Original Article

Ophthalmology and Allied Sciences
Volume 6 Number 1 / January – April 2020
DOI: http://dx.doi.org/10.21088/oas.2454.7816.6120.9

A Study to Determine the Role of Early Vitrectomy vs Intravitreal Antibiotics in Patients with Postoperative Endophthalmitis

Deepak Sharma[1], Pranav Saluja[2], Satya Prakash Singh[3], Kamaljeet Singh[4], Vinod Kumar Singh[5], Khushboo Meena[6]

Abstract

Aim: To determine the role of early vitrectomy versus intravitreal antibiotic injection in patients with postoperative endophthalmitis. *Design:* Randomized, prospective study. *Material and methods:* A total of 20 patients who had clinical evidence of endophthalmitis within 6 weeks after cataract surgery were included in the study. Patients were randomized into two groups. In Group A (n = 7) patients underwent core vitrectomy along with intravitreal antibiotics injection within 48 hours of presentation while in Group B (n = 13) patients received intavitreal antibiotic injection only. *Results:* In Group A (n = 7), all the patients had improvement in visual acuity. Out of total 7 patients, 5 (71.42%) patients achieved visual acuity of 6/60 or better, while in Group B (n = 13), 5 (38.46%) patients had improvement in visual acuity, 3 (30.76%) patients did not show any improvement or worsening and 5 (38.46%) patients had worsening of initial visual acuity. The media clarity improved significantly in all the patients of Group A (n = 7), in which 6 (85.71%) patients achieved the media clarity of Grade 1, while in Group B (n = 13) 6 (46.15%) patients achieved media clarity of Grade 1 and 2 (15.38%) patients did not have any improvement in media clarity during the follow-up period of 3 months. The complications were more in Group B as 2 (15.38%) patients developed retinal detachment, 1 (7.69%) patient had phthisis and 1(7.69%) patient worsened to panophthalmitis while in Group A only 1 (14.28%) patient developed retinal detachment 2 months after the vitrectomy. *Conclusion:* Early vitrectomy when done within 48 hours greatly improves visual acuity and media clarity when compared with intravitreal antibiotics injection alone.

Keywords: Postoperative endophthalmitis; Early vitrectomy and intravitreal antibiotics.

How to cite this article:

Deepak Sharma, Pranav Saluja, Satya Prakash, et al. A Study to Determine the Role of Early Vitrectomy vs Intravitreal Antibiotics in Patients with Postoperative Endophthalmitis. Ophthalmol Allied Sci. 2020;6(1):59–64.

Introduction

Endophthalmitis is a potentially devastating condition involving internal structures of the eye. This can result either from exogenous spread from ocular trauma, ocular surgeries (cataract extraction, penetrating keratoplasty, vitreoretinal procedures and glaucoma surgeries) and intravitreal injections or it can result from an endogenous infectious foci.[1]

According to Endophthalmitis Vitrectomy Study (EVS)[2] 1995, patients with acute endophthalmitis presented with one or more of four classic symptoms, including decreased vision (93%), conjunctival injection (81%), pain (75%) and lid swelling (33%). These findings are not universal; however, as pain and hypopyon were each absent in one-quarter of patients with acute endophthalmitis.[2]

Treatment modalities include initial vitreous tap procedure followed by intravitreal antibiotic injection (IVAB), topical antibiotics, topical cycloplegics, subconjunctival steroids, systemic

Author Affiliation: [1,6]Junior Resident, [2]Senior Resident, [3]Principal and Director, [4]Professor and Head, [5]Lecturer, Department of Ophthalmology, Motilal Nehru Medical College, R.I.O, Prayagraj, Uttar Pradesh 211002, India.

Corresponding Author: Dr. Vinod Kumar Singh, Lecturer, Department of Ophthalmology, Motilal Nehru Medical College, R.I.O, Prayagraj, 211002, Uttar Pradesh, India.

E-mail: drvinodsingh16@gmail.com

Received on 04.03.2020, **Accepted on** 14.03.2020

steroids and pars plana vitrectomy (PPV). The systemic antibiotics have a poor role in endophthalmitis.[2,3]

The landmark EVS provided guidelines for the treatment of acute onset infectious endophthalmitis (IE) after cataract surgery. This prospective randomized trial found no benefit from immediate pars plana vitrectomy (PPV) when compared with vitreous tap and intravitreal injection of antibiotics except in the subgroup where visual acuity (VA) at presentation was light perception (LP) or worse.[2] There has been significant advancement in the vitreoretinal surgical technology since the results of EVS were published and recent studies have suggested that PPV should be performed earlier.[4] But there is still controversy regarding the role, timing and advantages of early vitrectomy in cases of postoperative endophthalmitis and need for more data is warranted regarding the early PPV in cases of postoperative endophthalmitis.

Herewith, by means of this study we are aiming to determine the role, timing and advantages of early vitrectomy over intravitreal antibiotics in terms of visual outcome and media clarity in patients with postoperative endophthalmitis.

Materials and Methods

We conducted a prospective, randomized, single center study in 20 patients of postoperative endophthalmitis with mean age of 53.05 ± 13.69 years, who presented to us at Regional Institute of Ophthalmology (RIO), Prayagraj within 6 weeks of cataract surgery. This study was conducted after taking permission from ethical committee of M.L.N Medical College, Prayagraj.

The criteria for inclusion into our study were: clinical symptoms and signs of postoperative endophthalmitis within 6 weeks of intraocular surgery and the corneal and anterior chamber clarity should be enough to perform PPV. We excluded the patients who presented with: No light perception, panophthalmitis, patients with retinal detachment or choroidal detachment as evidenced on indirect ophthalmoscopy or B-mode ultrasonography at the time of presentation, any previously known ocular disease which limited the visual acuity to 6/36 or worse other than the cataract, previous intraocular surgery other than the cataract surgery, previous penetrating ocular trauma, previous intravitreal antibiotics injection or PPV and any known or probable allergy to any of the study drugs.

After taking the detailed medical and surgical history, all the patients underwent following investigations: Routine blood investigations, Snellen's visual acuity unaided, Slit lamp examination, Slit lamp photography, Direct and Indirect Ophthalmoscopy for evaluation of media clarity, B-Mode ultrasonography and Microbiological investigations of aqueous and vitreous tap.

The eligible patients for the study who gave their written consent were randomly divided into two groups: Group A, consisted of 7 patients with mean age of 47.85 ± 20.78 years who had undergone early vitrectomy, i.e. within 48 hours of presentation to our hospital and Group B, consisted of 13 patients with mean age of 55.84 ± 5.81 years who received intravitreal antibiotics (IVAB) injection after vitreous tap or biopsy.

The treatment was started as soon as possible after the initial examination. As an initial step, samples were taken from the eyelids for culture in all the patients.

All the patients were followed on the basis of severity of clinical signs and symptoms. A minimum of 3 months of follow up was imposed for final visual acuity and media clarity data.

At every follow-up visit patients were examined for Snellen's visual acuity unaided, Best corrected visual acuity, Slit lamp examination and photography, Direct and Indirect Ophthalmoscopy for evaluation of media clarity and B-Mode ultrasonography.

Grading of Media Clarity by Indirect Ophthalmoscopy (EVS Group, 1995)

- Grade 1: Media clarity of 6/12 or more in viewing retina
- Grade 2: Media clarity <6/12, second order retinal vessels visible
- Grade 3: First order main retinal vessels seen
- Grade 4: Vessels not seen,red reflex present
- Grade 5: Absence of red reflex

Results

In this study of total 20 patients, out of 7 patients in Group A, 4 (57.14%) patients were male and 3 (42.85%) were female. In Group B, out of 13 patients 6 (46.15%) were male and 7 (53.84%) were female.

Out of 20 patients, 4 patients had undergone

phacoemulsification surgery and 16 patients had undergone a small incision cataract surgery. The mean duration between the cataract surgery and the presentation to the hospital with clinical signs of endophthalmitis was about 10.35 ± 7.66 days.

The right eye was affected in 3 (42.85%) patients of Group A and 6 (46.15%) patients of Group B. The left eye was affected in 4 (57.14%) patients of Group A and 7 (53.84%) of Group B. There was history of diabetes mellitus in 3 (14%) patients and systemic hypertension in 3 (14%) patients and 1 (5%) patient had hyperthyroidism.

At presentation, out of total 20 patients, one had media clarity of Grade 2, four had media clarity of Grade 3, three had media clarity of Grade 4 and twelve patients had media clarity of Grade 5.

Out of total 20 patients, the visual acuity at presentation was less than 6/60 in all the cases except in one case where initial visual acuity was 6/36. In 4 (20%) cases the initial visual acuity was just light perception. In 7 (35%) patients visual acuity was hand motion, 1 (5%) patient's visual acuity was counting fingers close to face, 1 (5%) patient had visual acuity of 1/60, 3 (15%) patients had visual acuity of 2/60, 1 (5%) patient had visual acuity of 3/60, 1 (5%) patient had visual acuity of 4/60 and 1 (5%) patient had visual acuity of 5/60.

The microbiological analysis of aqueous and vitreous tap/biopsy was done and only 8 (40%) out of total 20 cases were culture positive with most common organism was coagulase negative Staphylococcus (37.5%) and in 12 (60%) patient samples did not reveal any growth.

In our study, empirically we had used intravitreal vancomycin for gram-positive organisms and ceftazidime for gram-negative organisms before the reports of culture and sensitivity was obtained. In case of resistance to ceftazidime, aminoglycosides were our second choice for gram-negative organisms. In Group A, only one patient required repeat core vitrectomy along with IVAB injection and one patient required repeat injection of IVAB. In Group B, 5 patients required repeat injection and one patient required core vitrectomy along with IVAB injection.

On follow up, all the patients in Group A had improved media clarity of Grade 1 at 3 months except one patient who achieved media clarity of Grade 2. In Group B, one patient did not have any improvement in media clarity while in one patient media clarity of Grade 4 was achieved, 3 patients had media clarity of Grade 3, and 2 patients achieved media clarity of Grade 2 while 6 patients achieved media clarity of Grade 1 at 3 months. (Table 1)

Table 1: Media clarity at 3 months

Media clarity (Grading)	Group A (*n* = 7)	Group B (*n* = 13)	Total (*n* = 20)
Grade 1	6 (85.71%)	6 (46.15%)	12 (60%)
Grade 2	1 (14.28%)	2 (15.38%)	3 (15%)
Grade 3	0	3 (23.07%)	3 (15%)
Grade 4	0	1 (7.69%)	1 (5%)
Grade 5	0	1 (7.69%)	1 (5%)

At 3 months follow-up, 1 (14.28%) patient of Group A had best corrected visual acuity of 6/18, 2 (28.57%) patients had visual acuity of 6/36, 2 (28.57%) patients had visual acuity of 6/60 and 2 (28.57%) patient had visual acuity of 2/60. In Group B, 3 (23.07%) patients had visual acuity of light perception only, 1 (7.69%) patient perceived hand motion, 3 (23.07%) patients had visual acuity of 2/60, 1 (7.69%) patient had visual acuity of 4/60, 3 (23.07%) patients had visual acuity of 6/60 and 1 (7.69%) patient had visual acuity of 6/18, 1 (7.69%) patient had no light perception vision and the eye became phthisical after follow-up period of 3 months (Tables 2, 3 and 4).

Table 2: Best corrected visual acuity at final follow up (3 months)

Snellen's best corrected visual acuity	Group A (*n* = 7)	Group B (*n* = 13)
No light perception	0	1 (7.69%)
Light perception	0	3 (23.07%)
Hand motion	0	1 (7.69%)
CFCF	0	0

(Contd.)

Snellen's best corrected visual acuity	Group A (n = 7)	Group B (n = 13)
1/60	0	0
2/60	2 (28.57%)	3 (23.07%)
3/60	0	0
4/60	0	1 (7.69%)
5/60	0	0
6/60 or better	5 (71.42%)	4 (30.76%)

CFCF: Counting fingers close to face

Table 3: Visual recovery in patients of Group A (Early vitrectomy group)

Case no.	Age (years) / Sex	Initial visual acuity	Final visual acuity (At 3 months)
1.	67/M	Light perception	6/60
2.	56/F	Light perception	2/60
3.	48/M	Hand movement	6/36
4.	65/F	Hand movement	2/60
5.	10/M	Hand movement	6/60
6.	24/M	2/60	6/18
7.	65/F	4/60	6/36

Table 4: Visual recovery in patients of Group B (IVAB group)

Case no.	Age (years) / Sex	Initial visual acuity	Final visual acuity(At 3 months)
1.	55/F	Light perception	6/60
2.	54/F	Light perception	Light perception
3.	52/M	Hand movement	No Light perception
4.	55/M	1/60	Hand movement
5.	45/F	Hand movement	Light perception
6.	54/F	2/60	2/60
7.	50/F	3/60	6/60
8.	60/M	Hand movement	Light perception
9.	60/M	5/60	6/18
10.	52/F	2/60	2/60
11.	58/M	6/36	6/60
12.	70/F	Hand movement	2/60
13.	60/M	CFCF	4/60

CFCF: Counting fingers close to face

In Group A, 1 (14.28%) patient developed retinal detachment during the follow-up. While, in Group B, 2 (15.38%) patients developed retinal detachment and 1 (7.69%) patient developed phthisis. One (7.69%) patient developed panophthalmitis in Group B during the follow-up with no light perception vision and later on enucleation was performed in that case. No other complications were reported in any of the groups.

Discussion

The debate regarding the role and timing of vitrectomy have been restarted after the increased understanding of pathogenesis of endophthalmitis and advances in surgical technique and equipment. The EVS group[2] recommended vitrectomy only in patients presenting with light perception (LP). While we have seen virulence will vary among different organisms, we must consider that they all have the potential to cause extensive sight loss if not treated properly. As we know that infecting bacteria multiplies in the vitreous until a plateau phase, swiftly followed by the maximal inflammatory response, which is when the retina is likely to sustain the most damage. As recommended by Kuhn and Gini[4], it is therefore more useful to think of infection in terms of presentation stage (early/advanced) as opposed to severity, as early appropriate treatment is likely to herald a better visual outcome.

Chaudhary et al.[5] found that patients underwent tap and injection of IVABs alone regained baseline

VA more often than those who underwent tap and injection with subsequent PPV (90% vs 46%). Kurniawan et al.[6] and Xu et al.[7] have also reported no benefit of early PPV in improving visual outcomes. Gower et al.[8] in the US and population studies by Ng JQ et al.[9] in Australia have reported that PPV has no evidence of increased benefit. In contrast, a number of case series have reported good outcomes following early PPV. The EVS[2] concluded that the initial vision was an important determinant of outcome. They suggested immediate vitrectomy in patients with initial vision of light perception only, as it had a threefold increase in the frequency of achieving 20/40 or better acuity. Opposite to these studies, Laatikainen and Tarkkanen[10] studied 12 cases of purulent postoperative endophthalmitis and concluded that the difference in visual outcomes between early (<12 hours) and late vitrectomy (>12 hours) group was not statistically significant but none of the eyes with early vitrectomy became blind during the follow-up period. Oshitari et al. (2003)[11] retrospectively studied 29 eyes of post-cataract endophthalmitis and concluded that almost 50% patients achieved final VA of LogMAR 0.5 or better when early PPV was done. Panarci et al.[12] reported 40% of their patients achieved final VA of 20/40, while other study by Kuhn and Gini[4] reported that 91% patients achieved visual acuity of 20/40. Tan et al.[13] concluded that 83.3% patients who undergo early vitrectomy for endophthalmitis can achieve good visual recovery. Almanjoumi et al.[14] have reported that approximately 80% of the patients achieve final visual acuity of 20/40 or higher if they underwent early vitrectomy.

In our study, the patients who underwent early vitrectomy (within 48 hours) for post-cataract endophthalmitis, all the patients had improvement in final visual acuity. None of the patients had worsening of visual acuity in a follow-up period of 3 months. This is similar to the findings of Kuhn and Gini[4] who also did not have any patient with worsening of vision after vitrectomy. This is due to the fact that advancement in vitreoretinal surgery and other additional surgical tools immediate PPV for endophthalmitis offers several advantages such as to obtain sufficient tissue for diagnosis, decreases the inflammatory debris load thus minimizing the effect of toxins over the macula and preventing the macular damage, removal of vitreous membranes that could lead to subsequent retinal detachment, clearing vitreous opacities and possibly better distribution of intravitreal antibiotics. The risk of inducing iatrogenic retinal injury and subsequent retinal detachment has also reduced significantly due to the better visualization during surgery.[4] The early PPV also leads to early and better visual rehabilitation when compared with the IVAB injection group.

However, vitrectomy in case endophthalmitis remains a difficult procedure due to poor visibility of the posterior segment (corneal edema, anterior segment exudates or vitreous opacities). Even preoperative ultrasonography can be of limited value during surgery with regard to whether the retina is detached or not.[4] The most frequent complications are retinal detachment, epiretinal membrane, ocular hypertension and phthisis.[1,2]

On the basis of results of our study, we believe that the patients with initial poor visual acuity, culture positivity, delayed presentation to hospital and patients from rural background were the poor prognostic factors for final visual acuity.

The limitations of this study include a small sample size, limited duration of follow up and inclusion of only post-cataract endophthalmitis cases. The further studies with longer duration of follow up and large sample size are required to strengthen the findings of this study.

Conclusion

As per the results of our study we came to a conclusion that, a rapidly destroying endophthalmitis can be controlled if the patient presents soon after developing the signs and symptoms and is rapidly intervened with vitrectomy. Early vitrectomy when done within 48 hours greatly improves visual acuity and media clarity when compared with intravitreal antibiotics injection alone.

References

1. Yanoff and duker 4th international edition. Part 6: Retina and vitreous. Section 3: Basic principles of retinal surgery. Chapter 6.11. Vitrectomy. Michael Engelbert, Stanley Chang.
2. Endophthalmitis Study Group. Results of the EVS: A randomized trial of immediate vitrectomy and of intravenous antibiotics for the treatment of postoperative bacterial endophthalmitis. Arch Ophthalmol 1995;113(12):1479–96.
3. Ryan Stephen J. Retina 5th edition. Chapter 122. Infectious Endophthalmitis. Travis A. Meredith, J. Niklas Ulrich.
4. Kuhn F, Gini G. Complete and Early Vitrectomy for Endophthalmitis (CEVE) as Today's Alternative to the EVS. In: Kirchhof B., Wong D. (eds) Vitreo-

retinal Surgery. Essentials in Ophthalmology. Springer, Berlin: Heidelberg. 2007.

5. Chaudhary KM, Romero JM, Ezon I, et al. Pars planavitrectomy in the management of patients diagnosed with endophthalmitis following intravitreal antivascular endothelial growth factor injection. Retina 2013;33(7):1407–416. Doi:10.1097/iae.0b013e3182807659.
6. Kurniawan ED, Rocke JR, Sandhu SS et al. Predictors of visual outcome and the role of early vitrectomy in streptococcal endophthalmitis. Clinical & Experimental Ophthalmology 2017;46(4):424–31.
7. Xu K, Chin EK, Bennett SR, et al. Endophthalmitis after Intravitreal Injection of Vascular Endothelial Growth Factor Inhibitors. Ophthalmology 2018;125(8):1279–286.
8. Keay L, Gower EW, Cassard SD, et al. Postcataract Surgery Endophthalmitis in the United States. Ophthalmology 2012;119(5):914–22. doi:10.1016/j.ophtha.2011.11.023.
9. Ng JQ, Morlet N, Bulsara MK, et al. Reducing the risk for endophthalmitis after cataract surgery: Population-based nested case-control study. Journal of Cataract & Refractive Surgery 2007;33(2):269–80.
10. Laatikainen L, & Tarkkanen A. Early vitrectomy in the treatment of postoperative purulent endophthalmitis. Acta Ophthalmologica 1987;65 (4):455–60. doi:10.1111/j.1755-3768.1987.tb07023.x
11. Oshitari K. Vitrectomy for endophthalmitis after cataract surgery. Nippon Ganka Gakkai Zasshi 2003 Oct;107(10):590–6.
12. Pinarci EY, Yesilirmak N, Bayar SA, et al. The results of pars plana vitrectomy and silicone oil tamponade for endophthalmitis after intravitreal injections. Int Ophthalmol. 2013;33(4):361–65.
13. Tan CS, Wong HK, Yang FP. Epidemiology of postoperative endophthalmitis in an Asian population: 11-year incidence and effect of intracameral antibiotic agents. J Cataract Refract Surg 2012;38:425–30.
14. Almanjoumi AM, Combey A, Romanet JP, et al. 23-gauge transconjunctival sutureless vitrectomy in treatment of postoperative endophthalmitis. Graefe's Archive for Clinical and Experimental Ophthalmology 2012;250(9):1367–71. doi:10.1007/s00417-012-1926-7.