

# Endoscopic endonasal prelacrimal recess approach for antrochoanal polyp

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## Background

The purpose of this study was to assess the effectiveness of endoscopic transnasal prelacrimal recess approach (ETPRA) in preventing the recurrence of antrochoanal polyps.

## Patients and methods

A total of 32 patients with antrochoanal polyp were divided into two equal groups: group 1 included 16 patients who underwent endoscopic middle meatal antrostomy (EMMA), and group 2 included 16 patients who underwent a combined surgical technique using EMMA together with ETPRA. They were followed up from 24 to 36 months. Success rates for visualization of the origin of the polyps, surgical complications, and recurrence were evaluated.

## Results

The most common symptoms were nasal obstruction (100%), snoring (75%), rhinorrhea (59.38%), headache (96.88%), and hyposmia (53.13%). The study found that postoperative complications varied between both groups. Recurrence was found in 18.75% in EMMA group and 0% in ETPRA group. They were statistically significant ( $P < 0.05$ ). However, nasolacrimal duct injury was found in two patients in ETPRA group, and postoperative lacrimation presented in only one (6.25%) patient of the same group. They were statistically insignificant ( $P > 0.05$ ).

## Conclusion

Recurrence rate of antrochoanal polyp has been reduced with the usage of ETPRA in comparison with EMMA alone.

## Keywords:

antrochoanal polyp, endoscopic sinus, prelacrimal recess

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## Introduction

Antrochoanal polyp is a pathology of the paranasal sinus region that usually originates from the maxillary sinus (MS) and extends to the nasopharynx through the choana. It presents with unilateral nasal obstruction in children and young adults. A unilateral, solitary, bluish, or yellowish nasal mass is expected on physical examination [1]. Nasal endoscopy and computed tomography (CT) are gold standard tools for its diagnosis [2]. The treatment of antrochoanal polyp is essentially surgical, and endoscopic middle meatal antrostomy (EMMA) has become a widely accepted modality. The conventional surgical procedures to the MS for antrochoanal polyp have been replaced by endoscopic sinus surgery (ESS) [1,3,4].

Traditional open surgical techniques are purposed to provide a better visualization of the MS and to prevent recurrence after simple resection. The canine fossa approach [5], Caldwell–Luc procedure [6], and inferior meatal nasooantral window with resection of the anterior part of inferior turbinate, are examples of traditional open techniques [7].

Some authors prefer to use traditional open surgical techniques combined with ESS in patients of recurrence or incomplete polyp excision. These studies advocated combined procedures as a useful option for total removal of antrochoanal polyps from the MS. However, many complications were reported after traditional open techniques such as swelling of the cheek in the acute or late postoperative period, anesthesia problems, and numbness of the cheek [1,8,9]. On the contrary, MS expansion continues at a rate of 2–3 mm/year until adult age [3]. Therefore, surgeons hesitate to damage the development of the MS and permanent teeth in children [10]. Antrochoanal polyp consists of two components, cystic, which is almost always in the antrum, and solid components [11–13]. The origin is frequently located on the posterior MS wall; the inferior and lateral sides are the other most commonly affected areas [14,15]. The recurrence rate with simple

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polypectomy is high [2,9,16]. To prevent recurrence of antrochoanal polyp, the maxillary stalk of the polyp should be removed [9,10].

ESS with middle meatal antrostomy has become the most popular approach in antrochoanal polyp treatment. This approach, a minimal invasive and effective method, provides complete removal with some complications [1–3,9].

However, some authors have cautioned that EMMA alone cannot be sufficient because of the inaccessibility to the stalk of the polyp in the MS wall and narrow intranasal structures [17–19].

This study aimed to describe a novel transnasal endoscopic approach via the prelacrimal recess in patients with antrochoanal polyp compared with the traditional method ESS.

### Patients and methods

This prospective study was performed in Otorhinolaryngology Department, Al-Azhar Faculty of Medicine, New Damietta, Egypt, on 32 patients with the diagnosis of antrochoanal polyps either virgin or recurrent cases. They were divided into two groups: group 1 included 16 patients who underwent EMMA and group 2 included patients who underwent surgery with endoscopic transnasal prelacrimal recess approach (ETPRA) combined with EMMA. The study period extended for 5 years from October 2013 to October 2018, including the follow-up period from 24 to 36 months.

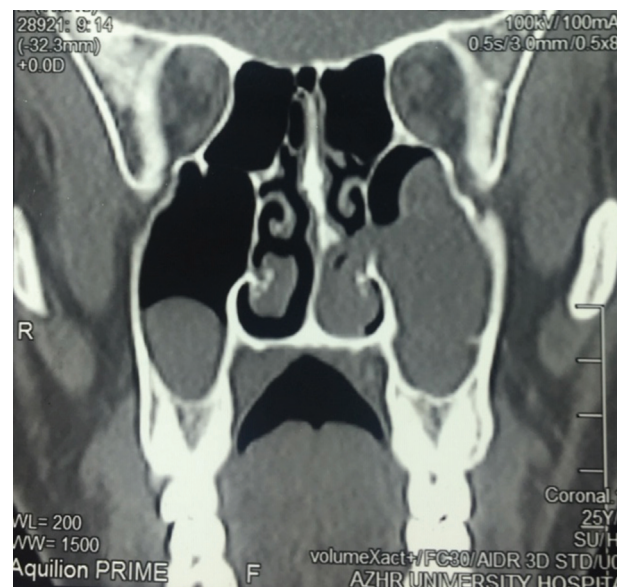
The study was approved by the local ethical committee, and a written informed consent was given by the patients for their clinical records to be used in this study.

All clinical parameters of the study subjects in ETPRA group were compared with those of the regular EMMA group. Patients from both groups had their preoperative CT scans (Figs 1 and 2) graded according to the Lund-Mackay CT grading system. The operative findings and postoperative pathologic diagnoses were recorded. The postoperative status, including possible complications and diseases recurrences, was also recorded.

### Surgical technique

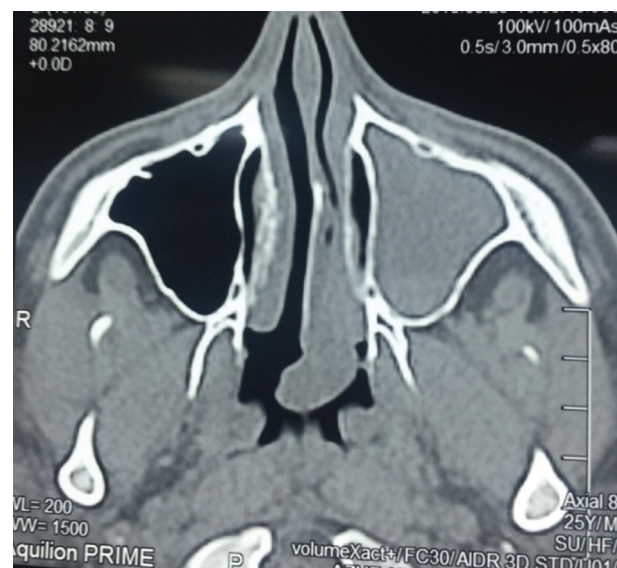
All patients had their surgery done under general anesthesia. Maxillary middle meatal antrostomy and uncinctomy was done unless if it had previously been

Figure 1



Coronal computed tomography image of antrochoanal polyp.

Figure 2

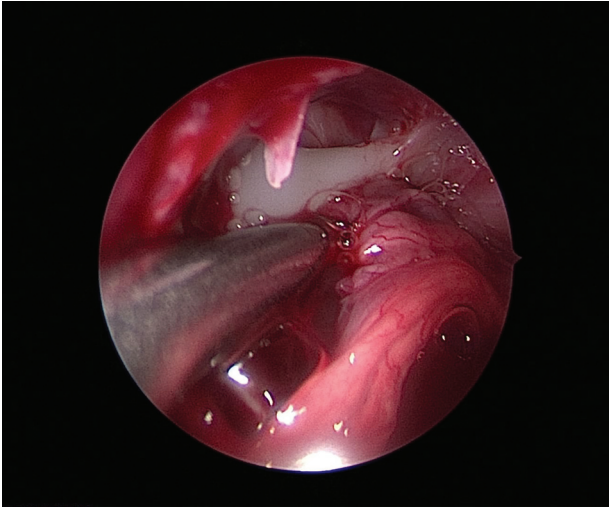


Axial computed tomography image of antrochoanal polyp.

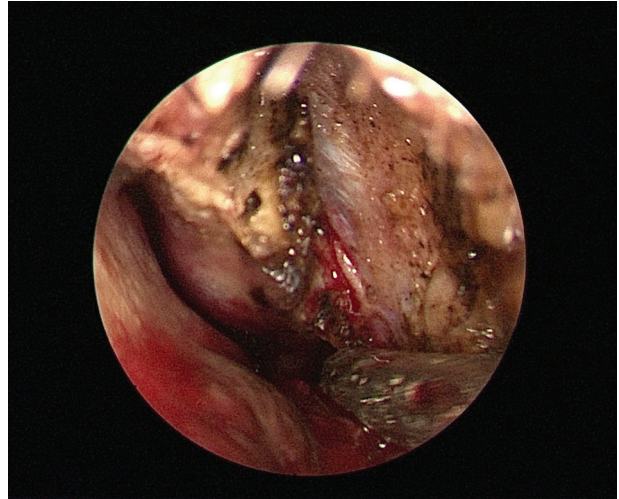
performed in previous surgery. In both groups, the part of the polyp that was extending from the MS to the choana was resected through the middle meatus.

In EMMA group, angled endoscopy (30, 45, and 70°) was used to view the antral part with the origin of the polyp (Figs 3 and 4), and then curved suction tip and instruments were used to mobilize and remove the antral part of the polyp. However, in group 2, an endoscopic prelacrimal recess approach was performed to examine and manipulate the origin inside the MS. One milliliter of 1% lidocaine with 1 : 100 000 epinephrine was injected to maxillary line,

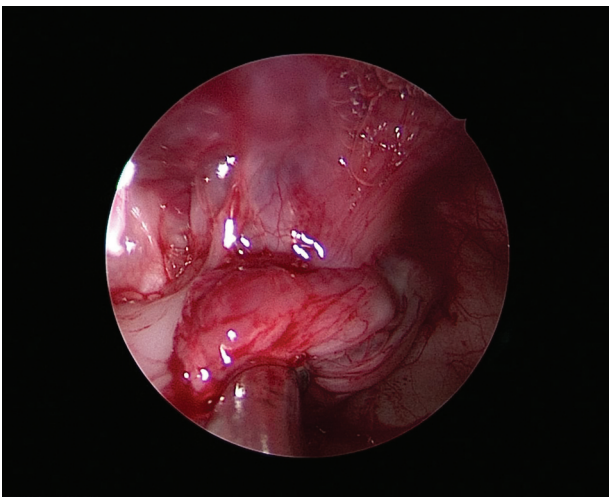


**Figure 3**

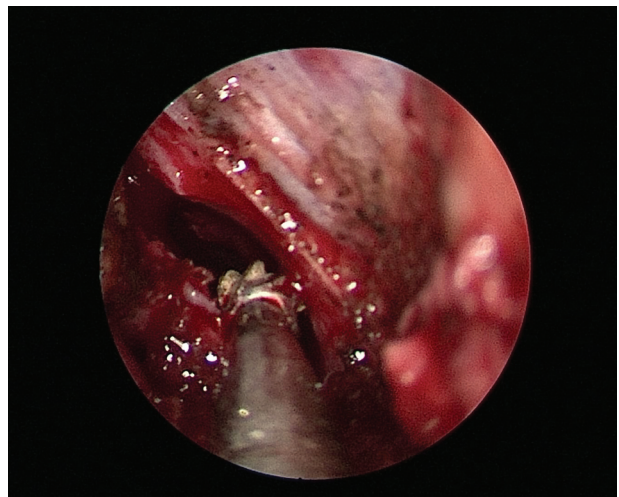
Wide middle meatal antrostomy with 30° endoscopy.

**Figure 5**

Incision of the prelacrimal recess approach.

**Figure 4**

Site of origin of the antrochoanal polyp with 70° endoscopy.

**Figure 6**

Drilling into the medial wall of the maxillary sinus.

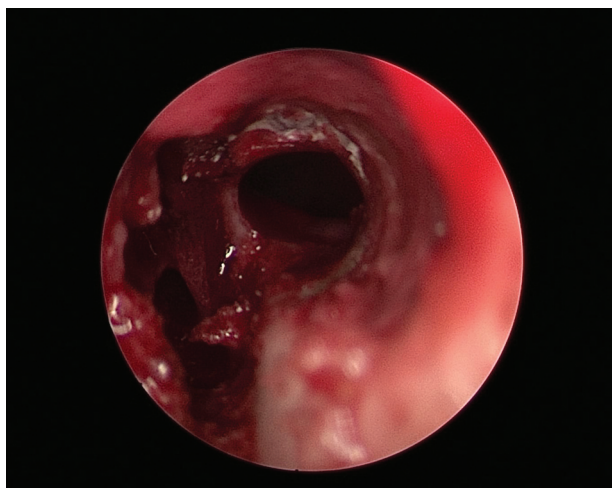
inferior turbinate, and lateral nasal wall adjacent and anterior to the inferior turbinate. Then a mucosal flap was prepared using a monopolar diathermy (Fig. 5).

The mucosal flap was prepared with an incision beginning from the anterior attachment of the middle turbinate, proceeding ~1 cm anteriorly, continuing inferiorly in a vertical plane to the level of the inferior turbinate, and proceeding again 1 cm posteriorly. The maxillary line was identified after the flap was elevated posteriorly in a submucoperiosteal fashion.

Drilling of the medial wall of MS was done (Fig. 6). Just superior to the inferior turbinate on the lateral nasal wall, a bony window (0.5–0.5 cm) (Fig. 7),

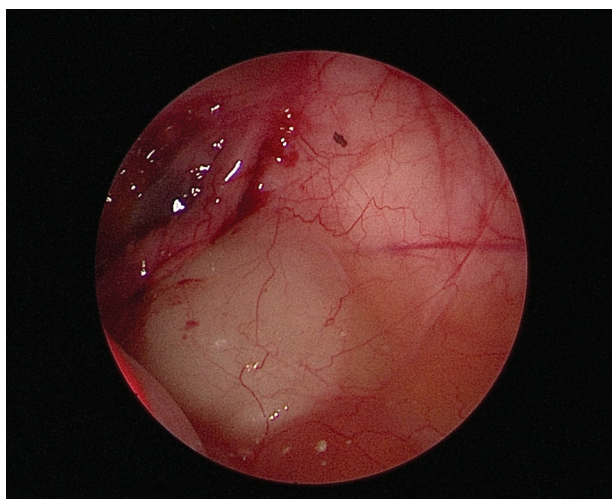
including parts from the frontal process of the maxilla and the lacrimal bone, was removed, and the nasolacrimal duct (NLD) was exposed. The bone window was further widened making anterior access around NLD into the MS, and then more drilling was done in posterior direction toward the maxillary ostium. Care was taken to avoid injury to NLD and the cheek anteriorly at the pyriform aperture. With this approach, the anterior part of the MS medial wall was resected, thus providing complete visualization and instrumentation of the MS anterior, lateral, and posterior walls. The stalk of the polyp was then visualized, attacked, and removed (Figs 8 and 9). After clearing the area from which the polyp originated, cauterization or drilling over the site of origin was done (Fig. 10). The flap over the lateral nasal

Figure 7



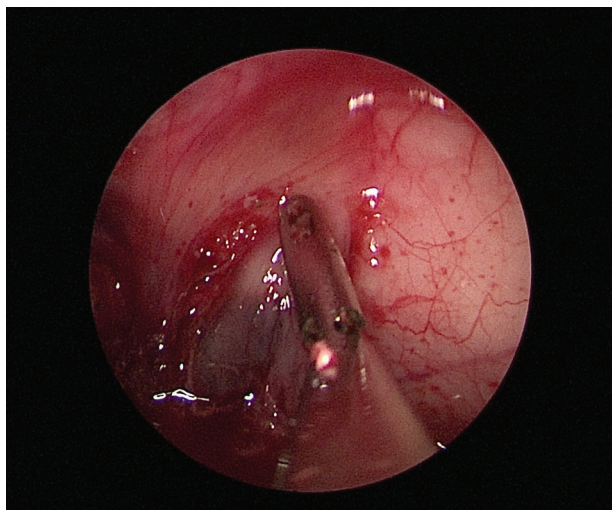
Opening the wall of maxillary sinus.

Figure 8



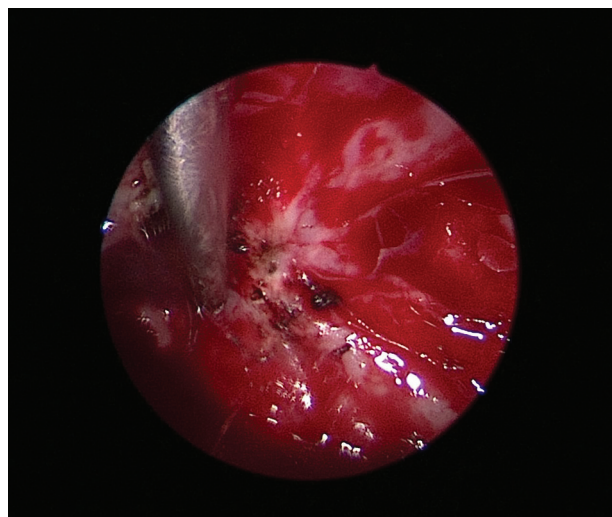
Appearance of the origin of the lesion through the prelacrimal recess.

Figure 9



Removing the site of origin through the prelacrimal recess.

Figure 10



The site of origin after cauterization.

wall was repositioned and supported with absorbable dressing medially.

The patients' records were reviewed for demographic data, clinical presentation, operative procedures, histopathologic findings, early and late complications, and morbidity and mortality. The local ethics committee of our university approved the study.

The patients' outcomes and the radiologic records were followed up to evaluate the status of the patients.

#### Statistics

Analyses of the data were performed using SPSS for Mac, version 23 (SPSS Inc., Chicago, Illinois, USA). Data are expressed as the mean values (with SD), and all statistical tests are two tailed. Nonparametric tests were applied to the data.  $\chi^2$ -Test was used to identify differences between groups. Values of  $P$  less than 0.05 were considered to indicate statistical significance.

#### Results

The study included 32 patients with antrochoanal polyps, and they were classified into two groups: group 1 included 16 patients who underwent EMMA and group 2 included patients who underwent surgery using a combined technique EMMA with ETPRA. The average age of the patients was 26 years (range: 13–40 years). The mean follow-up period was 28.4 months (range: 24–36 months). Demographic characteristics of the patients are shown in Tables 1–4.



**Table 1 Demographic data of our patients**

	Group 1: EMMA group [n (%)]	Group 2: ETPRA group [n (%)]	Total (n=32) [n (%)]	$\chi^2$	P value
Sex					
Males	6 (37.5)	5 (31.3)	11 (34.4)	0.341	0.122
Females	10 (62.5)	11 (68.7)	21 (65.6)	0.363	0.138
Total	16 (100)	16 (100)	32 (100)	0.000	0.999
P value	<0.01	<0.01	<0.01		
Age (years)					
Range	15–40	13–38	13–40	0.646	0.083
Mean±SD	20.3±2.1	18.6±1.9	19.5±2.0		

EMMA, endoscopic middle meatal antrostomy; ETPRA, endoscopic transnasal prelacrimal recess approach.  $P>0.05$ , insignificant.

**Table 2 Characteristics of the disease in the studied groups**

	EMMA (n=16) [n (%)]	ETPRA (n=16) [n (%)]	Total (n=32) [n (%)]	$\chi^2$	P
Laterality					
Right sided	9 (56.25)	10 (62.5)	19 (59.38)	0.281	0.192
Left sided	7 (43.75)	6 (37.5)	13 (40.62)	0.316	0.286
Signs and symptoms					
Nasal obstruction	16 (100)	16 (100)	32 (100)	0.00	0.999
Rhinorrhea	10 (62.5)	9 (56.25)	19 (59.38)	0.084	0.264
Headache	15 (93.75)	16 (100)	31 (96.88)	0.079	0.298
Hyposomia	8 (50.0)	9 (56.25)	17 (53.13)	0.081	0.257
MS polyp protrusion	14 (87.5)	13 (81.25)	27 (84.38)	0.083	0.273
Snoring	13 (81.25)	11 (68.75)	24 (75.00)	0.941	0.095
Recurrent cases	5 (31.25)	6 (37.5)	11 (34.38)	0.584	0.164

EMMA, endoscopic middle meatal antrostomy; ETPRA, endoscopic transnasal prelacrimal recess approach; MS, maxillary sinus.

**Table 3 Operative time**

Operation time (min)	Group 1: EMMA group	Group 2: ETPRA group	$\chi^2$	P
Range	18–23	34–47	4.886	0.001
Mean±SD	21.1±4.15	39.6±6.34		

EMMA, endoscopic middle meatal antrostomy; ETPRA, endoscopic transnasal prelacrimal recess approach.

## Discussion

Antrchoanal polyp is benign, usually unilateral with solid and cystic components, originates from the MS, and occurs predominantly in children and young adults. It usually presents as a unilateral nasal mass that can extend into the choana and oropharynx [1,9,11,12].

The recurrence rate varies between 0 and 15% after EMMA [1,2,20]. Before the development of the EMMA approach, Caldwell–Luc antrostomy was the gold standard approach for antrochoanal polyps. Caldwell–Luc antrostomy provides a better visualization of the MS and ensures complete removal of the antral part of the polyp [6,7]. However, many complications have been reported with this procedure such as facial numbness, swelling of the cheek, hemorrhage, devitalization of the permanent teeth, and growth anomalies in the faces of children [1,8,13]. On the contrary, some studies

reported no effect of EMMA on facial growth in pediatric patients [3].

EMMA has recently become the gold standard and is an indispensable approach for the management of antrochoanal polyp. However, antrally located part of antrochoanal polyp sometimes do not allow surgical intervention with standard EMMA alone. Therefore, surgeons continue to search for minimally invasive, innovative, and reliable techniques for these types of lesions.

The ETPRA is a novel popular surgical technique for the treatment of sinonasal tumors. This approach provides a wide and clear surgical view and allows easy access to the maxillary antrum to resect tumor and adjacent structures together, and therefore minimizes recurrence. It also could maximize the maneuver ability of the surgical instruments [21,22].

Lin *et al.* [23] used the prelacrimal recess approach for ESS for access and clearance of pathologic tissues in the anterior and inferior regions of the MS. They believe that the prelacrimal recess approach can be applied in all polyps in MSs. It is necessary to remove the polyp from the attachment site as well as the mucosa to prevent recurrence. In polyp cases, the middle meatal antrostomy could not eliminate the

**Table 4 Postoperative complications of the studied groups**

Postoperative complications	EMMA (n=16) [n (%)]	ETPRA (n=16) [n (%)]	Total (n=32) [n (%)]	$\chi^2$	P
Bleeding	0 (0.00)	1 (6.25)	1 (3.125)	1.406	0.066
Nasolacrimal duct injury	0 (0.00)	1 (6.25)	1 (3.125)	1.406	0.066
Postoperative lacrimation	0 (0.00)	1 (6.25)	1 (3.125)	1.406	0.066
Synechia formation	1 (6.25)	3 (18.75)	4 (12.50)	2.048	0.052
Recurrence	3 (18.75)	0 (0.00)	3 (9.375)	7.973	0.000*
Swelling of cheek	0 (0.00)	0 (0.00)	0 (0.00)		
Numbness of cheek	0 (0.00)	0 (0.00)	0 (0.00)		

EMMA, endoscopic middle meatal antrostomy; ETPRA, endoscopic transnasal prelacrima recess approach.

pathologic tissues completely, so prelacrima recess approach surgeries can be performed.

In our study, the use of ETPRA was indicated for antrochoanal polyps. It allowed complete resection of the antral part of the polyp without traditional open surgical procedures.

A total of 32 patients with antrochoanal polyp were enrolled in this study. They were divided into two equal groups: group 1 had 16 patients treated by EMMA, and group 2 had 16 patients who underwent surgery with ETPRA. In group 1, 6 (37.5%) patients were males and 10 (62.5%) were females, and the difference was statistically significant ( $P<0.01$ ). In group 2, 5 (31.3%) were males and 11 (68.7%) were females, and the difference was statistically significant ( $P<0.01$ ). However, in comparison between the two groups, the difference was statistically insignificant ( $P>0.05$ ). Thus, these data coincide with Comoglu *et al.* [23] who found a predominance of females than males in the incidence of antrochoanal polyps.

All patients had unilateral disease. In EMMA group, the lesion was right sided in nine (56.25%) patients and 10 (62.5%) in ETPRA group, whereas the left sided lesion was present in seven (43.75%) patients of the EMMA group and six (37.5%) in ETPRA group. The difference was statistically insignificant ( $P>0.05$ ).

Regarding the operated lesions in EMMA group, there were five (31.25%) patients with history of recurrence, whereas in ETPRA group, there were six (37.5%) patients with history of recurrence, and the difference was statistically insignificant ( $P>0.05$ ).

The most common symptoms were unilateral nasal obstruction in 32/32 (100%), snoring 24/32 (75%), rhinorrhea 19/32 (59.38%), headache 31/32 (96.88%), and hyposmia 17/32 (53.13%). Nasal polyp protrusion into the MS was found in 27 (84.38%) patients. All these signs and symptoms were statistically insignificant ( $P<0.05$ ) when comparing the two studied groups.

These data were comparable with that of Comoglu *et al.* [23] who found that the most common symptoms were nasal obstruction (12/12), snoring (9/12), rhinorrhea (7/12), and hyposmia (6/12).

The operative time was longer when ETPRA was used, where the mean operative time for EMMA group was  $21.1\pm4.15$ , whereas it was  $39.6\pm6.34$  for ETPRA, which is approximately 20 min more in comparison with the EMMA group; this is attributed to the usage of the combined technique in group 2. However, with this increase in time, there is the ability of complete removal of the polyp with no recurrence rate, which makes prolonged time a great benefit and is not to be considered a disadvantage.

In this study, we found that postoperative complications varied between both the groups. Bleeding was found in only one (6.25%) patient in ETPRA group, and it was moderate bleeding and managed by anterior nasal pack in the outpatient clinic. However, one patient in the EMMA group had synechia formation between the middle meatus and the septum, whereas three patients in ETPRA group had synechia formation between the lateral nasal wall and the septum just superior to the inferior turbinate; the four patients in both groups were not complaining and needed no surgical interference. Recurrence was found in three (18.75%) patients in EMMA group, and there was no recurrence in the ETPRA group. They showed a statistically highly significant value ( $P<0.001$ ). However, NLD injury was found in two patients in ETPRA group, and postoperative lacrimation presented in only one (6.25%) patient of the same group; they were statistically insignificant ( $P>0.05$ ).

Comoglu *et al.* [24] nearly found the same results. NLD injury occurred in two patients during operation but neither had epiphora postoperatively. Three (3/12; 25%) patients had synechia formation between the lateral nasal wall (particularly on the inferior edge of the mucosal flap) and septum just superior to the inferior turbinate. One of the three (1/12; 8.3%)

patients with synechia was symptomatic and required surgical treatment under local anesthesia. No patients developed recurrence during follow-up.

Compared with the Caldwell–Luc operation and canine fossa puncture, the prelacrimal recess approach can be performed endonasally and can minimize complications such as facial swelling, numbness of the face, and numbness of the dental region.

Lin *et al.* [23] performed middle meatal antrostomy before the prelacrimal recess approach technique because middle meatal antrostomy provides a better drainage route for the MS and wider access to the MS for postoperative treatment.

Chaiyasate *et al.* [25] have suggested that patients should be followed up for at least 2 years postoperatively to detect recurrence. In our study, no recurrence was seen, and no postoperative delayed complications were detected during the follow-up period (range: 24–36 months).

It has been reported that the incidence of epiphora is as high as 30% when performing medial maxillectomy [26]. In our study, epiphora as a complication was minimal. Only one case showed persistent epiphora. Similar results were shown in a study by Al Ayadi *et al.* [27] who found epiphora in one case only (0.4%). We believe that the ETPRA technique may be considered an auxiliary route for surgery of lesions located in concealed regions of MS. Lateral and anterior wall of MS can be considered difficult fields to reach and manipulate via conventional endoscopic route.

This approach provides wide access to almost all recesses and walls of the MS with the preservation of the inferior turbinate and NLD [23].

Management of recurrent antrochoanal polyp can be challenging owing to difficult or impossible visualization of the complete maxillary antrum and the limited maneuver ability of surgical instruments. In experienced hands, ETPRA is a novel, reliable, and useful method for the treatment of recurrent antrochoanal polyp. It ensures good exploration of the maxillary antrum and easy access to the polyp origin on the maxillary wall without the need of additional approaches. In this technique, one should keep in mind that special care must be taken when using powered instrumentation to reach the prelacrimal recess or to enlarge the posterior aspect of the antrum around the nasolacrimal sac boundaries.

Further prospective and controlled studies are needed to clarify the advantages of this technique for management of MS disease [24].

## Conclusion

From these data, it is concluded that ETPRA provides a better view of the antrum to remove antrochoanal polyp completely. Additionally, recurrence rate of such lesion was reduced when a combined technique of ETPRA and EMMA was used.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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