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Mitomycin C in Ophthalmology

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ABSTRACT: Mitomycin-C (MMC) is an anti-neoplastic as well as antibiotic agent. It is one of the emerging drugs in ophthalmology these days because of its modulatory effect on wound healing.

KEYWORDS: MitomycinC, Ophthalmology, pterygium, filtering bleb

I. INTRODUCTION

Mitomycin-C (MMC) is an anti-neoplastic as well as antibiotic agent that is obtained from bacteria named *Streptomyces caespitosus* which is found in soil. Spectrum of its uses include tumors of upper gastro-intestinal tract, genito urinary cancer, breast tumor and intra-peritoneal tumors. It prevents restenosis when used in the treatment of tracheal and esophageal stenosis. Not much is known about its use in eye. It is one of the emerging drugs in ophthalmology these days because of its modulatory effect on wound healing. Its uses in eye include pterygium surgery to prevent recurrence, in glaucoma filtering surgery to prevent scarring and in PRK (photorefractive keratectomy), lasik to prevent haze, treatment of ocular tumors also prevent their recurrence.

II. MECHANISM OF ACTION

Since it is anti-metabolite thus anti-proliferative action makes it useful in the treatment of cancers and to prevent fibrosis in eye surgeries. It inhibits mitosis by inhibiting DNA synthesis and also interferes with RNA transcription and protein synthesis. DNA synthesis is inhibited by cross linking at the N position of Adenine and the O6 and N position of Guanine. The cell cycle is most affected during the late G-1 and early S-phase.

III. DRUG RECONSTITUTION

Mitomycin-C is delivered in solubilized form. The drug is available in a 2mg/ml vial. It is reconstituted to make 0.4mg/ml on mixing it with 5ml normal saline or to 0.2mg/ml on mixing it with 10 ml normal saline. It easily penetrates into epithelially denuded cornea and conjunctiva due to its hydrophobic character.

IV. USES IN OPHTHALMOLOGY

- Pterygium surgery
- Glaucoma filtering surgeries
- Refractive surgeries
- Dacryocystorhinostomy (DCR)
- Ocular surface tumors
- Squint surgeries
- Allergic conjunctivitis

REFRACTIVE SURGERIES- Mitomycin-C at a concentration of 0.2mg/ml for 12 to 120 seconds is used over ablated stroma to prevent haze formation in PRK for myopia^{1,2}.

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PTERYGIUM SURGERY- Mitomycin-C in the dose of 0.2mg/ml to 0.4mg/ml is applied intra-operatively over the bare sclera for 1-5 minutes.keeping in mind to occlude the punctum while applying the drug. Its application should be avoided in patients with thin sclera to prevent scleral melting.

Eye should be thoroughly washed after its application.Mitomycin-C use after pterygium surgery has been published when a concentration of 0.4% was used post-operatively for up to 3 weeks³. Complications-corneal melting,scleral melt, secondary glaucoma, scleral calcification, delayed wound healing, superficial punctate keratitis and wound dehiscence.

Patients with history GLAUCOMA FILTERING SURGERY- Mitomycin-C inhibits fibroblast proliferation thus prevents subsequent scarring of filtering bleb. MMC is applied intra-operatively at a concentration of 0.2mg/ml for 1-5 minutes. This is as effective as 0.4mg/ml but with lower complication rates. Merocele sponge soaked in the desired concentration is kept for 1-5minutes subconjunctivally or can be injected subconjunctivally⁴.Eye is washed thoroughly after removal of merocele.Pieces of merocele should be counted well to prevent any retention. Complications-thin walled cystic blebs⁵, late bleb leaks, bleb infections, endophthalmitis, chronic hypotony, corneal epithelial toxicity,retained sponge⁶.

OCULAR SURFACE TUMORS- Anti-neoplastic action of MMC is used in the treatment of ocular surface tumors as well⁷. It has efficacy of 70-100 percent.Topical MMC in 0.02 percent to 0.04 percent concentration is administered four times daily with cycles one to weeks “on” and one to two weeks “off” . It has been used successfully as adjunctive therapy for controlling conjunctival and corneal squamous cell carcinoma as well in recurrence⁸.Topical MMC can treat satellite and multifocal lesions and the entire ocular surface⁹.

SQUINT SURGERY- Ocular motility dysfunction following ocular surgery can result from postoperative scarring and adhesions¹⁰. The intra-operative use of mitomycin-C in 0.2mg/ml concentration for 5 minutes helps in reducing postoperative adhesions following strabismus surgery.

DACRYOCYSTORHINOSTOMY- Failure of DCR surgery occurs due to fibrosis under the flaps near the osteotomy sites, so MMC is used to prevent fibrous proliferation and scar formation. Use of MMC is effective in increasing the success rate¹¹ of DCR surgery with no significant complications¹². It is used in the concentration of 0.2mg/ml for about 30 minutes intra-operatively at osteotomy site.

ALLERGIC CONJUNCTIVITIS- Topical MMC 0.02mg/ml applied four times per day for 3 months was found to be safe and effective in treating allergic conjunctivitis.

Complications- Minor complications like ocular pain, photophobia, lacrimation, lid edema, superficial punctate keratitis and foreign body sensation. Major complications are rare include scleral ulceration, necrotizing scleritis, perforation, cataract, glaucoma and symblepharon formation.

V. CONTRAINDICATIONS FOR TOPICAL USE

- One-eyed patients
- Pregnant women
- Very old patients
- Corneal ulceration or poor healing such as immunocompromised patients, or patients with Sjogren's syndrome, atopic keratoconjunctivitis, acne rosacea or herpetic keratitis.

REFERENCES

- [1].KottlerUB,Dick HB.[Mitomycin C in refractive corneal surface surgery with the eximerlaser:first experience and review of the Literature .KlinMonbl Augenheilkd.2005 Jun;222(6):499-504.
[2]. Vigo L, Scandola E, Carones F Scraping and mitomycin C to treat haze and regression after photorefractive keratectomy for myopia. J Refract Surg. 2003 Jul-Aug;19(4):449-54.

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- [3] Rubinfeld RS, Stein RM. Serious complications of topical mitomycin- C after pterygium surgery. *Ophthalmology* 1992;99: 1647- 54.
- [4]. Cantor LB, Mantravadi A, WuDunn D, Swamynathan K, Cortes A. Morphologic classification of filtering blebs after glaucoma filtration surgery: The Indiana Bleb Appearance Grading Scale. *J Glaucoma* 2003 ;12:3:266-271.
- [5]. Wells AP, Cordeiro MF, Bunce C, Khaw PT. Cystic bleb formation and related complications in limbus- versus fornix-based conjunctival flaps in pediatric and young adult trabeculectomy with mitomycin-C. *Ophthalmology* 2003;110:11:2192-7.
- [6]. Shin DH, Tsai CS, Krupin TH, Olivier MM. Retained cellulose sponge after trabeculectomy with adjunctive subconjunctival mitomycin-C. *Am J Ophthalmol* 1994;118:1:111-112.
- [7]HirstLW.Randomized controlled trial of topical mitomycin C for ocular surface squamous neoplasia: Early resolution *Ophthalmology* 2007;114:976-82.
- [8] Shields CL, Naseripour M, Shields JA. Topical mitomycin C for extensive,recurrentconjunctival-corneal squamous cell carcinoma. *Am J Ophthalmol* 2002;133:601-6.
- [9] Salmon SE, Sartorelli AC. Cancer chemotherapy.In: Katzung BG, editors.Basic and clinical pharmacology. 6th ed. Norwalk, CT: Appleton and Lange;1995.Chap.56.
- [10].Chen PL,ChenWY,LuDW.Evaluation of mitomycin C in reducing postoperative adhesions in strabismus surgery.*JOculPharmacolTher*2005;21:406-10.
- [11]. Kao SC, Liao CL, Tseng JH, Chen MS, Hou PK. Dacryocystorhinostomy with intraoperative mitomycin C. *Ophthalmology* 1997;104:86-91.
- [12].S. Liao, S. KaoJ. Tseng, M. Chen, and P.Hou, Results of intraoperative mitomycinC application in dacryocystorhinostomy *Br J Ophthalmol*.2000 August; 84(8): 903–906.