CASE REPORT

# EFFICACY OF INJECTING INTRA-VITREAL MOXIFLOXACIN IN ACUTE POST-OPERATIVE ENDOPHTHALMITIS

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Intra-vitreal Vancomycin (IV-V) and ceftazidime (IV-C) are commonly in the treatment of acute post-operative endophthalmitis. But there are suboptimal responses in some cases due to the emergence of antibiotic resistant micro-organisms. Moxifloxacin is a wide range antibacterial drug that is available as an eye drops for topical use for different types of ocular infections including post-operative endophthalmitis. But it has not been explored extensively as an intra-vitreal drug for post-operative endophthalmitis. We unveiled its broad spectrum anti-bacterial properties by giving it as an intra-vitreal route of delivery so to see its efficacy in post-operative endophthalmitis case. A 65 years old diabetic male presented with acute painful loss of vision in his right eye 2 days following his cataract extraction with posterior chamber intraocular lens implantation (PC IOL). His visual acuity (VA) on presentation was just counting finger close to eye. Slim lamp examination (SLE) revealed swollen lids, discharge in the inferior conjunctival fornix, conjunctival redness and chemosis, hazy cornea, fibrinous exudate in AC along with hypopyon, there was marked vitritis with yellowish fundal glow apparent. The patient was injected with intra-vitreal moxifloxacin 0.5mg/0.2 ml, along with topical and oral antibiotics in combination with steroids. VA reached to 6/24 and follow-up at 4th week didn't show any of intra-ocular inflammatory changes on SLE. Intra-vitreal moxifloxacin mono-therapy is a better substitute to combination of vancomycin and ceftazidime due to its broad-spectrum coverage in acute post-operative endophthalmitis.

**Keywords:** Acute post-operative endophthalmitis; Intra-vitreal moxifloxacin; Vancomycin

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## INTRODUCTION

Endophthalmitis as the name indicates is an infection that involves the intra-ocular structures, the source of infection may be from outside like in post-operative cases or post-traumatic or rarely from inside infections of the body remote from ocular sites like in sepsis or bacteraemia. It is a dreadful infection with disastrous outcomes in the form of visual prognosis and leads to irreversible loss of vision, if not diagnosed earlier and treatment not commenced on time.[1]

The frequency of post-operative endophthalmitis at our hospital, namely Qazi Hussain Ahmad Medical Complex, Nowshera between January 2018 to January 2021 was 0.52% and 96% of those cases were post-operative (Cataract surgery). The micro-organisms involved were *Staphylococcus aureus, Staph. epidermidis, Streptococcus pneumonae* and *Haemophilis influenzae.* The commonest isolate was *Staphylococcus aureus* (32%), 2nd most common was *S. epidermidis* (20%), and then *haemophilis* species (09%). Commonly used intra-vitreal antibiotics to cover gram positive and gram-negative micro-organisms in acute post-operative endophthalmitis are vancomycin and ceftazidime. However, there are suboptimal responses in some cases due to the emergence of antibiotic resistant micro-organisms.

Moxifloxacin, is a 4th generation fluoroquinolone, which has a wide range of spectrum against bacteria, it mainly inhibits bacterial DNA gyrase and type 4 topo-isomerase enzyme. This property gives an edge to it over 2nd and 3rd generation quinolones with additional advantage of superior efficacy against gram negative organisms.

We explored few case reports in the literature where moxifloxacin eye drops were given intra-vitreally with efficacy and safety both reported in the management of post-traumatic endophthalmitis in humans.[2,3] Hence we conducted this study in the form of case report to see how efficacious and safe intra-vitreal moxiflxacin (IV-M) is in the treatment of acute post-operative endophthalmitis.

## CASE PRESENTATION

A 65 years old diabetic male presented with acute painful loss of vision in his right eye 2 days following his cataract extraction with posterior chamber intraocular lens implantation (PC IOL). His visual acuity (VA) on presentation was just counting finger close to eye. Slim lamp examination (SLE) revealed swollen lids, discharge in the inferior conjunctival fornix, conjunctival redness and chemosis, hazy cornea, fibrinous exudate in AC along with hypopyon, there was marked vitritis with yellowish fundal glow

apparent. (Figure-1A), B-scan revealed multiple echogenic shadows in vitreous (Figure-1B) and attached retina. The patient was labelled as acute post-operative (cataract extraction with PC IOL) endophthalmitis on clinical and B-scan basis.

Treatment with 0.5% moxifloxacin eye drops started (Vigamox 0.5% Alcon Inc. USA) hourly, in combination with tobramycin 0.3% and dexamethasone 0.1% eye drops (Eybradex, Allergan Inc. USA) hourly, Oral Moxifloxacin tablets once daily (Moxiget, GETZ Pharma, Pak.) Cyclopentolate 1% eye drops thrice daily (Cyclopen 1%, Ethical Pharma, Pak.), timolol 0.5%/ Dorzolamide 2% eye drops twice daily (Glazol-T, Shazoo Pharma, Pak.) and IV-M in a dose of 0.5mg/0.2 ml (Vigamox 0.5% eye drop, Alcon Inc. USA). Injection was given under topical anaesthesia with proparacaine HCl 0.5% (Alcain, Alcon Inc. USA) using a 1cc D/S with 27G needle and inserted 4mm posterior to limbus in the super-temporal quadrant. Before the procedure 0.2 cc of vitreous sample was taken for culture and sensitivity (C/S) test and to avoid post injection rise in IOP.

We repeated intravitreal moxifloxacin after 24hrs due to presence of moderate AC reaction and minimal hypopyon and moderate vitritis with the appearance of hazy red fundal glow. Postoperative treatment included all the drugs mentioned above and tapered based upon reduced inflammatory activity and infectivity. We discharged the patient after 6 days with visual acuity of 4/60 and marked improvement in clinical appearance. No, yield was obtained from vitreous samples after its inoculation on blood, chocolate and anaerobic agar plates. At the 4$^{th}$ week follow-up (Figure-2), visual acuity was 6/60, BCVA was 6/24, and the patient did not show any signs of intraocular inflammation or retinal toxicity such as retinal oedema, cotton wool spots, and retinal haemorrhages.

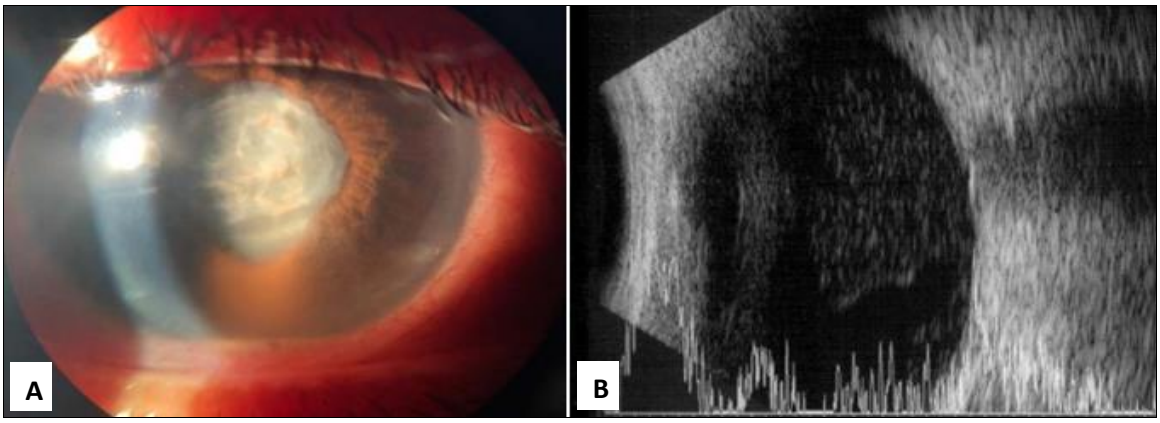


**Figure-1: Anterior segment photograph of R.E: (A) Conjunctival congestion, hazy cornea, +4 AC reaction and hypopyon on the SLE (B) Echogenic shadows in vitreous on B-scan.**

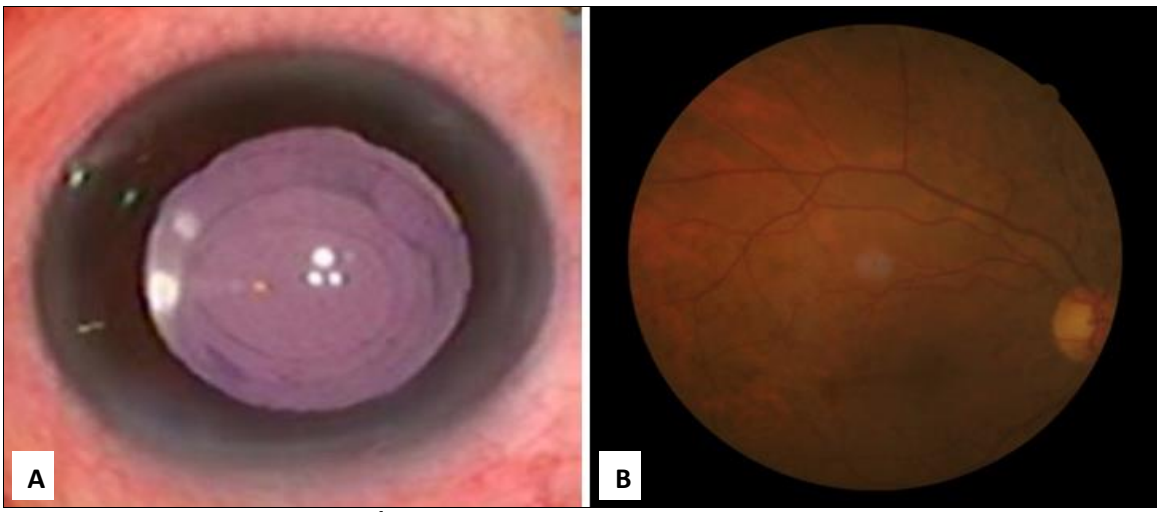


**Figure-2: Appearance of eye at 4$^{th}$ week: (A) No inflammatory reaction in the anterior chamber of eye (B) No vitritis observed in posterior segment of eye with clear view**

## DISCUSSION

Vitrectomy is considered as a definitive treatment for endophthalmitis esp. post-operative.[4] It should be worth consideration to give intra-vitreal antibiotics prior to vitrectomy to evaluate the response.[5] Clinical assessment of the endophthalmitis patient is very crucial within first 24hrs. Core vitrectomy (CV) is to be performed when there is clinical deterioration of the condition.[5] Moxifloxacin is a 4th generation quinolone that acts by inhibiting bacterial DNA synthesis via DNA gyrases and type-IV topoisomerases, causing bacterial cell lysis.[6] It has an extended coverage against gram positive, gram negative bacteria and anaerobes.[7] Moxifloxacin also exceeded the known minimum inhibitory concentration values for most bacteria involved in endophthalmitis in infected rabbit eyes.[8] Several microbiological, histological and interventional trials in experimental animal and cell culture models have evaluated the efficacy of IV-M in endophthalmitis. IV-M didn't cause electroretinographic abnormalities in rabbit eyes at a concentration up to 150 μg/ml.[7] The IV-M can well replace the current standard regimen of IV-V and IV-C combination in the management of post-operative endophthalmitis, if its efficacy and safety becomes established in further human eye trials.[8] In one of the trials conducted upon artificially created environment of human eyes in a lab showed no deleterious effects of IV-M at a dose of 150μg/ml, histological specimens showed no toxicity in human retinal pigment epithelial cells and primary optic nerve head astrocytes.[9] IV-M efficacy and safety was also revealed in post-traumatic endophthalmitis in human eyes in two case reports.[2,3] With increasing drug resistance in bacteria the efficacy of IV-V and IV-C is decreasing due to emergence of resistant strains in this scenario IV-M is an effective substitute to replace the current combination therapy in the treatment of endophthalmitis. The approximate volume of vitreous in a human eye is 4ml, by giving a dose of 125μg/ml makes a total dose of 500 μg/4 ml in 0.1cc of moxifloxacin for intra-vitreal injection.

By considering the above-mentioned studies, we established a dose of 0.5mg/0.1ml of moxifloxacin for intra-vitreal injection. We injected unprepared, readymade and commercially available moxifloxacin eye drop in our case in order to prevent any contamination and dilution errors in our cases. The contaminated vitreous in patients of endophthalmitis contains various endotoxins, exotoxins, lysed bacterial products, lysozymes, leucocytes, macrophages and antibodies all representing the parts of body immune response to infection.[5] The retinal tissue is constantly damaged by the ongoing immune reaction, even when the intra-vitreal antibiotics have successfully controlled the infection.[5] Vitrectomy is extremely effective in reducing the inflammatory and infective damage to retinal tissues by removing the bacterial and inflammatory load in the infected vitreous.[5] It is therefore prudent to perform vitrectomy to reduce or eliminate the bacterial and inflammatory load before irrecoverable visual loss develops in the infected eyes.[5] In our cases, IV-M was repeated after 01 day as the response to 1st dose was sub-optimal and to avoid any recurrence of infection and development of resistant strains, we gave another dose after 24hrs interval to maximize the control of infection and inflammatory activity mediated retinal damage. The outcome was rewarding in our case with retention of good visual acuity, absence of signs of infection as well as inflammation and no evidence of retinal toxicity. Further studies with larger sample size are required to prove its worth and safety in the management of endophthalmitis.

## CONCLUSION

It is safe and effective to administer moxifloxacin intra-vitreally for the treatment of acute post-operative endophthalmitis and can substitute the standard regimen of vancomycin and ceftazidime combination

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