoperative view: a large recurrent antrochoanal polyp emerging from the middle meatus and filling the right nasal cavity; (b) intraoperative view: Hiwase forceps used to remove the antral part of the antrochoanal polyp through the wide maxillary antrostomy of the same patient; (c) intraoperative view: angled sucker is introduced through the widened right middle meatal antrostomy, which shows a cannula introduced through a sublabial transcanine approach; (d) postoperative view: well-healed cavity with wide maxillary antrostomy of the same patient 18 months after surgery.

Lee and Huang [17] reported a success rate of 76.9% in ACPs managed by the transnasal endoscopic approach compared with 100% with the combined endoscopic and transcanine approach. Franche *et al.* [6] reported a recurrence rate of 6.9% in their 29 patients with ACP managed by the endoscopic transnasal approach. Freitas *et al.* [3] reported postoperative recurrence in 12.5% of 16 cases of ACPs managed endoscopically transnasally.

Conclusion

The main cause of recurrence of ACPs is incomplete removal. Every effort should be made to completely remove the polyp (especially the antral part) to avoid recurrence. Endoscopically, this can be performed using

30–45 and 70° telescopes, angled forceps, and performing a very wide middle meatal antrostomy, and may be aided by a canine fossa puncture. Endoscopic sinus surgery avoids swelling of the cheeks, minimizes the adverse effects on teeth and facial growth in children, and has a shorter recovery time. The operation preserves healthy antral mucosa and promotes epithelization and mucociliary clearance of the antrum.

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Magdy Eisa Saafan takes responsibility for the integrity of the content of the paper.

Conflicts of interest

There are no conflicts of interest.

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