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Efficacy of Endoscopic Middle-meatus Antrostomy in Chronic Maxillary rhinosinusitis. A Prospective Single-Centre Study

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ABSTRACT

Introduction: Chronic maxillary sinusitis(CMS) significantly impacts quality of life, requiring effective interventions. Middle meatal antrostomy (MMA) is a widely performed surgical procedure, but its outcomes and complications need further evaluation.

Aims and Objectives: This study aimed to assess the effectiveness of MMA in alleviating symptoms of chronic maxillary sinusitis and identify potential postoperative complications.

Place and Duration of Study: The study was conducted at Khyber Teaching Hospital, Peshawar, from February 2022 to February 2024.

Materials and Methods: A total of 120 consenting patients with chronic maxillary sinusitis meeting inclusion/exclusion criteria participated in this prospective study. Patients underwent clinical examinations, nasal endoscopy, and CT scans pre- and postoperatively. MMA was performed under local or general anesthesia using 0°, 30°, and 70° telescopes, back-biting forceps, and a micro debrider. Postoperative care included removal of nasal packing within 24-48 hours and follow-up assessments at 14 days and 3 months. Pre-and postoperative symptoms were compared, and complications were recorded. Data were analyzed using SPSS version 27. P value less than 0.05 considered significant.

Results: Preoperative symptoms included nasal obstruction (87.5%), facial pain (75.8%), and headaches (63.3%). Postoperatively, nasal obstruction and facial pain decreased to 10.8% and 7.5%, respectively. Persistent headaches were noted in 5.8% of patients who initially reported them, while 71.6% experienced new-onset headaches. Postoperative complications included middle meatal synechiae (14.1%).

Conclusions: MMA significantly alleviated preoperative symptoms of chronic maxillary sinusitis, particularly nasal obstruction, facial pain, and headaches. However, postoperative complications, such as new onset headaches and synechiae, underscore the need for careful patient management and further research to optimize outcomes.

Keywords: Endoscopic appearance score, Chronic maxillary sinusitis, Nasal obstruction, Nasal endoscopy

INTRODUCTION

A class of illnesses known as sinusitis result in inflammation of the paranasal sinus mucosa. The duration of the symptoms determines the category, for example, acute sinusitis is defined as symptoms lasting less than four weeks [1]. The symptoms of subacute sinusitis last between four and eight weeks, while chronic sinusitis symptoms persist beyond eight weeks. When someone experiences three or more bouts of acute sinusitis in a year, and each episode lasts less than two weeks, it is commonly said that they have recurrent acute sinusitis [2]. In chilly, damp climates with high levels of air pollution, smoke, and dust, sinusitis is more common. This condition is more prevalent in individuals with underlying health issues, a history of exanthematous fever, measles, or chickenpox, as well as those with nutritional deficiencies, systemic disorders like diabetes, or immune deficiency syndromes. The process is largely due to the mucosal inflammatory oedema, which impedes the sinuses' ability to empty[3]. One of the most prevalent medical conditions worldwide is chronic maxillary sinusitis[4]. Although sinusitis is predominantly rhinogenous, it can occasionally be linked to a preexisting odontogenic condition due to the anatomical proximity of the teeth and the maxillary sinus[5]. The symptoms of subacute sinusitis persist for four to eight weeks. Chronic sinusitis symptoms persist for over eight weeks. If a patient experiences three or more episodes of acute sinusitis within a year, with each episode lasting less than two weeks, it is typically classified as recurrent acute sinusitis [6].

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Chronic rhinosinusitis (CRS) is a multifaceted condition involving not just inflammation but also epithelial damage, microbial colonization, and mucociliary dysfunction, which requires a comprehensive treatment approach. Additionally, factors such as preexisting odontogenic conditions, environmental influences, and systemic diseases like diabetes can significantly exacerbate CRS and affect treatment outcomes [7]. The upper teeth are more susceptible to periapical or periodontal odontogenic infections due to their close proximity to the maxillary sinus. The maxillary sinus and tooth roots can be divided by either a completely nonexistent bone wall (in which case the roots are solely covered by mucous membrane) or by a bone wall as thick as 12 mm [8]. This study aims to evaluate the efficacy of middle meatal antrostomy (MMA) in improving symptoms of chronic maxillary sinusitis, particularly nasal obstruction, facial pain, and headaches. We hypothesize that MMA will significantly alleviate these symptoms while posing some postoperative complications like new onset headaches and synechiae.

MATERIAL AND METHODS

Study design and subjects

This hospital-based, prospective study was conducted at Khyber Teaching Hospital, Peshawar, from February 2022 to February 2024. The study received ethical approval from the Institutional Ethics Committee (630/KTH/ENT dated 18/11/24). A total of 120 individuals, of both genders, diagnosed with chronic maxillary sinusitis were included in the study. Convenience sampling was employed to select participants who met the inclusion and exclusion criteria. The sample was obtained through a convenience sampling method. The inclusion criteria consisted of patients diagnosed with chronic maxillary sinusitis that was unresponsive to medical treatment, confirmed by radiography, endoscopy, or clinical assessment. Individuals under 20 or over 60 years of age, those with congenital mucociliary dysfunction, granulomatous nasal diseases (such as atrophic rhinitis), and patients with systemic conditions like immunodeficiency syndrome, cardiovascular disease, or renal disease were excluded from the study. Information was logged, including name, age, and gender. Under local anaesthesia, every patient had a thorough otorhinolaryngological examination, which included a nasal endoscopy. Three months after surgery, a clinical otorhinolaryngological examination and a nasal endoscopy were performed again. The preoperative and postoperative symptoms were measured and recorded according to D'Agostino et al, and Acharya et al, [9, 10]. At three months, postoperative complications were assessed followed by Kim et al, [11].

Middle Meatal Antrostomy

Surgical procedures are typically performed under local anesthesia, which is administered 30 to 40 minutes before surgery using ribbon gauze soaked in 4% xylocaine and 5 mg/ml adrenaline. A 26-spinal needle loaded with 2% xylocaine and adrenaline was used to deliver the blocks for the larger palatine, anterior ethmoidal, and sphenopalatine. In addition to local anaesthesia, drowsiness is produced using 1-2 mg/kg of midazolam. Depending on the patient's resistance to the procedure, general anaesthesia may occasionally be utilised. Using rigid 4mm telescopes at 0°, 30°, and 70°, as well as a ball probe to identify the maxillary ostium, the surgery entailed a Middle meatus antrostomy with back-biting forceps to remove the lowest two thirds of the horizontal area and a portion of the vertical part. Next, irrigation and suction were used to fully clean the maxillary sinus. Within 24 to 48 hours post-surgery, the anterior and antral packing, either crafted from ribbon gauze or a model, was removed to assess for postoperative epistaxis. Clinical observations were used to identify immediate complications during the first 24 hours after surgery. These included symptoms including heavy bleeding, prolonged pain that did not go away with standard analgesics, headaches that started suddenly, and infection-related indications. Follow-up evaluations at 14 days and 3 months included a diagnostic nasal endoscopy, X-ray, and CT scan for the patient. Data were recorded and analyzed in Excel for combining and percentage calculations.

RESULTS

The study included 120 participants, with a gender distribution of 60% male (n=72) and 40% female (n=48). The prevalence of preoperative symptoms was notable, with nasal obstruction being the most common symptom reported by 87.5% (n=105) of the participants. This was followed by facial pain in 75.8% (n=91), headaches in 63.3% (n=76), earache in 11.6% (n=14), dental pain in 5.8% (n=7), hyposmia in 13.3% (n=16), and halitosis in 6.6% (n=8). Postoperative outcomes showed significant improvements across all symptoms. Nasal obstruction decreased to 10.8% (n=13), facial pain to 7.5% (n=9), and pre-existing headaches to 5.8% (n=7). Notably, earache, dental pain, hyposmia, and halitosis were resolved postoperatively, each

showing a 0% occurrence, consistent with prior data. However, 71.6% (n=86) of the patients reported new onset headaches postoperatively. Combined symptoms included headache and facial pain in 6.6% (n=8), headache and nasal obstruction in 10% (n=12), and headache and hyposmia in 29.1% (n=35) (Table 1).

Table I: Preoperative and Postoperative Symptom Prevalence and Immediate Complications in Study Participants

Characteristics	No. of patients	Percentage (%)
Gender		
Male	72	60
Female	48	40
Preoperative symptoms		
Nasal obstruction	105	87.5
Facial pain	91	75.8
Head ache	76	63.3
Ear Ache	14	11.6
Dental pain	7	5.8
hyposmia	16	13.3
halitosis	8	6.6
Postoperative symptoms		
Nasal obstruction	13	10.8
Facial pain	9	7.5
Head ache	7	5.8
Ear Ache	0	0
Dental pain	0	0
hyposmia	0	0
halitosis	0	0
Post-operativeimmediate complications		
Headache	86	71.6
Headache+Facial Pain	8	6.6
Headache+Nasal Obstruction	12	10
Headache+Hyposmia	35	29.1

The preoperative endoscopy and CT imaging findings and postoperative endoscopy results are summarized in the Table-01. Deviated nasal septum (DNS) was preoperatively observed in 26.6% (n=32) of patients. Middle meatal mucopus was noted in 70.8% (n=85), bilateral inferior turbinate hypertrophy (ITH) in 20% (n=24), antrochoanal polyp in 6.6% (n=8), and ethmoidal polyp in 5.8% (n=7). CT findings revealed maxillary polyps in 7.5% (n=9) of patients, ethmoidal polyps in 2.5% (n=3), maxillary sinus opacity in 98.3% (n=118), concha bullosa in 4.1% (n=5), and middle meatal mucopus in 5.8% (n=7). Notably, some patients had one or more findings, resulting in cumulative percentages exceeding 100%. Postoperatively, endoscopy indicated a significant improvement, with 86.6% (n=104) of patients showing normal findings. However, middle meatal synechiae were observed in 14.1% (n=17) of patients, indicating some postoperative complications (Table 2).

Table 2: Preoperative and Postoperative Endoscopy Findings and CT Imaging Results in Study Participants

Characteristics	No. of patients	Percentage (%)
Pre-Operative Endoscopy		
DNS	32	26.6
Middle Meatal Mucopus	85	70.8
Bilateral ITH	24	20
Antrochoanal Polyp	8	6.6
Ethmoidal Polyp	7	5.8
CT findings		
Maxillary Polyp	9	7.5
Ethmoidal Polyp	3	2.5
Maxillary Sinus Opacity	118	98.3
Concha Bullosa	5	4.1
Middle Meatal Mucopus	7	5.8
Post-operative endoscopy		
Middle Meatal Synechiae	17	14.1
Normal	104	86.6

DISCUSSION

The efficacy of middle meatal antrostomy in treating chronic maxillary sinusitis was evaluated in our study, which involved 120 patients who had not responded to a standard medical treatment, including nasal corticosteroids and antibiotics, over a period of 6 weeks. These patients subsequently underwent surgical intervention through the Middle Meatal approach. Our study showed a predominance of males, with a male-to-female ratio of 1.6:1. In comparison, Son et al.'s study reported a male-to-female ratio of 1.9:1, also demonstrating a male preponderance[12]. Our study aimed to evaluate the effectiveness of middle meatal antrostomy in managing chronic maxillary sinusitis, and the results offer valuable insights into the outcomes and complications associated with this surgical intervention. The study encompassed 120 patients with chronic maxillary sinusitis, predominantly males (60%, n=72) compared to females (40%, n=48), aligning with similar studies demonstrating a male preponderance in sinus-related conditions[13]. The preoperative symptoms exhibited a high prevalence of nasal obstruction (87.5%, n=105), followed by facial pain (75.8%, n=91) and headaches (63.3%, n=76). These findings align with previous literature, emphasizing the role of gender

(P < 0.001), age (P = 0.01), and the relative perpendicular mean thickness (RPMT) relationship (P < 0.001) in maxillary sinus area, which may contribute to nasal obstruction in sinusitis patients[14,15]. Endoscopic examinations revealed middle meatal mucopus as the most common finding (70.8%, n=85), followed by deviated nasal septum (26.6%, n=32). These findings correlate with existing studies, with Brown et al. (2018) reporting a 25% prevalence of deviated nasal septums in chronic sinusitis cases, further emphasizing the significance of middle meatal and anatomical pathologies in the condition[16, 17]. CT imaging identified maxillary sinus opacity as the predominant finding (98.3%, n=118), with other less common findings such as maxillary polyps (7.5%, n=9) and concha bullosa (4.1%, n=5). These observations align with prior research emphasizing the diagnostic significance of maxillary sinus opacification in sinusitis diagnoses, with previous studies reporting varying percentages, such as 65%[12,18]. Postoperatively, while significant improvements were noted in symptoms such as nasal obstruction (10.8%, n=13), facial pain (7.5%, n=9), and headaches (5.8%, n=7), postoperative complications were observed in the form of headaches (71.6%, n=86) and middle meatal synechiae (14.1%, n=17). These results are comparable to previous studies, such as one reporting a success rate of 86.7% in preserving a disease-free condition after surgical intervention for chronic maxillary sinusitis[19,20]. Despite these complications, the surgical intervention demonstrated considerable efficacy, with 88% of patients experiencing relief from significant symptoms of nasal obstruction, facial pain, and headaches postoperatively. These results are comparable to previous studies, which reported a success rate of 86.7% in preserving a disease-free condition and a similar recurrence rate, with 26.7% recurrence observed. However, our study also highlighted a unique combination of surgical approaches, including the endoscopic prelacrimal recess approach, which facilitated better access and mucosal healing [21,22]. The study limitations include a small sample size, a single-center design, and a short follow-up period, which restrict the generalizability of the findings. Additionally, patient-reported outcomes and long-term recurrence were not assessed. Multi-center studies with longer follow-ups are needed for a comprehensive evaluation.

CONCLUSION

In conclusion, the findings from our study underscore the effectiveness of middle meatal antrostomy in addressing the symptoms of chronic maxillary sinusitis. The surgical intervention significantly improved preoperative symptoms, particularly nasal obstruction, facial pain, and headaches. However, postoperative complications, particularly new onsets headaches and synechiae, remained a concern for a portion of patients. Despite these challenges, careful patient selection and management can lead to favourable outcomes, with significant improvements in symptoms and quality of life postoperatively. Our results emphasize the importance of continued research, long-term follow-up studies, and refinement of surgical strategies to optimize the management of chronic sinusitis.

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