

Research Article*Open Access, Volume 3***Role of mitomycin-C to reduce post FESS
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Received: Apr 26, 2022

Accepted: May 27, 2022

Published: Jun 03, 2022

Archived: www.jcimcr.org

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DOI: www.doi.org/10.52768/2766-7820/1870

Abstract

The aim of this study is to determine adhesion formation rate and antrostomy closure rate after the use of Mitomycin-C in patients underwent FESS. This is a prospective case control study conducted at ENT Department Lyari General Hospital, Karachi, Pakistan. Fifty one patients included with diagnosis of bilateral chronic rhinosinusitis or allergic fungal sinusitis and were the surgical candidate, underwent bilateral Functional Endoscopic Sinus Surgery (FESS). The patients were evaluated using Lund-Mackay staging system prior to surgery. At the completion of surgery Mitomycin-c (MMC) was applied in one nasal cavity the other nasal cavity served as a control. Among fifty one patients both nostrils were used hence we have 51 cases and 51 controls. The patients were followed for a minimum period of three months after surgery. Subjective improvement of symptoms were recorded as well as rigid nasoendoscopic examination was also performed regularly. The adhesion formation rate in MMC applied nasal cavities was 11.7% as compared to 64.7% of controls. The middle meatal antrostomy closure rate was 41% and 5% in controls and MMC applied group respectively. Hence mitomycin-c application has shown benefit in reducing post FESS ostial stenosis and adhesion formation between middle turbinate and lateral nasal wall. Application of Mitomycin-C has impact on reducing post FESS adhesion formation and middle meatal antrostomy closure.

Keywords: FESS; Post FESS adhesion; Allergic nasal polyp.**Introduction**

Inflammatory and allergic diseases of nose and paranasal sinuses influence the development of nasal polyps and sinusitis. These have significant effect on quality of life. With the advancement in endoscopes and introduction of microdebrider the disease has been effectively managed by rhinologists but synechiae and stenosis formation following endoscopic sinus surgery are the major contributing factors in surgical failure

and increase the frustration of surgeon, the incidence has been reported up to 36% [1]. The local application of Mitomycin-C (MMC) has shown promising results in its ability to decrease postoperative scar formation by suppressing fibrosis and vascularity. Hu D et al has proposed application of MMC for few minutes can stop the growth of fibroblasts and can promote their cell death [2]. Depending on these assumptions we hypothesize that ostial stenosis and adhesion formation related to Function-

Citation: Humayun NH, Usman R, Ahmed S, Yousuf M, Ayub B, et al. Role of mitomycin-C to reduce post FESS adhesion and ostial stenosis. J Clin Images Med Case Rep. 2022; 3(6): 1870.

al Endoscopic Sinus Surgery (FESS) can be reduced by superficial application of mitomycin-C. Functional endoscopic sinus surgery (FESS) after its first introduction by Messerklinger has undergone many changes to improve the post-operative results. Maneuvers to reduce the adhesions and synechiae formation is one the big challenge for the rhinologist as it has the direct impact in restoring aeration of paranasal sinuses and mucociliary clearance mechanism was also improved, which is the main aim of FESS [3]. This prospective case control study was designed to determine that topical application of MMC can help in reducing the synechiae formation between middle turbinate and lateral nasal wall and also prevents closure of middle meatal stenosis after endoscopic sinus surgery.

Materials and methods

This study was conducted in Department of ENT Head & Neck Surgery, Lyari General Hospital during January 2018 to September 2020. A total of 51 patients underwent bilateral endoscopic sinus surgery were included in the study. The indications for surgery were CRS and AFS. In all these patients, 0.8 mg/mL topical mitomycin-C in the nasal cavity was used at the end of surgery, while the anterior nasal cavity served as a control. Patients between the ages of 18 and 50 having CRS with or without polyps and AFS were included in the study. Patients with nasal septal deviation were excluded and as well as the patients having invasive fungal sinus disease were also excluded. Revision surgery and presence of comorbid conditions like uncontrolled diabetes mellitus and hypertension were taken as exclusion factors. Written informed consent was taken from all patients. Prior approval from ethical review committee was obtained. For obtaining 0.8 mg/ml of topical MMC concentration, one vial of MMC with concentration of 2mg supplied by our pharmacy is diluted with 2.5 ml of distilled water. All patients were subjected to routine pre-operative work up, nasal examination with zero degree endoscope and plain Computed tomogram scan of nose and sinuses region was also obtained.

Procedure

All surgeries were done under general anesthesia. Polyps were removed with the use of micro debrider and specimens were sent for histopathological assessment. At the end of the surgery, a nostril was randomly selected to apply a neuro Petti saturated with 0.8 mg/ml of MMC. The Petti was applied for a period of 5 min, and then removed and the nasal cavity was irrigated with 0.9% normal saline. The opposite nostrils of all patients were taken as control and neuro Petti soaked in 0.9% normal saline was placed in opposite nostril for similar duration. Diagnostic nasoendoscopy with rigid Hopkins rod was repeated on 1st and 2nd follow up visit at 2 weeks in first month and then it was repeated once in a month for next three months after surgery. Examination Perfora was filled according to the examination findings. The patients were examined for improvement in symptoms. The presence of synechiae between middle turbinate and lateral nasal wall was recorded and also if any stenosis of maxillary sinus ostia with the help of zero degree and 30 degree Hopkins rod in both nasal cavities. Each patient included in the study was evaluated through a single questionnaire. Collected observations were used to estimate the following variables. Adhesion rate: Total surgeries with adhesions are formed divided by the total number of surgeries. Antrostomy closure rate: The

number of surgeries with middle meatal stenosis divided by the total number of surgeries.

Results

To conduct the study, a total of 51 patients were considered as a reference population. The minimum follow up of all patients was three months after the surgery, in which they were examined for improvement in symptoms and diagnostic nasoendoscopy was performed. There was a male predominance with 31 (61%) males and 20 (39%) females. Minimum age of included patients was 20 years and maximum was 42 years and the average age was 29 with dispersion of 6.6 years. The most common symptom was nasal obstruction seen in all of the patients followed by decrease sense of smell reported in 48 (94.1%) patients. The mean duration of symptoms was 3 years with minimum of 1 year and maximum of 7 years. Twenty seven patients which is 52% of study population had AFS and the rest of 24 (48%) patients CRS. In all patients the polyps were present in middle meatus and occupying whole of nasal cavity obscuring the view of nasopharynx.

Table 1 shows the CT scan scoring system, Lund-Mackay staging system which was used for operative staging of disease [4].

Table 1: CT Scan scoring for staging Nasal Polyps.

Patient	CRS n=24		AFS n=27	
	Right	Left	Right	Left
Mean	8	7	9	9

Post-Operative Findings

Under local anesthesia the included patient had nasal examination with zero degree and 30 degree Hopkins rod, fortnightly for one month and once every month till three months. All patients were evaluated for improvement in symptoms. Table 2 shows the recorded findings.

Table 2: Post-Operative follow up.

Duration of Follow up (in weeks)	Nasal obstruction improvement		Improvement in hyposmia	
	Control (count)	Mitomycin C (count)	Control (count)	Mitomycin C (count)
2	0	0	0	0
4	9	6	0	0
8	36	42	6	15
12	51	51	30	39
Ratio in 12 months	100%	100%	58.80%	76.40%

Zero degree Hopkins rod was used to evaluate the adhesion and 30 degree for middle meatal antrostomy closure in our study, at the end of three months. The following formulae were used for calculating the adhesion rate and middle meatal antrostomy closure rate. Adhesion rate = (Number of Adhesion / Total Number of procedures) × 100

MMA closure rate = (Number of closed antrostomy / Total Number of procedure) × 100

Table 3: Adhesion formation rate.

	Presence of adhesion	Total	Adhesion rate
Control	33	51	64.7%
MMC applied	6	51	11.7%

Table 4: MMA closure rate.

	MMA Closure	Total	MMA closure rate
Control	21	17	41%
MMC applied	3	17	5%

The results were shown in table 3 and 4. No statistically significant result was found in patients had CRS vs. AFS.

Discussion

Paranasal sinus diseases requiring surgical treatment are one of the most common health care problems worldwide, and there is evidence that it is increasing in prevalence and incidence [5]. With multiple contributing factors like pollens, microorganisms, smoke and hereditary factors and anatomic variation isolated or a combination of any of these results in chronic rhinosinusitis. Endoscopic sinus surgery has gained impressive popularity in dealing with paranasal sinus diseases most common were CRS and AFS and the orthodox Caldwell-Luc procedure is now obsolete. The persistence of symptoms even after multiple sinus surgeries is still a big challenge [1]. Blockage of paranasal sinus Ostia and mucosal sensitivity are the two common causes of unsuccessful endoscopic sinus surgery [5]. Nearly half of the patients who had functional endoscopic sinus surgery due to disease recurrence had adhesions, nearly one fourth of the patients had middle meatal stenosis, and 25% had stenosis at fronto ethmoidal recess as identified by Ramadan [6]. Hence it was clearly concluded that there are factors other than surgeon skill that can contribute in adhesion formation which includes local tissue reaction. It was mentioned that patient ability to form connective tissue in a raw surgical area has an impact on scar formation. Mitomycin-C per operation is used to reduce the fibroblastic growth.

For reducing the adhesion formation, several measures have been attempted. Splints have been used without any benefit in reducing adhesion formation [7]. For stabilizing the middle turbinates there are some alternative maneuvers that are called middle turbinate medialization and metallic clips (Moukarzel N) or trans-septal sutures [8,9]. Although both maneuvers reported with better outcomes but require specific instruments. Another method by using middle meatal spacers or packing has also shown promising results to secure bleeding, synechia, and lateralization of the middle turbinate [10]. The use of stents have also been reported by some authors [11]. Veronica et al evaluated the use of cryotherapy spray to maintain maxillary sinus Ostia patency post FESS and described it a promising therapy [12]. The mitomycin has been used as an agent to reduce the post ostial stenosis in a small group of patient showing promising results [13]. The triamcinolone and mitomycin C nasal packs were compared in a recent randomized controlled trial and suggested that mitomycin has significant impact in reducing post FESS ostial stenosis at least in early post-operative period but all the patients had chronic rhinosinusitis and other indications for FESS were excluded hence the results can't be generalized [14]. Adhesion formation rate has been estimated up to 35%

even after utilizing any of the above maneuvers [15,16]. Additionally prolonged post-operative care is associated with some techniques adding up the morbidity hence are not cost effective. According to many researchers in the field of cultured fibroblasts, an antiproliferative effect of MMC at absorption of 0.08 mg/ml seems to be a better alternative [17].

To use MMC in humans nasal cavity is safe and can effectively delays the scar formation at paranasal sinus Ostia and prevents synechia formation is the gain from this study.

Conclusion

In our study, to decrease adhesion formation in patients undergoing functional endoscopic sinus surgery, one-time superficial mucosal use Mitomycin C per operatively in concentration 0.8 mg/ml applied over 5 minutes has been demonstrated. Identifying the preventive role of Mitomycin-C in terms of reducing the adhesion formation and stenosis of ostiomeatal complex is the ultimate goal of the study and it can be concluded that application of Mitomycin-C has an impact on reducing post FESS adhesion formation and middle meatal antrostomy closure.

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