

# Visual outcome of Pars Plana Vitrectomy following Endophthalmitis – A Vitreo-retinal Surgeon's Experience

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## ABSTRACT

**Purpose:** To determine the visual outcome of pars plana vitrectomy following endophthalmitis.

**Methods:** A retrospective hospital-based study of 20 eyes of consecutive patients who had pars plana vitrectomy by a particular surgeon following endophthalmitis in the Ispahani Islamia Eye Institute and Hospital, Dhaka, Bangladesh from August–December 2017. Using the Snellen's visual acuity chart, post-operative distant visual acuity improvement was graded 0–9, with 0 meaning no improvement in visual acuity, and 9 meaning nine lines of improvement in visual acuity from presenting best corrected visual acuity.

**Results:** Pre-operative corrected distant visual acuity (CDVA) ranged from perception of light to 6/36. Seventy percent of the patients had post-operative visual improvement of varying degrees. The mean pre-operative and post-operative CDVA were 2.20 logMAR and 1.40 logMAR respectively. All the patients tractional retinal detachment and corneal laceration with rhegmatogenous retinal detachment as co-morbidities did not have visual improvement, and this was statistically significant

(p-value = 0.007). There was an association (although not strong) between age range and post-operative visual improvement (p-value = 0.639).

**Conclusion:** Pars plana vitrectomy helps to prevent or minimize ophthalmic complications from endophthalmitis, thus making it a necessary line of treatment endophthalmitis. Pars plana vitrectomy is therefore a safe and desirable definitive treatment for endophthalmitis, and it confers a good chance of visual improvement.

## INTRODUCTION

Pars plana vitrectomy (the intricate surgical removal of vitreous gel from the vitreous cavity) has seen remarkable progress in surgical technique and post-operative outcome in ophthalmic practices all over the world. It has become the main stay of treatment for many surgical vitreous and retinal conditions, e.g. retinal detachments, retinal haemorrhage, retinal vaso-proliferative conditions, macular hole, intraocular foreign body, etc. In recent times, endophthalmitis is being managed by vitrectomy, with documented positive outcome.<sup>1-3</sup>

With judicious use of broad-spectrum and new generation antibiotics, post-operative endophthalmitis has reduced in incidence. However, it still remains a major concern for every ophthalmic surgeon, as it confers an appalling visual prognosis. Previously, the only invasive component of the

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established line of treatment for infective endophthalmitis was injection of precise doses of anti-microbials (with or without steroids) into the mid-vitreous. Nonetheless, even with successful suppression of the infection, visual outcome was often poor, largely due to conditions like cystoid macular oedema, tractional retinal detachment and retinal necrosis resulting from the post-inflammatory debris left within the vitreous cavity.<sup>4</sup>

The timing of the pars plana vitrectomy following endophthalmitis remains debatable, and lies with the judgement and experience of the managing ophthalmic surgeon, and the time of presentation of the patient. Immediate vitrectomy could be desirable, as it would ensure early clearance of the toxic infected vitreous for therapeutic and investigative motives. Conversely, delayed vitrectomy could present the advantage of operating a less inflamed eye with less friable intraocular tissues.<sup>3,5</sup>

## METHODS

This was a retrospective hospital-based study of consecutive 20 patients (20 eyes) with endophthalmitis from various etiologies who presented to the Retina department of the Ispahani Islamia Eye Institute and Hospital in Dhaka, Bangladesh from August 2017 to December 2017. The study protocol was approved by the Research and Ethics Committee of the Ispahani Islamia Eye Institute and Hospital. The diagnosis of endophthalmitis was made by clinical examination which was confirmed by B-scan ultrasonography. The diagnostic clinical features included painful eye, severe and rapid deterioration in vision with a recent history of ocular surgery or injury to the eye. Other diagnostic clinical features were redness/chemosis, +/-hypopyon in the anterior chamber and marked vitreous inflammation. B-scan ultrasonography done for all the eyes diagnosed with endophthalmitis showed significant vitreous opacification with cavitations and chorioretinal thickening.

All the patients underwent a 3-port pars plana core vitrectomy with an Alcon Constellation Visual System, vitreous biopsy for microscopy, culture and sensitivity and then had intravitreal antibiotics (vancomycin and ceftazidime). Perfluorocarbon liquid was used to flatten the retina of the patient with tractional retinal detachment and the one with rhegmatogenous retinal detachment during surgery. This was followed by perfluorocarbon liquid-silicon oil exchange. Visual acuity was done for these patients with silicon oil in their vitreous cavities. All surgeries were done by a particular surgeon. Post-operative topical medications were prednisolone eye drops, atropine eye drops and moxifloxacin eye drops. Systemic medications were prednisolone tablets, ciprofloxacin tablets and analgesics.

Data reviewed and analyzed included age, sex, cause of endophthalmitis, duration of endophthalmitis before pars plana vitrectomy and visual outcome after vitrectomy. Data obtained from the patients' case files were analyzed using SPSS17.0 software (SPSS Inc., Chicago, IL, USA). Categorical variables were analyzed using Fisher's exact test, with  $P < 0.05$  taken as a level of statistical significance. Pre-operative and post-operative corrected distant visual acuities (CDVA) for all the patients were measured and documented using the Snellen's visual acuity chart (perception of light, hand movement and counting fingers included). Four weeks post-operative CDVA was used for analysis in all cases. The CDVA were then converted to the logarithm of the minimum angle of resolution (logMAR) units for assessment of the mean pre-operative and post-operative CDVA. Improvement of visual acuity was graded as 0-9, with 0 meaning no improvement, and 9 meaning nine lines of improvement from presenting CDVA with respect to the Snellen visual acuity chart (perception of light, hand movement and counting fingers included). The study was done in strict adherence to the Helsinki declaration and ethical guidelines.

## RESULTS

A total of 20 eyes of 20 patients that had pars plana vitrectomy due to endophthalmitis were reviewed. They were 15 males and 5 females, giving a male to female ratio of 3:1. The age of the patients ranged from 2.5 years to 77 years with a mean age of 44.075 years (SD± 28.785). The age ranges with the highest number of patients were 1-10 years (5 patients) and 61-70 years (5 patients) – Table 1. These had 4 males and 1 female in each category. Pre-operative CDVA ranged from perception of light to 6/36, with hand movements being the most common pre-operative CDVA (8; 40%), followed by counting fingers (7; 35%) – Table 2. In 40% of the patients, the time interval between the cause of endophthalmitis and the manifestation of symptoms was two weeks, while it was one week in 25% and 4 weeks in 20% of the patients (Table 2). A majority (70%) of the patients in this study experienced different degrees of post-operative visual improvements, while 30% did not experience any improvement in their vision after surgery (Table 2). The mean pre-operative and post-operative CDVA were 2.20 logMAR and 1.40 logMAR respectively. These correspond respectively to hand movement (HM) and 6/150 respectively with the Snellen's visual acuity chart. Ophthalmic co-morbidities included corneal laceration (4 patients), diabetic macular oedema (2 patients), tractional retinal detachment (1 patient), corneal laceration with rhegmatogeneous retinal detachment (1 patient), corneal ulcer (1 patient), cystoid macular oedema (1 patient) – Table 3. All patients within the age groups of 11-20 years and 51-60 years had improvement in their post-operative visual acuity. Sixty percent of the patients in the age group of 1-10 years did not experience improvement in their visual acuity after surgery (Table 1). Cataract surgery contributed the most to the causes of endophthalmitis (12; 60%), followed by trauma with corneal repair (4; 20%) – Figure 1. Children under 10 years of age in this study had trauma (with and without corneal repair) as the only cause of endophthalmitis (Figure 2). Cataract surgery was the only cause of endophthalmitis in patients 61 years and above.

**Table 1: Association between age range and post-operative visual improvement**

Age (Years)	POST OPERATIVE VISION		Total
	IMPROVED	NOT IMPROVED	
1-10	2(40.0)	3(60.0)	5(100.0)
11-20	2(100.0)	0(0.0)	2(100.0)
41-50	1(50.0)	1(50.0)	2(100.0)
51-60	2(100.0)	0(0.0)	2(100.0)
61-70	4(80.0)	1(20.0)	5(100.0)
71-80	3(75.0)	1(25.0)	4(100.0)
Total	14(70.0)	6(30.0)	20(100.0)

Fishers' Exact Test = 4.072; P-value = 0.639

**Table 2: Pre-operative corrected distant visual acuity, time interval between onset of symptoms of endophthalmitis and presentation and grades of post-operative visual acuity improvement**

Variables	Frequency (n =20)	Percent
PL	4	20.0
HM	8	40.0
CF	7	35.0
6/36	1	5.0
<b>Interval (weeks)</b>		
1.0	5	25
2.0	8	40
3.0	1	5
4.0	4	20
8.0	1	5
16.0	1	5
<b>Grades of VA improvement</b>		
0	6	30
1	6	30
2	2	10
3	1	5
5	2	10
6	2	10
9	1	5

\*VA – visual acuity; CF – counting fingers close to face; HM – hand movement close to face; PL – perception of light.

Table 3: Association between ophthalmic co-morbidities and post-operative visual improvement

Co-Morbidity	POST-OPERATIVE VISION		Total (%)
	IMPROVED (%)	NOT IMPROVED (%)	
Diabetic Macular Oedema	1(50.0)	1(50.0)	2(100.0)
Tractional RD	0(0.0)	1(100.0)	1(100.0)
Corneal Laceration	2(50.0)	2(50.0)	4(100.0)
Nil	10(100.0)	0(0.0)	10(100.0)
Cornel Laceration + RRD	0(0.0)	1(100.0)	1(100.0)
Corneal Ulcer	1(100.0)	0(0.0)	1(100.0)
Cystoid Macular Oedema	0(0.0)	1(100.0)	1(100.0)
Total	14(70.0)	6(30.0)	20(100.0)

Fishers' Exact Test = 13.111; P-value = 0.007

\*RD – retinal detachment; RRD – rhegmatogenous retinal detachment

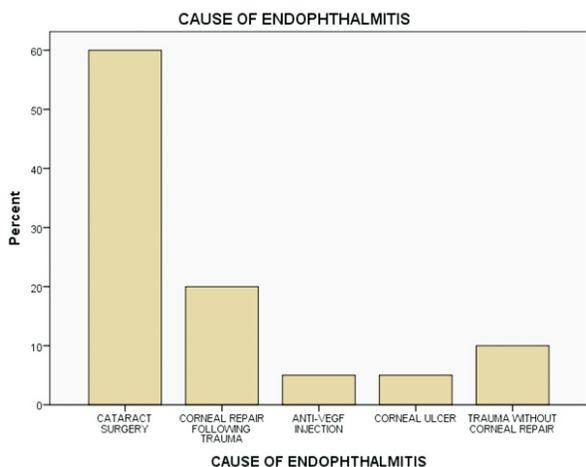


Figure 1

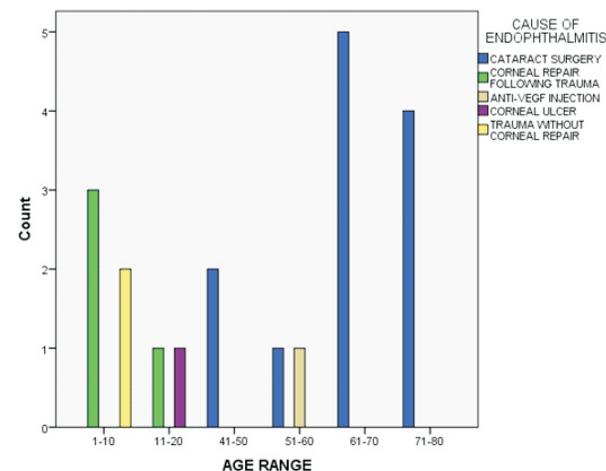


Figure 2: Age range and causes of endophthalmitis

## DISCUSSION

The age ranges with the highest number of endophthalmitis were 1-10 years and 61 – 70 years (Table 1). All cases in the 1 – 10 years age group were due to trauma (Figure 2). Due to their young age with subsequent incapacity in taking proper care of themselves, patients of this age group are prone to traumatic eye injuries with varying degrees of tissue/structural damage.<sup>6,7</sup> This age group also had the least percentage of improvement in visual acuity (Table 1). The 3 patients in this group that did not have improved post-op visual acuity had corneal scars from repair of corneal tears. Clarity of the cornea (especially within the visual axis) is required for proper image formation on the retina. Opacities within the cornea could then cause reduced visual acuity. However, the findings here were not statistically significant ( $p > 0.05$ ). All the patients in the 61 – 70 years group had endophthalmitis following cataract surgery (Figure 2). Notably, cataract formation with subsequent cataract surgery is higher among the elderly than among the young.

The commonest cause of endophthalmitis among all the patients was cataract surgery (12; 60%) – Figure 1. Cataract surgery is the commonest intra-ocular surgery performed by ophthalmologists worldwide. The invasiveness of this surgical procedure puts the eye at risk of endophthalmitis. With the increase in cataract surgery uptake in most parts of the world, studies have shown this procedure to be the leading cause of post-operative endophthalmitis.<sup>1,8</sup> The second commonest cause of endophthalmitis in our study was from trauma resulting in corneal laceration with subsequent corneal repair (Figure 1). Here, objects with high microbial loads cause penetrating injury to the eye, with subsequent introduction of bacteria and/or fungi into the eye. The objects of injury were vegetative matter (in 2 patients) and metallic objects (in 2 patients). However, none of these eyes had intraocular foreign body. Findings from other studies here also show trauma to be a leading cause of endophthalmitis.<sup>9,10</sup>

The duration between the incidence of cause of endophthalmitis and presentation at clinic ranged from 1 week to 16 weeks, with a mean duration of 3.2 weeks (SD± 3.44277), and a modal duration of 2 weeks (8 patients; 40%) Table 2. Endophthalmitis could be acute (developing within 1-2 weeks) or chronic (>6 weeks). However, as time of surgical intervention depended on time of presentation and readiness to have surgery, we could not choose to either do early vitrectomy or delayed vitrectomy.

CDVA for all cases was taken at 4 weeks post-operative. Post-operative visual improvement was seen in 70% of the cases (14; 70%) – Table 2. This was consistent with findings from other studies.<sup>11,12</sup> It is noteworthy that our study included eyes that had trauma and corneal ulcers (factors that would worsen visual prognosis).

The degree of post-operative visual improvement ranged from 0 grade (no improvement) to 9 grades of visual improvement. The mean number of grades improved was 2.050 (SD± 2.76), and the modal number of grades improved was 1 (6; 30%). Also, the mean pre-operative and post-operative CDVA were 2.20 logMAR and 1.40 logMAR respectively. Our study shows a 53 year old male who had pars plana vitrectomy due to endophthalmitis from cataract surgery with visual improvement from hand movement to 6/6 (9 grades of visual improvement). Without ocular co-morbidities, the visual acuity of patients who had vitrectomy for endophthalmitis is expected to improve. This is so because beyond helping to prevent toxic and mechanical damage to the retina, clearance of the inflamed and hazy vitreous via pars plana vitrectomy helps to ensure clarity of ocular media. Thus, proper image formation on the retina can be achieved. Studies have shown similar remarkable improvement in vision after pars plana vitrectomy for endophthalmitis in eyes without co-morbidities.<sup>11,12</sup>

In our study, ocular co-morbidities (as observed before pars plana vitrectomy) were seen to affect post-operative visual outcome, and this was statistically significant ( $p < 0.05$ ) – Table 3. The co-

morbidities in the eyes operated were corneal scar following corneal laceration repair (4; 20%), diabetic macular edema (2; 10%), tractional retinal detachment (1; 5%), cystoid macular oedema (1; 5%) and corneal scar following corneal laceration repair with rhegmatogenous retinal detachment (1; 5%). All the eyes without identifiable co-morbidities had improvement in visual acuity after pars plana vitrectomy.

Our study shows that pars plana vitrectomy for endophthalmitis is a safe procedure, as only 1 patient had intra-op complications (retinal haemorrhage) which was effectively managed intra-operatively by retinal cauterization. Although hypotony from wound leak and high intraocular pressure are reported post-operative complications of pars plana vitrectomy<sup>13,14</sup>, the findings in our study did not show any of these.

## CONCLUSION

Pars plana vitrectomy helps to prevent or minimize ophthalmic complications from endophthalmitis, thus making it a necessary line of treatment endophthalmitis. Pars plana vitrectomy is therefore a safe and desirable definitive treatment for endophthalmitis, and it confers a good chance of visual improvement.

## DECLARATION

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## REFERENCES

1. Ben Artsi E, Katz G, Kinori M, Moisseiev J. Endophthalmitis today: a multispecialty ophthalmology department perspective. *Eur J Ophthalmol* 2016 Jan-Feb;26(1):71-77.
2. Clarke B, Williamson T, Gini G, Gupta B. Management of Bacterial Postoperative Endophthalmitis and the Role of Vitrectomy. *Surv Ophthalmol* 2018 Feb 14.
3. Stankiewicz A, Robaszkiewicz J, Kosatka M. Immediate vitrectomy as a method of choice in the treatment of endophthalmitis. *Klin Oczna* 2005;107(4-6):256-259.

4. Lu X, Chen W, Xia H, Zheng K, Jin C, Ng DSC, et al. Atrophy of retinal inner layers is associated with poor vision after endophthalmitis: a spectral domain optical coherence tomography study. *Eye (Lond)* 2017;31(10):1488-1495.
5. Behera UC, Budhwani M, Das T, Basu S, Padhi TR, Barik MR, et al. Role of Early Vitrectomy in the Treatment of Fungal Endophthalmitis. *Retina* 2017 May 23.
6. El-Sebaity DM, Soliman W, Soliman AM, Fathalla AM. Pediatric eye injuries in upper Egypt. *Clin Ophthalmol* 2011;5:1417-1423.
7. Puodziuviene E, Jokubauskiene G, Vieversyte M, Asselineau K. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol* 2018; 18(1):10-018-0676-7.
8. Kessner R, Golan S, Barak A. Changes in the etiology of endophthalmitis from 2003 to 2010 in a large tertiary medical center. *Eur J Ophthalmol* 2014; 24(6):918-924.
9. Omobolanle AA, Henrietta N. Pattern of paediatric corneal laceration injuries in the University of Port Harcourt teaching hospital, Rivers state, Nigeria. *BMC Res Notes* 2012; 5: 683-0500-5-683.
10. Bhoombunchoo C, Ratanapakorn T, Sinawat S, Sanguansak T, Moontawee K, Yospaiboon Y. Infectious endophthalmitis: review of 420 cases. *Clin Ophthalmol* 2013;7:247-252.
11. Thapa R, Paudyal G. Clinical profile and visual outcome following pars plana vitrectomy in acute post-operative endophthalmitis. *Nepal J Ophthalmol* 2011; 3(2):102-108.
12. Ghoraba HH, Ellakwa AF, Elgemai EM, Mansour HO, Heikal MA. Results of Pars Plana Vitrectomy for the Management of Endogenous Fungal Endophthalmitis After Urinary Tract Procedures. *Retin Cases Brief Rep* 2017 Spring;11(2):171-174.
13. Lin Z, Zhang R, Liang QH, Lin K, Xiao YS, Moonasar N, et al. Surgical Outcomes of 27-Gauge Pars PLana Vitrectomy for Symptomatic Vitreous Floaters. *J Ophthalmol* 2017;2017:5496298.
14. Yau GL, Silva PS, Arrigg PG, Sun JK. Postoperative Complications of Pars Plana Vitrectomy for Diabetic Retinal Disease. *Semin Ophthalmol* 2018;33(1):126-133