

ORIGINAL RESEARCH

Topical mitomycin C application post endoscopic removal of antrochoanal polyp

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Abstract

Objective: Assessment the effect of topical application of mitomycin-C (MMC) after endoscopic removal of antrochoanal polyp (ACP) on its recurrence rate.

Methods: This prospective study was done on patients with ACP. Endoscopic nasal surgery has been done to remove the polyp after wide middle meatal antrostomy. The patients were categorized into two groups. In MMC group, after endoscopic ACP removal, MMC on a piece of cotton was topically applied inside the maxillary antrum in the suspected site of ACP origin. A second group was used as a control group without MMC application.

Results: The study included on 40 patients; 20 patients in each group. Topical MMA application was easily performed. No granulation, crust, infection, or bleeding was reported in all cases of both groups. Recurrent polyp was not reported in MMC group, while recurrent polyp was detected in four cases (20%) in control group without MMA application with statistically significant difference ($P = .035$).

Conclusion: Topical MMC application inside the maxillary sinus after endoscopic removal of the ACP is safe, easy, and effective.

Level of evidence: 2c.

KEYWORDS

antrochoanal polyp, endoscopic sinus surgery, maxillary sinus, mitomycin C, recurrence

1 | INTRODUCTION

The term antrochoanal polyp (ACP) or Killian polyp is used to describe a benign polypoidal mucosal lesion, which arises from the mucosa of the maxillary sinus antrum and extends posteriorly toward the nasal choana, after passing through the nasal cavity. In most of cases, ACP leaves the maxillary sinus through an accessory ostium. The ACP usually has two components; cystic component (the maxillary part) and solid polypoidal component (the nasal and choanal parts).¹

Although the ACP was firstly described by Palfyn in 1753, however Gustav Killian was the first one who precisely described its maxillary sinus origin.^{2,3}

ACPs are more common among children as it represents up to 33% of nasal polyps in children, however, in adult it represents 4% to 6% of nasal polyps.⁴

Surgery is the only treatment option for ACP. It is ranging from polypectomy, Caldwell-Luc operation,⁵ endoscopic sinus surgery,⁶ combined endoscopic and transcanine approach.⁷

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Mitomycin-C (MMC) is an antineoplastic agent produced from *Streptomyces caespitosus*. It is used intravenously to treat upper gastro-intestinal cancers; however its most common usage is topically and both human and animal applications confirm the safety of topical use of MMC.⁸ It acts as an alkylating agent, inhibiting DNA, protein synthesis and fibroblasts in cell cultures.⁹

It has many topical usages by otolaryngologist in; endoscopic sinus surgery,¹⁰ choanal atresia,¹¹ laryngeal,¹² and tracheal surgery¹³ to minimize or even prevent post-operative synechia and stenosis.

The aim of this study was to assess the effect of topical application of MMC after endoscopic removal of ACP on its recurrence rate.

2 | PATIENT AND METHODS

2.1 | Study design

This prospective study was conducted on 40 patients at the otorhinolaryngology department, Zagazig University Hospitals over a period from January 2014 to January 2018. Informed consent was signed by all enrolled subjects or their relative after explanation of the research purpose and the IRB approval was obtained. All included patients were diagnosed to have ACP by CT scan and nasal endoscopy. Patient with recurrent ACP after previous surgery and patient lost from follow up were excluded from the study. All patients were subjected to diagnostic serial post-operative endoscopic examination and CT scan of the nose and paranasal sinus at 1 year post operatively.

2.2 | Methods

Endoscopic removal of the ACP with wide middle meatal antrostomy was performed for all patients. The patients were randomly categorized into two groups. Group A for whom MMC was topically applied in the maxillary sinus over a soaked piece of cotton. Group B for whom MMC was not used.

Routine endoscopic removal of ACP was done in all patients. First, endoscopic assessment of the nose was done to assess the polyp's size, nature and extend (middle meatus, nasal cavity, and nasopharynx). Then the lower half of the uncinat process was removed to enlarge middle meatal antostomy. The ACP was grasped from its neck from maxillary sinus by gentle sustained traction to achieve complete removal the whole polyp. In some cases, when ACP was large, it is pushed back through the nasopharynx and oropharynx to get it out through the oral cavity. Then, the maxillary antrum was carefully examined by various angled telescopes ranging from 30°, 45°, and 70° to ensure complete removal of the ACP remnants.

In group A, a piece of cotton soaked with MMC was applied through the wide middle meatal antrostomy inside the maxillary sinus on the anticipated site of origin of the ACP for about 5 minutes. MMC vial (2 mg) was used, 10 mL distilled water was added to the vial (2 mg/10 mL), and then 1 mL (0.2 mg) was taken to be used. While group B was used as a control group without MMC application.

All patients were followed up for a period ranging from 16 to 24 months by doing office based diagnostic endoscopy every 3 months interval. Recurrence was reported if any polyp was seen within the middle meatus in the previously affected side and confirmed by the CT. Post-operative CT was performed after 1 year.

The two groups were compared as regard the demographic features (age and sex), associated anatomical variations and pathology, complications, and recurrence rate.

2.2.1 | Statistical methods

All analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows, version 15 packed programs. A difference was considered significant at $P < .05$.

3 | RESULTS

Forty three patients were included but three patients were excluded because they did not complete the follow up. So, the patients who were included in the current study were 40 patients (22 male and 18 female) who were divided to two groups. Group A; included 20 patients (12 male and 8 female) with age ranged from 15 to 28 years (mean 19.7 ± 3.5), and group B included 20 patients (10 male and 10 female) with age ranged from 16 to 29 years (mean 20.3 ± 4.3). Both groups were matched as regard age ($P = .6312$, $t = 0.4840$) and sex ($P = .525$, $\chi^2 = 0.404$) (Table 1).

In group A; 9 patients (45%) had deviated nasal septum (DS), 6 patients (30%) had concha bullosa (CB), 4 patients (20%) had paradoxal middle turbinates (PMT), 7 patients (35%) had hypertrophied inferior turbinates (HIT), 6 patients (30%) had chronic sinusitis, and 6 patients (30%) had symptoms of nasal allergy.

While in group B; 8 patients (40%) had DS, 5 patients (25%) had CB, 6 patients (30%) had PMT, 9 patients (45%) had HIT, 5 patients (25%) had chronic sinusitis, and 6 patients (30%) had symptoms of nasal allergy. Apart from ACP, no polyp was detected in the studied patients of both groups.

There was no statistical difference between the two groups in relation to anatomical variations, chronic sinusitis, and nasal allergy ($P = .97179$, $\chi^2 = 0.878$).

Throughout a follow up period between 13 months and 25 months, in group A, recurrence was not detected, while in group B, recurrence was detected in four cases with significant difference between the two groups ($P = .035$, $\chi^2 = 4.444$) (table).

No granulation, persistent crust, infection, nor bleeding was reported in any of the cases without registered complications in both groups.

4 | DISCUSSION

The main treatment of ACP is surgery, and the cornerstone of successful surgery is to remove the polyp with its origin in the maxillary sinus.^{14,15}

TABLE 1 comparison of group A (with MMA application) and group B (without MMC)

Parameter		Group A (with MMC)	Group B (without MMC)	P value
Sex	Male	12	10	$P = .525$ ($X^2 = 0.404$)
	Female	8	10	
Age (in years)	Range	15-28	16-29	.6312 ($t = 0.4840$)
	Mean \pm SD	19.7 \pm 3.5	20.3 \pm 4.3	
Associated anatomical variations and pathology	Deviated septum	9	8	$P = .97179$ ($X^2 = 0.878$)
	Concha bullosa	6	5	
	Paradoxal middle turbinates	4	6	
	Hypertrophied inferior turbinates	7	9	
	Chronic sinusitis	6	5	
	Nasal allergy	6	6	
Recurrence		0 (0%)	4 (20%)	$P = .035$ ($X^2 = 4.444$)

Abbreviations: MMC, mitomycin-C; NS, non-significant; S, significant; X^2 , Chi-square test.

The endoscopic management of the ACP is the standard and most famous approach, by doing wide middle meatal antrostomy and using various angle telescopes to identify the origin of ACP. However its success rate is around 80%^{14,16} because it is still difficult to manage the polyp originated from the lateral or anterior wall of the maxillary sinus. So some surgeon prefer to use the combined endoscopic and transcanine approach for such cases to decrease the recurrence rate.¹⁷

Although these more invasive approaches offer a good exposure of the maxillary sinus which ensure complete removal of the ACP with its origin with low recurrence rate 4.8%,¹⁸ however many morbidities may develop from these approaches such as facial swelling, hypoesthesia, or paraesthesia of the cheek, teeth, and gingival, dental hypoesthesia, oroantral fistula, tooth devitalization, and orbital complications (epiphora, diplopia, edema, hematoma, and orbital cellulites).¹⁸ Moreover, these approaches are not recommended in children because as it could break dentition and affect facial growth.¹⁹

In the current study, we aimed to get the benefit of low recurrence rate that produced by invasive approaches (transcanine or combined) and minimal morbidity effect of transnasal endoscopic approach. So we used the MMC as a topical applicant in the suspected site of origin of the ACP after complete endoscopic removal.

Mitomycin-C (MMC) has also many topical usages in otolaryngology. It was used safely to reduce nasal synechiae and stenosis after endoscopic sinus surgery,¹⁰ and choanal atresia.¹¹

In this study, after topical MMC application in the maxillary sinus in the site of origin of the ACP after endoscopic removal, the recurrence was not encountered in comparison to 20% recurrence without MMC application ($P = .035$). It was clear that recurrence rate in the current study in the group without MMC usage was near to most previous studies.^{14,16} So the recurrence of traditional technique was comparable to previous studies reflecting its validity as a control group.

The etiopathogenesis of the ACP is still not well understood but this effect of MMC in minimizing ACP recurrence could be attributed

to that the MMC is a chemotherapeutic agent that inhibits the DNA synthesis and so inhibits cell migration and mitosis decreasing the rate of cell proliferation particularly at site of origin of the ACP that was our target during MMC application.

MMC was applied easily and safely without any added risk to the patients, No granulations, crusts, infection, bleeding was reported in any of the cases with its usage. With topical application MMC, It could minimize the recurrence rate without adding more risk to the patient and without the need for extra instrument or special training skills. So, the technique is safe, reliable, easily applicable and effective. However, topical application of MMC is recommended to be investigated on larger series of patients in double blinded studies with longer follow up period.

5 | CONCLUSION

Topical MMC application in the maxillary sinus after endoscopic removal of the ACP is safe, easy, and effective that could significantly minimize the recurrence rate in comparison to the control group.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

ETHICS STATEMENT

The institutional review board (IRB) approved the research. The study was performed according to the Declaration of Helsinki on Biomedical Research Involving Human Subjects.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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