ORIGINAL ARTICLE

Mean Decrease in Endothelial Cell Lost With Peroperative Topical Application of MMC in Pterygium Surgery

TANVIR ABBAS[1], ASAD ASLAM KHAN[2], SARDAR M ALI AYAZ SADIQ[3]

ABSTRACT

Aim: To determine the mean decrease in endothelial cell lost with peroperative topical application of MMC in pterygium surgery
Settings: Institute of ophthalmology unit 3 King Edward Medical University, Mayo Hospital Lahore
Duration of study: From: January to July 2016
Results: In our study, out of 100 cases, 43(43%) were between 20-40 years of age while 57(57%) were between 41-60 years, mean±sd was calculated as 43.06±9.87 years, 61(61%) male and 39(39%) were females. Mean decrease in endothelial cell lost with peroperative topical application of MMC in Pterygium surgery was calculated showing 2228.08±51.49 cells/mm2 pre-operatively, it was recorded as 1784.35±57.74 cells/mm^2 post operatively and mean decrease was calculated as 443.73±26.01 cells/mm2, p value was calculated as 0.0001.
Conclusion: The findings of the study determined a significant higher mean decrease in endothelial cell lost with peroperative topical application of MMC in pterygium surgery.
Keywords: Pterygium surgery, peroperative topical application of MMC, mean decrease in endothelial cell lost

INTRODUCTION

Pterygium is known as "triangular fibrovascular sub epithelial growth of degenerative bulbar conjunctiva", extending from the medial canthus onto limbus or cornea.[1]. Overall prevalence rate ranges from 0.7% to 13%[2]. in Pakistan one study shows prevalence of pterygium 2.6%[3]. The most common causative factor is ultraviolet rays. It is influenced by age, race and other environmental factors. Pterygia can cause irritation, grittiness, redness, astigmatism and severe deterioration of vision. Surgery is indicated in patient in whom Pterygium is invading, threatening visual axis or causing visual impairment due to astigmatism, and cosmetic problem. Surgery is aimed at complete removal of pterygium and to decrease the rate of its recurrence. Different surgical techniques has been tried upto now with the aim to decrease the rate of recurrence which is 40% to70% with bare sclera technique[4,5].

Adjunctive treatment with β irradiation, Mitomycin C (MMC) and 5 fluorouracil is a good alternative. These are antifibrotic agents which reduce the rate of recurrence to 10 to 20%[6]. MMC is applied either as an intraoperative application, preoperative subpterygial injection, or as postoperative eye drops. A number of Mitomycin C doses have been used, but the intraoperative low dose 0.2mg/ml (0.02%) concentration applied directly on the bare sclera over five minutes is now most popular mode of administration. Adverse effects associated with Mitomycin C application are, delayed healing, scleral thinning, scleritis, and one study shows that when MMC was applied post excision, mean endothelial cell count before surgery was 2254±128 cells per square millimeter, while 1775±63 cells per square millimeter were recorded after 1 week of the procedure, (mean cell loss 479±65), 1707±41 cells per square millimeter at 1 month (mean cell loss 547±87), and 1780±72 cells per square millimeter at 3 months (mean cell loss 474±56)[7]. Endothelial cell count is measured with special instrument known as specular microscope. Specular microscope helps to study the different layers of cornea especially endothelium. This gives 100 times greater magnification than slit lamp. It helps in the assessment of endothelial cell density, shape, size in various corneal disorders, preoperative evaluation and to observe the effect of various medications on cornea.

Corneal endothelium cannot regenerate and is vital for maintenance of stromal dehydration and transparency, normally endothelial cell count ranges between 2400-3000 cells/mm^2 with average 1% annual loss. Pterygium surgery with MMC can decrease endothelial cell count. Endothelial count below the threshold (700-1000 cells/mm2) leads to corneal edema. However, ophthalmologists are routinely doing surgery with this technique. Worldwide very little numbers of study are available on this topic and no such study available locally and I

[1]MO, [2]*Professor of Ophthalmology,* [3]*Assistant Professor*
Department of Ophthalmology KEMU/Mayo Hospital, Lahore
Correspondence to Dr. Tanvir Abbas Email: tfteye@gmail.com Cell: 03133075110

would like to see the effect of Mitomycin C in patients undergoing pterygium surgery in our population, this study may guide ophthalmologist whether to continue with this technique or shift to another to avoid this potential complication.

MATERIAL AND METHODS

We enrolled 100 new cases of pterygium, whether unilateral or bilateral between 20 to 60 years of age with either gender. We excluded those cases with Pseudopteygium diagnosed on the slit lamp, previous history of treatment with topical antifibrotic agent, patients having low preoperative endothelial cell count (less than 2000) and those with ocular surface disorders diagnosed clinically. These cases were enrolled from outdoor of the Institute of Ophthalmology unit 3 King Edward Medical University / Mayo Hospital Lahore. Demographic information of the participants of this study like name, age and gender was recorded. Preo and postoperative endothelial cell counts were measured in each patient by the researcher using specular microscope and recorded on proforma. All the patients underwent Pterygium excision with adjunctive use of 0.2mg/ml Mitomycin C for 5 minutes. To avoid bias the whole procedure was performed by a single surgeon and findings recorded by researcher himself on proforma. Follow up was done on 1st week, 1st month and 3 month and endothelial cell count was measured by specular microscope. We used paired sample t test to determine any significant difference pre and post-operatively.

RESULTS

Mean age was calculated as 43.06±9.87 years, 61(61%) male and 39(39%) were females, mean decrease in endothelial cell lost with peroperative topical application of MMC in Pterygium surgery was calculated showing 2228.08±51.49 cells/mm^2 pre-operatively, it was recorded as 1784.35±57.74 cells/mm^2 post operatively and mean decrease was calculated as 443.73±26.01 cells/mm^2, p value was calculated as 0.0001.

Table 1: Age distribution (n=100)

Age(in years)	n	%age
20-40	43	43
41-60	57	57

Mean±SD: 43.06±9.87

Table 2: Gender distribution (n=100)

Gender	n	%age
Male	61	61
Female	39	39

Table 3: Mean decrease in endothelial cell lost with peroperative topical application of MMC in pterygium surgery (n=100)

Time of operation	No. Of corneal endothelial cell on specular microscope	
	Mean	SD
Pre-operative	2228.08	51.49
Post-operative	1784.35	57.74
Mean decrease	443.73	26.01

P value= 0.0001

Table 4: Stratification for mean decrease in endothelial cell lost with peroperative topical application of MMC in pterygium surgery with regards to age (n=100)

Age (in years)	No. of corneal endothelial cell on specular microscope	
	Mean	SD
20-40	432.00	26.20
41-60	446.96	30.12

P value=0.010

DISCUSSION

In our study, mean decrease in endothelial cell lost with peroperative topical application of MMC in Pterygium surgery was calculated showing 2228.08±51.49 cells/mm^2 pre-operatively, it was recorded as 1784.35±57.74 cells/mm^2 post operatively and mean decrease was calculated as 443.73±26.01 cells/mm^2, p value was calculated as 0.0001.

These findings are in line with a study showing that when MMC was applied post excision, mean preoperative endothelial cell count was 2254±128 cells per square mm, mean postoperative values were 1775±63 cells per square millimeter at 1 week (mean cell loss 479±65), 1707±41 cells per square millimeter at 1 month (mean cell loss 547±87), and 1780±72 cells per square millimeter at 3 months (mean cell loss 474±56)[7].

Bahar I and colleagues[8] evaluated the changes in endothelial cell counts in patients after performing pterygium surgery with MMC 0.02% and to compare with those undergoing pterygium excision without MMC, they recorded mean preoperative endothelial cell counts were 2330±318 cells/mm(2) in the pterygium excision without MMC group and 2486±327 cells/mm(2) in the pterygium excision with MMC group (P value=0.13). One month after surgery, the pterygium with MMC group had a significant endothelial cell loss of 6% and it was not recorded in the control group (P value=0.03). Three months after surgery, endothelial cell loss was reduced to 4% (P value =0.08 compared with the control). In those cases pterygium was excised with MMC, endothelial polymeghatism was improved (at 1 and 3 months) and the %age of hexagomal cells was reduced (at 1 month).

They concluded that the use of topical MMC during recurrent pterygium surgery was having a deleterious effect on corneal endothelium one month following surgery. Judicious use of this drug is therefore recommended.

McDermott et al[9] and Garweg co-workers[10] revealed that direct application of MMC at concentrations of 100 mg/ml (0.01%) or lesser did not cause in endothelial toxicity, while the application of 200 mg/ml (0.02%) MMC promptly induced edema with the findings of marked ultrastructural changes. Two other studies conducted by Torres et al[11] and Song et al55 recorded MMC affect in the aqueous humor after administration of 0.02% MMC for two minutes and observed an aqueous humor concentration significantly lower than 0.002%. However, this small concentration is found to cause cross-linking and double strand breaks of corneal endothelial DNA in goat corneas.

The findings of the current studies are guide for ophthalmologist whether to continue with this technique or shift to another to avoid this potential complication. Some other trials should also be done to authenticate the findings of the current study.

CONCLUSION

The findings of the study determined a significant higher mean decrease in endothelial cell lost with peroperative topical application of MMC in pterygium surgery.

REFERENCES

1. Jack J Kanski, Brad bowling. Degenrative disorder of conjunctiva. 7th edition. China:Elseveir 2011;162-5.
2. Asokan R, Venkatasubbu RS, Velumuri L. Prevalence and associated factors for pterygium and pinguecula in a South Indian population. Ophthalmic physiol Opt. 2012;32(1):39-44.
3. Hussain A, Awan H, Khan MD. Prevalence of non-vision-impairing conditions in a village in Chakwal district, Punjab, Pakistan.Ophthalmic Epidemiol. 200;11(5):413-26.
4. Rasool A.U, Ahmed C.N, Khan A. A Recurrence of Pterygium in Patients Having Conjunctival Autograft and Bare Sclera Surgery. ANNALS. 2010;16(4):242-6.
5. Khan N, Ahmad M, Baseer A, Kundi NM, To Compare the Recurrence Rate of Pterygium Excision with Baresc. lera, Free Conjunctival Auto Graft and Amniotic Membrane Grafts. Pak J Ophthalmol 2010;26.
6. Kareem AA, Farhood QK, Alhammami HA. The use of antimetabolites as adjunctive therapy in the surgical treatment of pterygium. Clin Ophthalmol. 2012;6:1849-54.
7. Avisar R, Apel I, Avisar I, Weinberger D. Endothelial cell loss in pterygium surgeryimportance of timing of mitomycin c application. Cornea. 2009:28(8);879-81.
8. Bahar I, Kaiserman I, Lange AP, Slomovic A, Levinger E, Sansanayudh W, Slomovic AR. The effect of mitomycin C on corneal endothelium in pterygium surgery. Am J Ophthalmol. 2009;147(3):447-52.
9. McDermott ML, Wang J, Shin DH. Mitomycin and the human corneal endothelium. Arch Ophthalmol. 1994;112:533—7.
10. Garweg JG, Wegmann-Burns M, Goldblum D. Effects of daunorubicin, mitomycin C, azathioprine and cyclosporine A on human retinal pigmented epithelial, corneal endothelial and conjunctival cell lines. Graefe's Arch Clin Exp Ophthalmol. 2006;244:382—9.
11. Torres RM, Merayo-Lloves J, Daya SM. Presence of mitomycin-C in the anterior chamber after photorefractive keratectomy. J Cataract Refract Surg. 2006;32:67—71.