RESEARCH ARTICLE

International Journal of Retina (*IJRETINA*) 2025, Volume 8, Number 2.
P-ISSN. 2614-8684, E-ISSN.2614-8536

THE DEMOGRAPHIC PROFILE, ETIOLOGY AND OUTCOMES OF ACUTE POSTOPERATIVE ENDOPHTHALMITIS

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Abstract

***Introduction*:** *To describe patient characteristics, bacterial patterns, management, and outcomes of therapy in patients with acute postoperative endophthalmitis.*

Methods*: This observational, descriptive study was conducted at Dr. Saiful Anwar General Hospital in Malang, Indonesia, between 2020 and 2024, involving all patients with newly diagnosed acute postoperative endophthalmitis with periode follow up patient's initial visit, on day 7, and on day 28 following treatment*

Result*: A total of 74 patients were included in the study. The majority were male (51.3%), with a mean age of 61.57 ± 11.54 years. The most common comorbid was diabetes mellitus (16.2%). The etiology was most commonly due to gram-negative bacilli (13%), and phacoemulsification was the most common surgical procedure associated with endophthalmitis (74%). Quinolones exhibited the highest sensitivity. The most common management was a combination of medical and surgical treatments, including intravitreal antibiotic injections (59%) and combination of intravitreal antibiotic injections and pars plana vitrectomy (PPV) (18%) . The visual acuity outcomes revealed that 45,9% patients experienced improvement.*

Conclusion*: The incidence of endophthalmitis increases with advancing patient age, correlating with a higher frequency of cataract surgeries performed. Current management outcomes for endophthalmitis are favorable, reflecting improvements aligned with updated clinical guidelines. The comprehensive management of endophthalmitis will result in an improved visual outcome.*

Keywords: Acute postoperative endophthalmitis, intravitreal antibiotic injection, pars plana vitrectomy (PPV), phacoemulsification Cite This Article: DEWI, Amalia Zahra; SOFIA, Ovi. The Demographic Profile, Etiology and Outcomes of Acute Postoperative Endophthalmitis. International Journal of Retina, [S.l.], v. 8, n. 2, p. 154, oct. 2025. ISSN 2614-8536. Available at: <https://www.ijretina.com/index.php/ijretina/article/view/330>. Date accessed: 01 oct. 2025. doi: https://doi.org/10.35479/ijretina.2025.vol008.iss002.330....

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INTRODUCTION

Endophthalmitis is defined as intraocular inflammation that can lead to total and permanent visual loss.[1] Acute postoperative endophthalmitis is an intraocular inflammation that occurs within 48 hours to 6 weeks following a surgical procedure, caused by intraocular infection due to microorganisms introduced during or after surgery.[2]

The etiology of acute endophthalmitis, according to a study by Pijlt et al., is most commonly coagulase-negative, gram- positive bacteria, specifically *Staphylococcus* species, which account for 70% of acute postoperative endophthalmitis cases. These organisms typically manifest symptoms approximately one week after the procedure.[1],[2]

Intravitreal antibiotic injections are administered before culture samples are obtained. The antibiotics commonly used in the intravitreal injection for acute postoperative endophthalmitis include vancomycin and ceftazidime.[3] A study by Jeong S et al. (2017) reported that patients who presented with initial visual acuity better than hand motion and had culture results indicating low-virulence organisms, such as gram-positive bacteria, generally had a more favorable prognosis.[4]

Although acute postoperative endophthalmitis is relatively rare, it carries a significant risk of poor visual outcomes.[5] This underscores the importance of evaluating demographic factors that influence the prognosis of acute postoperative endophthalmitis, identifying the most common etiological agents, and assessing the outcomes of its management.

The findings of this study are expected to serve as a foundational reference for understanding the overall profile of acute postoperative endophthalmitis cases at Dr. Saiful Anwar General Hospital. This includes identifying the demographic characteristics of affected patients, the most frequent causative agents, and the outcomes of treatment strategies employed.

METHOD

This study is a descriptive retrospective study utilizing secondary data from the records of the Ophthalmology Infection and Immunology Division Clinic and Vitreoretinal Division Clinic at Dr. Saiful Anwar General Hospital, Malang, covering the period from January 2020 to December 2024, with all new patients diagnosed with acute postoperative endophthalmitis (ICD-10: H44.0). This study was approved by ethical and research committee Dr. Saiful Anwar General Hospital Malang number 400/362/K.3/10.2/2024. Samples were collected using a consecutive sampling technique. Data were collected at the patient's initial visit, on day 7, and day 28 following treatment.

Inclusion criteria were all new patients who received either medical and/or surgical therapy. Exclusion criteria included new patients confirmed with acute postoperative endophthalmitis who did not return for follow-up one week after treatment, as well as those with incomplete medical records lacking key data such as demographic information, visual acuity, intraocular pressure (IOP), anterior segment findings, and ocular ultrasonography (USG) results required to confirm the diagnosis of acute postoperative endophthalmitis.

Data retrieved from the medical records included visual acuity at initial presentation, on day 7, on day 28 follow-up; demographic status (age and gender); and comorbidities (e.g., diabetes mellitus). Microbiological evaluation was performed through culture and antibiotic sensitivity testing using vitreous and/or aqueous tap samples. The management of endophthalmitis, including both medical and surgical treatments, was assessed and correlated with treatment outcomes by evaluating visual acuity on day 28 after therapy.

Visual acuity recorded in the medical records, either via Snellen chart or finger counting, was converted into graphical form to illustrate the progression of treatment outcomes, comparing visual acuity at day 7 and on day 28 with the initial presentation, and expressed in logMAR units. Anterior segment evaluation included assessment of conjunctival and pericorneal injection, corneal edema, anterior chamber reaction (cells, flare, fibrin, and hypopyon), and intraocular pressure (IOP) measurements. Posterior segment evaluation was performed using ocular ultrasonography (USG) to assess the severity of vitritis based on the density of vitreous opacities, as well as the presence of choroidal thickening or retinal detachment.

The management of acute postoperative endophthalmitis included medical treatment consisting of topical fluoroquinolone antibiotics, systemic fluoroquinolones, topical corticosteroids, systemic corticosteroids, and topical cycloplegics, as well as surgical treatment including intravitreal antibiotic injection (a combination of vancomycin and ceftazidime) and pars plana vitrectomy (PPV).

RESULTS

This study initially obtained a total of 92 patients and 74 patients met the inclusion criteria. A total of 18 patients were excluded: 7 patients did not attend the day-7 follow-up; 1 patient had missing initial visit data; 8 patients were diagnosed with endophthalmitis other than acute postoperative endophthalmitis; and 2 patients had missing data. Of the 74 included patients, 38 patients (51.3%) were male and 36 patients (48.6%) were female (Table 1). The age distribution of acute postoperative endophthalmitis cases ranged from 7 to 89 years, with a mean age of 61.57 ± 11.54 years. Demographic characteristics of patients diagnosed with acute postoperative endophthalmitis were summarized in **Table 1.**

Table 1. Demographics of Patients with Acute Postoperative Endophthalmitis

Data	N	(%)
6Sex		
Male	38	51.30%
Female	36	48.60%
Age (years)		
<30	1	1.35%
30–39	3	4.05%
40–49	4	5.40%
50–59	17	20.40%
60–69	32	43.20%
70–79	15	20.20%
80–89	2	2.70%
Comorbidities		
Diabetes Mellitus (DM)	12	16.20%
Hypertension	8	10.80%
DM, Hypertension	9	12.16%
Stroke	1	1.35%
Others	3	4.09%
None	41	55.40%

Figure 1 demonstrated patients with acute postoperative endophthalmitis after phacoemulsification showed clinical improvement, as evidenced by a reduction in inflammatory signs observed on day 7 post-treatment compared to the initial presentation.

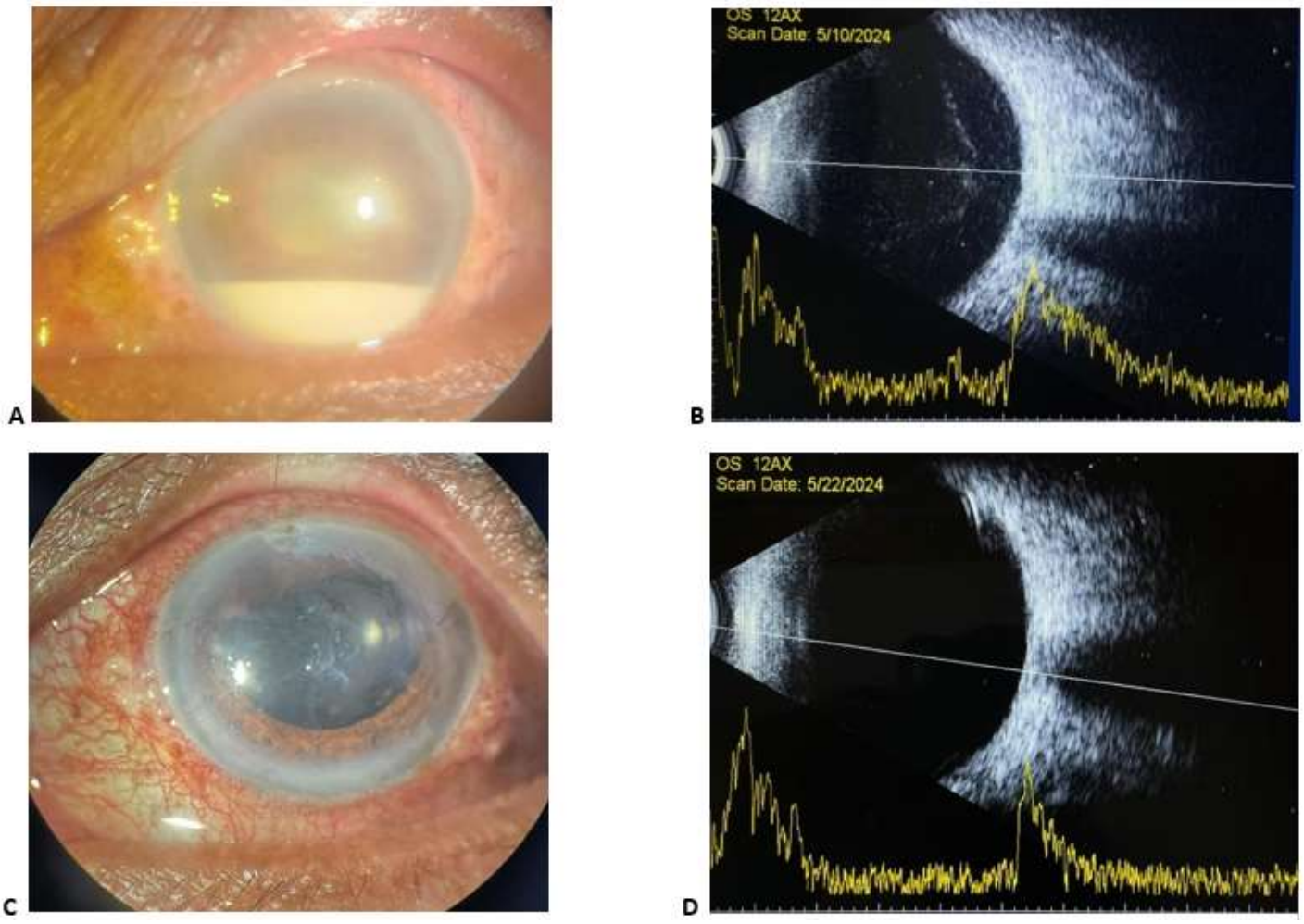

Figure 1. A case of acute postoperative endophthalmitis occurred in the left eye of the 68-year-old male, presenting nine days after phacoemulsification surgery. A. At the initial outpatient visit, anterior segment of the patient revealed dense corneal edema, hypopyon, and a secluded pupil. B. B-scan ultrasonography on the first day demonstrated low- to medium- reflectivity vitreous opacities, indicated the vitritis. C. Anterior segment 7 days following intravitreal antibiotic injection and pars plana vitrectomy showed a clear cornea, with no evidence of hypopyon or membranous formation. D. Ultrasonography on postoperative day seven showed absence of vitritis and an attached retina

Figure 2**.** illustrates the percentage of visual acuity (logMAR) among patients with acute postoperative endophthalmitis at initial visit, 7 days after treatment, and 28 days after treatment.

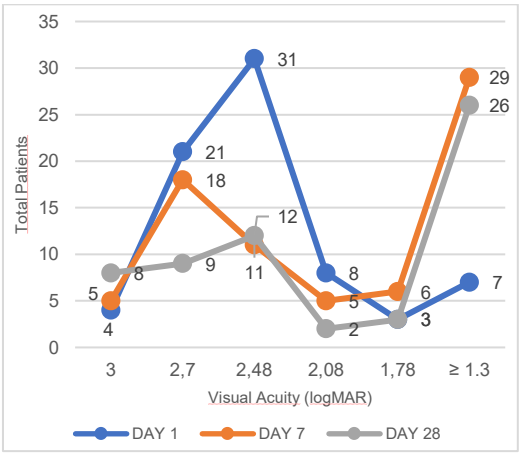

Figure 2. Visual Acuity of Acute Postoperative Endophthalmitis Patients on Day 1, Day 7, and Day 28

Visual acuity evaluation after 28 days of treatment showed improvement in 34 patients, no change in 37 patients, and deterioration in 2 patients.

Medical record data showed that the most common surgical procedure associated with acute postoperative endophthalmitis in this study was phacoemulsification (74%), followed by Small Incision Cataract Surgery (SICS) (14%), Extracapsular Cataract Extraction (ECCE) (1%), and other procedures (11%). These included 1 case of lensectomy, 1 pars plana vitrectomy (PPV), 1 secondary intraocular lens (IOL) implantation, 1 IOL repositioning, 2 trabeculectomy cases, and 1 IOL explantation. The types of surgical procedures associated with acute postoperative endophthalmitis are shown in Figure 3.

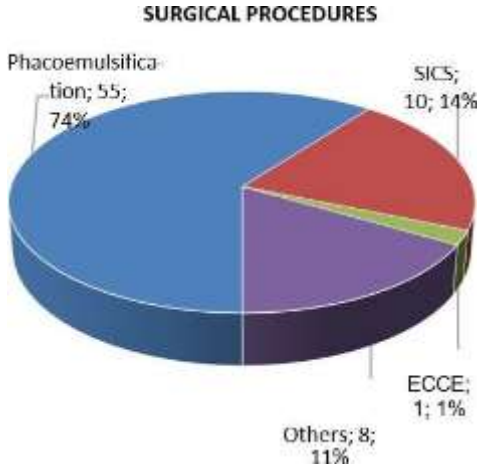

Figure 3. Surgical Procedures Associated with Acute Postoperative Endophthalmitis

Culture results from vitreous tap and/or aqueous tap specimens revealed gram-positive cocci in 3 patients (7%) (*Staphylococcus aureus* MDR in 1 patient, *Micrococcus luteus* in 1 patient, and *Staphylococcus epidermidis* in 1 patient); and gram-negative bacilli in 5 patients (13%) (*Pseudomonas aeruginosa* in 4 patients, and *Proteus mirabilis* MDR in 1 patient). No fungal growth was observed. In 32 patients (80%), no bacterial growth was found, and 34 patients had no microbiological data available. The distribution of bacterial etiology in acute postoperative endophthalmitis cases is presented in Figure 4.

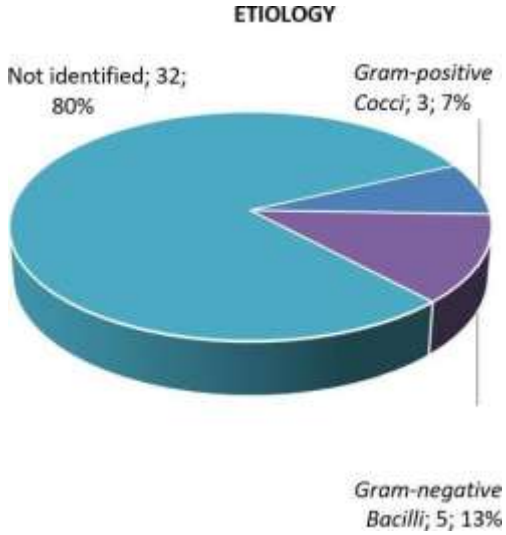

Figure 4. Bacterial Etiology in Acute Postoperative Endophthalmitis Cases

Antibiotic sensitivity testing was available for 8 patients with positive bacterial culture results. Of these, 7 patients had data indicating varying levels of sensitivity and resistance to different antibiotic classes. One patient cultured *Micrococcus luteus*, a common skin flora considered a potential contaminant, and therefore had no valid antibiotic susceptibility results. In one patient, sensitivity testing revealed both susceptibility and resistance to two antibiotic classes, while some showed no resistance to any particular class. Data on antibiotic susceptibility are presented in Figure 5.

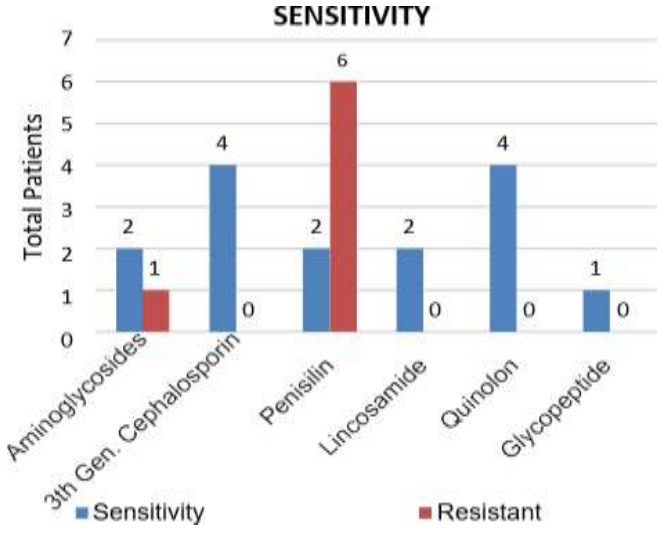

Figure 5. Antibiotic Sensitivity in Acute Postoperative Endophthalmitis Cases

Posterior segment evaluation using ocular ultrasonography (USG) showed choroidal thickening in 5 patients and retinal detachment in 8 patients.

The management of acute postoperative endophthalmitis varied depending on individual patient conditions. In this study, 37 patients (50%) received medical therapy and intravitreal antibiotic injection; 14 patients (18%) received medical therapy, intravitreal antibiotics, and underwent pars plana vitrectomy (PPV); 7 patients (9%) received medical therapy and two intravitreal antibiotic injections; and 17 patients (23%) received only medical therapy, including 15 with standard medical treatment and 2 patients who received medical therapy along with other interventions (one patient had a complication of corneal perforation which was managed with a periosteal graft and hypopyon aspiration).

Among those who received two intravitreal antibiotic injections, 5 patients had already received their first injection at a referring healthcare facility before being referred to Dr. Saiful Anwar General Hospital, and 2 patients received both injections at the hospital. Comparison of visual outcomes in patients who received intravitreal injections at Dr. Saiful Anwar Hospital on their first visit showed decreased visual acuity at day 28, whereas patients who received their first injection at a referring facility showed improved visual acuity. Details of management approaches are illustrated in Figure 6.

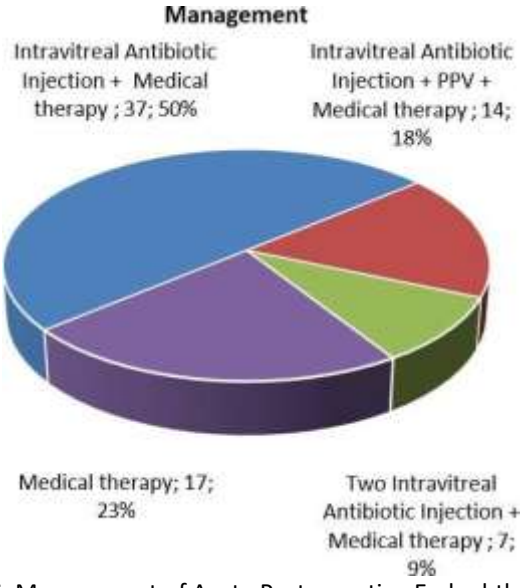

Figure 6. Management of Acute Postoperative Endophthal

DISCUSSION

The incidence of endophthalmitis was relatively rare; however, it remains one of the most vision-threatening conditions and may result in permanent visual loss.[6] In this study, the mean age of patients was 52.03 years, with a range from 7 to 89 years. Of the total, 52.7% were male and 47.3% were female. A report by the National Health Service (NHS) revealed a 1:1 gender distribution ratio for acute postoperative endophthalmitis cases, with an age range between 43 and 87 years and a mean age of 67.1 years. This suggests that gender did not significantly influenced the trend of increasing incidence in acute postoperative endophthalmitis. One of the key risk factors identified was the presence of complications during the surgical procedure.[7] A systematic review and meta-analysis conducted by Chen KY et al. (2024), which included studies from 1984 to

2023, reported the age range of patients with acute postoperative endophthalmitis to be between 21 and 88 years, with a mean age of 58 years.[8] These findings support the conclusion that the incidence of acute postoperative endophthalmitis increases with advancing age

Comorbidities present at the time of surgery may influence the risk of developing acute postoperative endophthalmitis. A study by Patengay A et al. (2012) identified diabetes mellitus, ocular comorbidities, and contact lens use as significant preoperative risk factors for the development of postoperative endophthalmitis.[9] In this study, diabetes mellitus was the most common comorbidity, found in 16 patients (21%). A meta-analysis by Chen KY et al. (2024) comparing acute postoperative endophthalmitis in patients with and without diabetes showed a significantly higher incidence in those with diabetes (18.5%) compared to non-diabetics (5.7%). Elevated blood glucose levels in diabetic patients may lead to microvascular alterations in the blood-retinal barrier, reducing resistance to pathogenic invasion.[8,9]

The most common surgical procedure associated with acute postoperative endophthalmitis in this study was phacoemulsification (74%). The introduction of sutureless clear corneal incisions was initially linked to an increased incidence of postoperative endophthalmitis. This is likely due to potential bacterial entry through inadequately sealed corneal incisions via tear film and conjunctival contamination. Proper administration of antibiotic eye drops within the first 24 hours postoperatively, secure corneal wound hydration and povidone-iodine application over hydrated corneal wounds were shown to reduce the risk of postoperative endophthalmitis.[10]

This study identified 11% (8 patients) who developed acute postoperative endophthalmitis following other types of ocular surgeries: 1 patient post-lensectomy, 1 post-pars plana vitrectomy (PPV), 1 after secondary intraocular lens (IOL) implantation, 1 after IOL repositioning, 2 post-trabeculectomy, and 1 after IOL explantation. A cohort study by Baudin et al. (2022) involving 7,522 cataract surgeries found that 63.9% of acute postoperative endophthalmitis cases followed cataract surgery, 17.23% after intravitreal injections, 9.28% after PPV, 3.26% after anterior segment surgery, and 1.06% after trabeculectomy. This ranking likely reflects the high volume of cataract procedures performed in ophthalmology.[11]

Culture results in this study revealed five patients with gram-negative bacilli: four with *Pseudomonas aeruginosa* and one with *Proteus mirabilis*. Among the *P. aeruginosa* group, three patients presented with LP+ vision and one with 1/300. Three received pharmacological and intravitreal antibiotic therapy, and one underwent additional PPV. At day 28 follow- up, three had final vision of NLP and one had LP+ at day 7, but was lost to follow-up on day 28. In this study, *Proteus mirabilis* was identified in one patient, who was treated using both medical and surgical treatments, including intravitreal antibiotic injection and pars plana vitrectomy (PPV). The patient's visual acuity upon presentation was LP+ (light perception), which improved to 1/60 by day 28, indicating clinical improvement. A study by Lin et al. (2022) stated that although gram-negative bacteria are less commonly implicated in acute postoperative endophthalmitis, their outcomes tend to be worse. They reported that 90% of patients treated for gram-negative endophthalmitis had vision of 1/300 or worse, and 50% required evisceration.[12] Culture results in this study also revealed 3 patients with gram- positive Cocci.

These findings were consistent with the Endophthalmitis Vitrectomy Study (EVS), where 70% of positive cultures were *Staphylococcus epidermidis*, followed by *Staphylococcus aureus* (10%), *Proteus mirabilis* (6%), and *Pseudomonas aeruginosa* was not detected—whereas studies from India reported *Pseudomonas* in 19.8% of cases. In this study, one patient with *S. epidermidis* had an initial visual acuity of 1/300, which improved to 6/45 after medical and surgical treatments, including intravitreal antibiotic injection. Conversely, a patient with *S. aureus* presented with no light perception (NLP) and clinical signs of corneal ulcer with epithelial-stromal defects and hypopyon, requiring hypopyon aspiration and periosteal grafting.

A study by T. Das et al. (2023) reported that gram-negative bacilli and gram-positive cocci generally exhibit good sensitivity to ceftazidime-class antibiotics, which aligns with this study's findings. In the present study, ceftazidime was effective against *P. mirabilis*, *S. aureus*, *P. aeruginosa*, and *S. epidermidis*, all of which are pathogens commonly associated with acute postoperative endophthalmitis and considered suitable targets for intravitreal antibiotic treatment. Vancomycin, according to the same study by T. Das et al. (2023), is also effective against gram-positive cocci such as methicillin-resistant *Staphylococcus aureus* (MRSA), multidrug-resistant (MDR) strains, and *S. epidermidis*.[13] A study by Bari et al. (2022) noted that the combination of vancomycin and ceftazidime has a vitreous half-life (t1/2) of approximately 48 hours, which is longer compared to other antibiotic combinations. This pharmacokinetic property supports the rationale for repeating intravitreal antibiotic injections 48 hours after the initial dose, given that the drug combination remains effective within the vitreous cavity for that duration.[12,13] This study found that several patients exhibited sensitivity to amikacin, ceftriaxone, cloxacillin, clindamycin, ciprofloxacin, and gentamicin. Cephalosporin antibiotics are reported to have limited penetration into intracellular compartments and the vitreous.[15]

Ultrasonographic examination in this study revealed retinal detachment (RD) in 8 patients and 1 patient with corneal perforation, which was managed using a periosteal graft. Acute postoperative endophthalmitis cases require routine follow-up to monitor for potential complications, particularly retinal detachment. RD in acute postoperative endophthalmitis can be influenced by several predisposing factors that existed prior to the diagnosis, such as aphakia. Aphakic status, particularly when associated with posterior capsular rupture (PCR) and vitreous prolapse during lens extraction, is a known risk factor for RD.[24,25] In this study, all 8 patients with retinal detachment on ultrasonography were pseudophakic. Visual acuity at presentation in this group included 7 patients with light perception (LP+) and 1 patient with no light perception (LP−). These findings are consistent with a study by Ying Z et al. (2021), which reported that 50% of endophthalmitis patients with RD had final visual acuity of 1/300 or worse. Other literature supports the need for long-term follow-up, even after acute inflammation has resolved, as late-onset retinal detachment can still occur.[16,17]

Several factors can influence the therapeutic outcomes of acute postoperative endophthalmitis. Peng et al. (2021) found that post-treatment visual acuity was affected by the patient's baseline vision, severity of vitritis, pre-existing conditions (such as diabetes mellitus), treatments received before referral, and the presence of post-treatment complications.[18,19,20] This study also showed that among 14 patients

who underwent pars plana vitrectomy (PPV) combined with intravitreal injection, 4 patients had stable visual acuity, 6 showed improvement, and 4 experienced deterioration. The European Society of Cataract and Refractive Surgeons (ESCRS) in 2013 proposed PPV as the gold standard for managing acute postoperative endophthalmitis. Currently, PPV may be performed in all cases of acute postoperative endophthalmitis, regardless of the patient's presenting visual acuity. Some literature suggests that in acute cases, vitrectomy yields better outcomes if performed within 7 days of symptom onset. The timing of vitrectomy plays a crucial role in the patient's visual prognosis.[21,22] In this study, 7 patients received two intravitreal antibiotic injections. Of these, 5 had already undergone pharmacologic therapy and received intravitreal antibiotic injections at referring centers. These patients demonstrated improved outcomes compared to their visual acuity upon arrival at our institution (RSSA), suggesting that prior intravitreal antibiotic injection before referral was associated with better visual prognosis.

This study has several limitations, including missing or damaged medical records, incomplete or unrecorded medical documentation, and lack of follow-up in some patients, leading to incomplete data collection.

CONCLUSION

The distribution of acute postoperative endophthalmitis cases by age ranged from 7 to 89 years, with a mean patient age of 61.57 ± 11.54 years. The most common presenting visual acuity was 1/300 (logMAR 2.48; 31 patients), with gram- negative bacilli identified as the most frequent etiologic agent. Treatment modalities included intravitreal antibiotic injections using vancomycin and ceftazidime, with pars plana vitrectomy (PPV) considered in certain cases. This study demonstrated that after 28 days of treatment, visual acuity outcomes improved in 34 patients (45.9%), remained unchanged in 37 patients (50%), and worsened in 2 patients (2.7%). Notable complications observed included corneal perforation and retinal detachment (RD).

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