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Original research

Treatment outcomes of post cataract surgery endophthalmitis in a tertiary referral center in Iran

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Abstract

Purpose: To evaluate the treatment outcomes of patients with post cataract surgery endophthalmitis in our tertiary referral center.
Methods: In this prospective study, patients with presumed post cataract surgery endophthalmitis were treated based on the modified endophthalmitis vitrectomy study (EVS) guidelines and followed for at least three months. Visual and anatomical outcomes were assessed in the last follow-up visit.
Results: A total of 46 eyes with presumed post cataract surgery endophthalmitis were admitted to our hospital, of which 3 eyes with initial visual acuity of no light perception (NLP) and severe inflammation underwent primary evisceration. Forty-three patients were included to this study and followed up for at least three months. Culture results were positive in 51.2% of cases and streptococcus viridans was the most frequent isolated organism. Pars plana vitrectomy was performed in 16 eyes as primary treatment, and intravitreal antibiotic injection was done in 27 eyes. Re-treatment with pars plana vitrectomy was required in 15 eyes (34.9%). Best corrected visual acuity (BCVA) at final visit was 20/40 or better in 12 eyes (27.9%), between 20/200 to 20/40 in 17 eyes (39.5%), and worse than 20/200 in 14 eyes (32.6%). Evisceration was done in one eye (2.3%), and retinal detachment happened in 4 eyes (9.3%).
Conclusions: The visual outcomes of post cataract surgery endophthalmitis are generally poor. Our results in this study were comparable with many previous studies from other referral centers, however, unlike many reports, streptococcus viridans was the most common isolate in our study.

Keywords: Endophthalmitis; Cataract surgery; Phacoemulsification; Vitrectomy; Intravitreal antibiotic

Introduction

Endophthalmitis is the vision-threatening intraocular infection that may occur following any intraocular surgery or open globe injury.[1] Causative organisms may enter the eye exogenously or from another site of systemic infections (endogenous). Cataract surgery is the most common cause of postoperative endophthalmitis because of the great number of cataract surgeries worldwide.[2] The incidence of endophthalmitis following cataract surgery varies in different studies (0.02–0.68).[2–4]

The visual outcome of post cataract surgery endophthalmitis is generally poor, and early diagnosis and appropriate treatment are essential for the improvement of visual

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prognosis. There is no agreement on the preferred treatment for post cataract surgery endophthalmitis. Endophthalmitis vitrectomy study (EVS) consider pars plana vitrectomy only for patients with initial visual acuity of light perception while some studies recommended early pars plana vitrectomy for all patients with post cataract surgery endophthalmitis.[5,6]

The aim of this study is to describe the treatment outcomes of eyes with presumed post cataract surgery endophthalmitis in the tertiary referral center in Iran.

Methods

From April 2015 to January 2016, we followed all patients that were admitted with presumed post cataract surgery endophthalmitis in Farabi Eye Hospital, Tehran, Iran. Only the cases that underwent phacoemulsification surgery were included in this study. Eyes with simultaneous intravitreal anti-vascular endothelial growth factors (anti-VEGFs) or intravitreal triamcinolone acetonide injection were excluded. Diagnosis of endophthalmitis was performed clinically based on the patients' signs and symptoms including presence of visual acuity reduction, prominent inflammatory anterior chamber reaction or hypopyon, vitreous cellular reaction or marked vitreous opacification in B-scan ultrasonography. In all cases, clinical diagnosis of endophthalmitis was confirmed by a vitreoretinal fellowship or attending before treatment initiation.

Management of presumed post cataract surgery endophthalmitis cases followed the modified EVS guidelines.[5] Pars plana vitrectomy, vitreous sampling for smear and culture with a conjunction of intravitreal antibiotic injection (1 mg/0.1 ml vancomycin and 2.25 mg/0.1 ml ceftazidime) were considered for patients with initial visual acuity of light perception. Eyes with initial visual acuity of hand movements or more underwent intravitreal antibiotic injection (1 mg/0.1 ml vancomycin and 2.25 mg/0.1 ml ceftazidime) as an initial treatment. In eyes with initial visual acuity of light perception and severe corneal clouding, intravitreal antibiotic injection was performed as a primary treatment, and pars plana vitrectomy, using keratoprosthesis, was performed as soon as possible. Also, all of the cases received an adjunctive intravenous antibiotics (ceftazidime and vancomycin) and topical fortified antibiotics, besides the primary surgical intervention. Pars plana vitrectomy was performed if intraocular inflammation persisted or progressed.

Three months after initial treatment, complete ophthalmic examination including best corrected visual acuity (BCVA) measurement by Snellen charts, slit-lamp examination, and funduscopy were performed, and data was recorded.

The main outcome was the visual outcomes following treatment of post cataract surgery endophthalmitis, and anatomical outcome was the secondary outcome.

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY, USA).

Results

A total of 46 cases with presumed post cataract surgery endophthalmitis were admitted to our hospital. Primary evisceration was performed in 3 eyes (6.5%) with initial visual acuity of no light perception (NLP), severe inflammation, and corneal melting. Forty-three patients were included to this study, and all of them were followed up for at least 3 months after treatment. The patients' mean age was 68.7 ± 11 years. Twenty-five cases (58.1%) were male, and 18 cases (41.9%) were female. Ocular involvement was unilateral in all of them. The mean interval from primary phacoemulsification surgery to onset of symptoms was 6.43 ± 4.31 days, and all of cases underwent surgical intervention on the day of admission.

Culture results were positive in 22 cases (51.2%), and the most commonly isolated organism was Gram-positive bacteria in 16 cases (72.7% of culture positive cases). Among them, streptococcus viridans (8 eyes) was the most common isolate followed by *Staphylococcus epidermidis* (5 eyes), *Staphylococcus aureus* (2 eyes), and *Streptococcus pneumonia* (one eye). Gram-negative bacteria was isolated from 6 eyes (27.3% of culture positive cases) including *Pseudomonas aeruginosa* in 3 eyes, haemophilus sp, *Escherichia coli*, and enterobacteriaceae sp, each of them in one eye.

Initial visual acuity was light perception in 19 eyes (44.2%), and hand motion or better in 24 eyes (55.8%) ranged from light perception to counting finger at 3 m. Pars plana vitrectomy was performed in 16 eyes from 19 eyes with initial visual acuity of light perception, and in 3 eyes, intravitreal antibiotics injection was performed as a primary treatment because of corneal haziness that precluded pars plana vitrectomy. Intravitreal antibiotic injection was done in eyes with initial visual acuity of better than light perception (24 eyes) as a primary management and in 3 eyes with corneal haziness. Pars plana vitrectomy using keratoprosthesis was performed in these 3 cases the next day.

Re-treatment with pars plana vitrectomy was performed in 15 eyes (34.9%) including 8 eyes with severe persistent or progressive inflammation (6 eyes with intravitreal antibiotic injection as a primary treatment and 2 eyes with primary pars plana vitrectomy as initial treatment), 4 eyes with retinal detachment, and 3 eyes with severe corneal clouding that underwent pars plana vitrectomy using keratoprosthesis.

Silicone oil tamponade was used in 16 eyes from 31 eyes that underwent pars plana vitrectomy in this study (16 eyes underwent primary pars plana vitrectomy and totally 15 pars plana vitrectomy was done as a re-treatment). Evisceration was performed in one eye (2.3%) in which *Pseudomonas aeruginosa* was isolated. BCVA was 20/40 or better in 12 eyes (27.9%), between 20/200 and 20/40 in 17 eyes (39.5%) and worse than 20/200 in 14 eyes (32.6%) including 4 eyes with retinal detachment and one eviscerated eye. Final visual acuity was NLP in 5 eyes (11.63%) at the end of a three-month follow-up period (including one eviscerated eye).

Retinal detachment happened in 4 eyes (9.3%) of post cataract surgery endophthalmitis cases. Pars plana vitrectomy with silicone oil tamponed had been performed for all of them. At the final follow-up visit, retina was attached in 3 eyes, and re-detachment happened in one eye.

The mean logMAR final BCVA in eyes that treated with pars plana vitrectomy was 0.80 ± 0.50, and it was 0.70 ± 0.40

in eyes that were treated with intravitreal antibiotic injection. The difference between them was not statistically significant ($P = 0.26$, t test).

Discussion

This study aimed to evaluate the visual outcomes of eyes with endophthalmitis following cataract surgery. Visual outcomes after endophthalmitis are usually poor. In our study, BCVA better than 20/40 was achieved in 27.9% of eyes, and retinal detachment occurred in 9.3% of them. In the retrospective study, Kelkar et al. evaluated 60 post cataract surgery endophthalmitis cases with comparable results to our study.[7] They reported that BCVA better than 20/40 was achieved in 26.7% of cases, and retinal detachment happened in 5% of eyes. Also, final visual acuity of better than 20/200 was reported in 66.7% of eyes in the Kelkar study, which is similar to our results (67.4%).

In the retrospective study from China, only 6.5% (3 from 46) of eyes attained a visual acuity ≥20/40.[8] Benjamin and coworkers evaluated the medical records of 250 eyes with presumed endophthalmitis.[9] They reported that 51.6% of cases had final visual acuities of ≥0.50, and 68.8% of eyes had final visual acuities of ≥0.20. The culture positivity rate in the Benjamin et al. study was 66.4%.[9] The culture positivity rate in our study was 51.2%, and streptococcus viridans was the most common isolated organism. Our institute is a tertiary referral center, and presumed endophthalmitis cases were referred from many centers to our hospital. Some geographic variations may contribute to the prevalence of streptococcus viridans infection in Iran. The percentage of cases achieving visual acuities ≥20/40 in our study (27.9%) was lower than the Benjamin et al. study (68.8%)[9] or EVS (53.1%).[5] This difference may be related to causative organism or lower presenting visual acuities in our study. Also, the time from cataract surgery to signs of endophthalmitis and time from signs of endophthalmitis to treatment may be effective factors for different visual outcomes. Delayed presentation and diagnosis lead to delayed management which may lead to permanent damage to ocular tissue and result in poor visual outcomes.[10] Proper patient education about the operative complications and symptoms of potential complications especially postoperative endophthalmitis, and rapid and appropriate diagnosis and management by the surgeon, is essential for improvement of prognosis.[2,11]

Our results were compatible with the Lalitha et al. study[12] and the Wu et al. study[13] in which final visual acuities ≥20/40 achieved in 29.4% and 21% of cases, respectively, and were better than the Ding et al. study[8] and the Al-Mezaine et al. study[14] in which final visual acuities ≥20/40 achieved in 6.5% and 10% of eyes with post cataract surgery endophthalmitis, respectively.

In the Ding et al. study, the mean time from cataract surgery to presentation was 10 days, however, 54% of patients had symptoms of endophthalmitis within 3 days of operation.[8] Poor visual outcomes in Ding and coworkers' study may be due to this delayed management. Experimental studies have shown that retinal function impairment happened 16 h after infection.[15] The mean time between cataract surgery and presentation was 6.43 days in our study, and all cases underwent surgical management on admission day.

According to EVS study, pars plana vitrectomy is considered for patients with presenting visual acuity of light perception, and intravitreal antibiotic injection is recommended for cases with presenting visual acuity of hand motions or better.[5] All cases with presumed endophthalmitis in our tertiary referral center were treated based on EVS study guidelines; however, in three cases with initial visual acuity of light perception, intravitreal antibiotic injection was performed as a primary management because of diffuse corneal haziness. Pars plana vitrectomy with keratoprosthesis and corneal transplant was performed at the next day for them. Adjuvant systemic antibiotics and topical fortified antibiotic drops were used in all of them. Systemic antibiotics reached the vitreous cavity in adequate concentration very slowly and should not be used alone for the treatment of endophthalmitis.[16] Systemic antibiotics had no additional advantages on the visual outcomes in the EVS study and were not recommended[5]; however, recent antibiotics with excellent intravitreal penetration may decrease the rate of infection recurrence.[17–19]

Intravitreal injection of antibiotics is a better route to deliver adequate concentration of antibiotics to the vitreous cavity.[20] It needs no especial equipment or skills to perform and can be used as an emergency treatment in local hospitals.

Recent suggestions for empirical intravitreal antibiotic therapy include vancomycin 1.0 mg/0.1 ml, ceftazidime 2.25 mg/0.1 ml, or amikacin 0.4 mg/0.1 ml, providing a broad coverage of Gram-positive and Gram-negative bacteria.[21] In the present study, we used vancomycin 1.0 mg/0.1 ml and ceftazidime 2.25 mg/0.1 ml for intravitreal injection as a primary treatment or as an adjuvant therapy at the end of pars plana vitrectomy in all cases.

In the retrospective study, Rahimi et al. reported the outcome of endophthalmitis in southern Iran.[22] The rate of evisceration in the Rahimi et al. study was 5.7% (4 from 70 eyes).[22] Only one eye ended up to evisceration in our study (2.3%), and the bacterial isolate in this case was *Pseudomonas aeruginosa*.

In our study, the visual outcomes of patients treated with pars plana vitrectomy had no significant difference with patients that were treated with intravitreal antibiotic injection. It is comparable with Rahimi and coworkers' results.[22]

In summary, the prognosis of post cataract surgery endophthalmitis is usually poor, and our results were compatible with previous studies. Only 27.9% of cases in this study achieved BCVA of 20/40 or better, retinal detachment happened in 4 eyes (9.3%), and also, endophthalmitis in one eye (2.3%) ended up to evisceration.

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