

Mitomycin - C Effect after Endonasal Endoscopic Sinus Surgery on Antrostomy Size

Amrish Kumar¹, Sanjay Kumar Verma

¹ENT, Consultant, Medical Hospital, Ranchi, Jharkhand, India, ²Anesthesia, Consultant, Medical Hospital, Ranchi, Jharkhand, India

Abstract

Introduction: Mitomycin-C (MMC) is an antibiotic and anti-neoplastic agent which decreases the scar formation along with production of fibroblast.

Aim: To know the effect of MMC on the antrostomy size.

Materials and Methods: (1) 40 patients of chronic sinusitis on both side, (2) after performing middle meatal antrostomy on anyone side a piece of mawal soaked in 1.5 ml of metomycine-c applied for five minute. On other side normal saline was applied for control, (3) the size of antrostomy was measured with a ruler after surgery.

Result: The effect of MMC in maintaining the antrostomy size was effective and the relative size was effectively more as compared with that of control side.

Conclusion: The patency of antrostomy side has significant effect after MMC topical application.

Key words: Middle Meatal Antrostomy, Mitomycin-C, Sinus Surgery

INTRODUCTION

Mitomycin-C (MMC) is an abstract from *Streptomyces caespitosus* which inhibits DNA, RNA, protein synthesis, and fibroblast proliferation resulting into hindrance in collagen synthesis.^{1,2} MMC has been used in dacryocystorhinostomy as it adequately prevents obstruction of lacrimal duct by obstructing granular tissue formation.³⁻⁵

MMC has shown lower adhesion rate in middle meatus than in control site without MMC at completion of endonasal endoscopic sinus surgery.⁶ MMC application during surgery improves the post-operative result by preventing scar formation.

The aim of this study is to compare the result in surface area of antrostomy site between the control site and MMC

applied side. The patency of antrostomy site is critical point for success rate of surgery. Post-operative adhesions and stenosis due to the formation of scar tissue and granulation during tissue recovery process.^{1,3,5} Attempts to decrease adhesion and stenosis after surgery includes packs, spaces and nasal splints are controversial.⁷⁻¹² Allergy, asthma, and nasal polyp are known factor to influence on success rate of endonasal endoscopic sinus surgery.¹³⁻¹⁵

MATERIALS AND METHODS

Materials

- Those patients who had similar score on both the sides on Lund-Mackay scoring system as graded on C.T. PNS.¹⁶
- All of them had obstructed both ostiomeatal complex and various degree of opacification in both maxillary sinuses.
- The average age of patients was 30 years. (20-56 years).
- 28 male and 12 female.

Methods

- Every surgery was performed under general anesthesia.
- By performing endonasal endoscopic sinus surgery

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Corresponding Author: Dr.Amrish Kumar, MS ENT, Consultant Medica Hospital, Ranchi, India. E-mail: roshanchanchlani@gmail.com

preservation of nasal mucosa was done as much as possible.

- After performing uncinectomy both maxillary sinuses were opened with back biting forceps and the redundant mucosa and polyps were trimmed with help of microdebrider.
- The anterior and superior portions of natural ostium were intact as circumferential cutting induce edema of mucosa antrum by preventing lymphatic drainage.
- Care was taken to preserve middle turbinate and its mucosa. The position of middle turbinate was maintained by preventing horizontal position of basal lamella.
- Random application of MMC at one side and normal saline on other side was done.

To measure surface area of antrostomy a ruler with 1 mm unit wire gauge was designed. Using the ruler one can measure the distance of horizontal and vertical axes of antrostomy site. The area was presumed to be oval in shape. The surface area was measured by calibration:

$$\text{Surface area} = \pi a \times b/4,$$

a = horizontal value

b = vertical value

Before the application of MMC, 3 times measurement was done and mean measurement was used to minimize the error. Both the opening of antrostomy site was packed with merocel (Medtronic xomed) and one side 1.5 ml of MMC and other side 1.5 ml of normal saline was injected.

After 5 min, measurement size of antrostomy was done three times, and mean measurement was used. In post-operative care, uses of oral antibiotics, steroids for four weeks and nasal irrigation for two months with NASOWASH were given. Post-operative dressing for removal of blood clots and crusts was done every 10th day for next 1½ months.

The measurement was done by same method at the end of 1st month, 3rd month, and 6th month postoperatively to compare the patency of antrostomies, we compare the average and relative sizes, i.e., the ratio of remaining antrostomy area with compare to immediate post-operative area between the two sides at each time after surgery.

Statistical Analysis

The data were analyzed with a paired *t*-test by means of SPSS. The fisher exact test was used for postoperative stenosis and closure. A paired *t*-test was used for relative size. A $P < 0.05$ was considered statistically significant.

RESULTS

The closure and stenosis of antrostomy site was not different between the MMC side (closure 0 of 40 cases: Stenosis 2 of 40 cases) and control side (closure 4 of 40: Stenosis 4 of 40 cases) at 6 months after operation (fisher exact test $P = 1.00$). In the immediate post-operative period, the average size of antrostomy was larger in control group than in MMC group (control versus MMC, $2.86 \pm 0.72 \text{ cm}^2$ versus $2.55 \pm 0.28 \text{ cm}^2$; $P > 0.05$).

But after 1 month, the sizes were reversed and the area was larger in MMC group than in control group (control versus MMC, $1.35 \pm 0.51 \text{ cm}^2$ versus $1.72 \pm 0.23 \text{ cm}^2$; $P = 0.1$). Moreover, the average antrostomy size was greater in MMC group at 3rd month and 6 month.

The relative size (percent; the ratio of remaining antrostomy area compare to the area immediately after operation) of antrostomy site at 1 month compare to the initial size was significantly increased in MMC group as compare to control group (control versus MMC group $47.2\% \pm 15.2\%$ versus $67.4\% \pm 10.1\%$; $P = 0.017$).

The relative size at third month and six month was also greater in MMC group but the difference was not statistically significant. The effect of MMC in maintaining size of antrostomy was more after 1 month of surgery (Figure 1).

DISCUSSION

The study done by Chung *et al.* shows that MMC application causes lower incidence of middle meatus addition as compare to control side, but my result shows that application of MMC does not decrease the incidence of stenosis and closure of antrostomy after six months.⁶ Although MMC may have only short term effect.¹⁷ Infection following endonasal endoscopic sinus surgery affect the occurrence of antrostomy stenosis or closure in patients.

The relative size of antrostomy site applied with MMC is greater (67.4%) as compare to control group (47.2%) after surgery. Middle meatal antrostomy stenosis is not the only cause for failure of surgery but is a common one. Scarring and addition of maxillary sinus ostium and ethmoid sinus were only endoscopic finding that correlated to poor outcome of sinus surgery.¹⁸

Salam and Cable classified the patency of middle meatal antrostomy after surgery into four groups: Widely patent (more than 8 mm), patent (5 to 8 mm), stenosed (<5 mm),

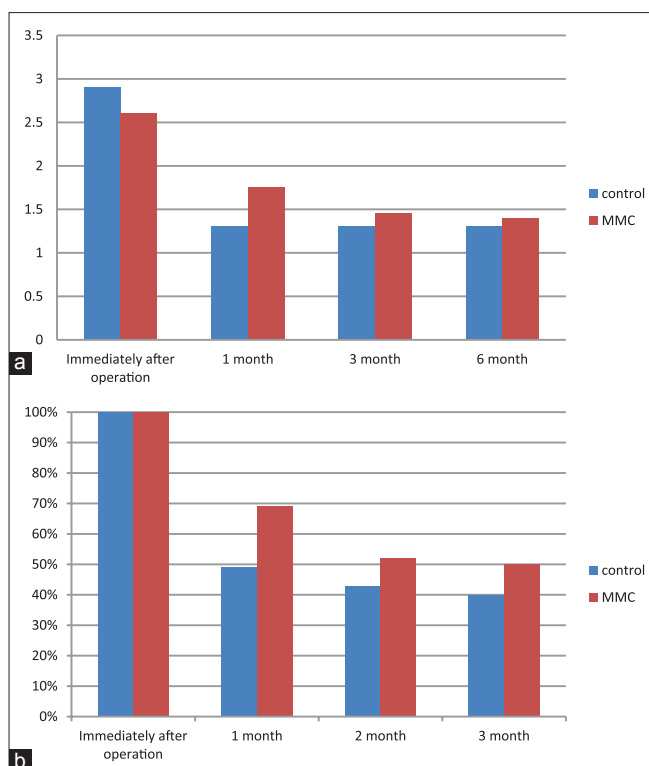


Figure 1: (a) Surface area of antrostomy site in square centimeters. There was significant difference between control group and mitomycin-C (MMC) group at 1 month after surgery, but there was no significant difference at 3rd and 6th months, (b) Relative size (percent; ratio of remaining antrostomy area compare to immediate postoperative area). At one month, there was a significant difference between control group and mitomycin-C (MMC) group. At 3rd month and 6th month was also greater in mitomycin-C (MMC) group but difference was not significant

and blocked by mucosal disease.¹⁹ They reported that there is a significant relationship between the degree of patency and degree of improvement of symptoms of chronic maxillary sinusitis.

Albu and Tomescu compared small (<6 mm) antrostomies with large (more than 16 mm) antrostomies in relieving symptoms of chronic maxillary sinusitis, also found that antrostomy sized has no influence on outcome of surgery for maxillary sinusitis.²⁰

My study is different from previous studies in many ways. The method for measuring antrostomy sized only with an endoscope is in accurate and chances of error will be due to endoscopic visuospatial distortion.²¹

Nouraei *et al.* introduce a 5 mm probe in conjunction with software use on computer.²¹ We measured size of antrostomy with right angled ruler which is marked at 1 mm intervals, which can measure superior-inferior axis and anterior-posterior axis too. The effect of MMC on fibroblast is to inhibit proliferation and scar formation and

to delay fibrosis to let epithelium re-epithelialize before a scar forms.²² Local infiltration of small amount of MMC does not induce general toxicity. MMC at 1 mg/ml also shown a cytotoxic effect on cultured fibroblast and the effect of decreasing cultured cell numbers.²

MMC treated success rate of dacryocystorhinostomy in patients were 94-100%.¹ Even in repeat dacryocystorhinostomy the application of MMC has been reported successfully. MMC used as an adjuvant for patients with vocal fold and tracheal stenosis during endoscopic laser surgery.²³ In summary, this study demonstrates application of MMC on antrostomy did not decrease the incidence of stenosis and closure but was effective in maintaining antrostomy size.

CONCLUSION

The application of MMC at antrostomy site may be effective adjuvant therapy in maintaining the patency of size of antrostomy in early postoperative period.

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