Challenging course of endophthalmitis with corneal ulcer following cataract surgery: successful management and visual rehabilitation

Caso desafiador de endoftalmite com úlcera corneal após cirurgia de catarata: manejo bem-sucedido e reabilitação visual

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ABSTRACT

The objective of this case report was to share the successful management of severe endophthalmitis, aiming at ocular integrity and visual acuity. A 73-year-old man presented with visual acuity of 20/30 in the right eye and 20/200 in the left eye. On the 21st day postoperatively after phacoemulsification in the left eye, he developed symptoms of endophthalmitis, including ocular discomfort, blurred vision, and whitish discharge. Despite negative cultures, his condition worsened, resulting in corneal perforation on the 31st day. Conjunctival flap and penetrating keratoplasty were performed. Currently, the patient maintains a visual acuity of 20/40 in the left eye, with a healthy graft and no signs of failure. Despite the complications, careful follow-up and timely interventions successfully preserved his vision. The use of conjunctival flap during the inflammatory phase was crucial to maintaining ocular integrity. This underscores the importance of different approaches in complex ocular complications, including alternative strategies for ocular protection during active inflammation.

RESUMO

O objetivo deste relato de caso foi compartilhar o manejo bem-sucedido de uma grave endoftalmite, visando à integridade ocular e à acuidade visual. Um homem de 73 anos apresentou acuidade visual de 20/30 no olho direito e 20/200 no olho esquerdo. No 21° dia pós-operatório de facoemulsificação em olho esquerdo, ele desenvolveu sintomas de endoftalmite, incluindo desconforto ocular, visão embaçada e secreção esbranquiçada. Apesar de culturas negativas, sua condição piorou, resultando em perfuração corneal no 31° dia. A cobertura conjuntival e a ceratoplastia penetrante foram realizadas. Atualmente, o paciente mantém acuidade visual de 20/40 no olho esquerdo, com enxerto saudável e sem sinais de falha. Apesar das complicações, o acompanhamento cuidadoso e as intervenções oportunas preservaram a visão com sucesso. O uso de cobertura conjuntival durante a fase inflamatória foi crucial para manter a integridade ocular. Isso destaca a importância de diferentes abordagens em complicações oculares complexas, incluindo estratégias alternativas para proteção ocular durante a inflamação ativa.

INTRODUCTION

Endophthalmitis is an uncommon yet severe form of ocular inflammation resulting from infection within the intraocular cavity. If left untreated or delayed, it can lead to irreversible visual impairment. Endophthalmitis can be categorized into exogenous and endogenous types based on the route of infection transmission. Exogenous endophthalmitis occurs when microorganisms directly enter the eye through means like intraocular surgery, penetrating trauma, or contiguous spread from nearby tissues. On the other hand, endogenous endophthalmitis arises when infectious agents are carried through the bloodstream and reach the eye from a distant source of infection. Timely recognition and appropriate management are crucial in mitigating the detrimental effects of endophthalmitis and preserving visual function.[1]

Postoperative endophthalmitis, a significant post-surgical complication, is categorized as acute or chronic depending on the time elapsed since the surgery (≥6 weeks). The sources of infection in postoperative endophthalmitis encompass bacteria that colonize the patient's eyelid margin and conjunctiva, healthcare personnel, surgical instruments, solutions, and intraocular lenses. These sources serve as potential reservoirs for pathogenic organisms that can cause infection and subsequent inflammation within the eye. Understanding the routes of entry and potential sources of infection helps to prevent and manage postoperative endophthalmitis, emphasizing the importance of strict aseptic techniques and thorough disinfection protocols in surgical settings.[1,2]

Cataract surgery, a generally safe and successful procedure leading to favorable visual outcomes, is not exempt from potential complications. Among these, postoperative endophthalmitis stands out as the most dreaded complication, arising from the introduction of microorganisms into the eye's interior during or after the surgical intervention. Despite the overall positive outcomes associated with cataract surgery, the specter of endophthalmitis looms as a significant concern for ophthalmologists. This infectious condition poses a substantial threat to vision and demands prompt diagnosis and appropriate management to minimize its potentially devastating effects. While cataract surgery remains a valuable and widely performed procedure, diligent adherence to sterile techniques and preventive measures is crucial to reduce the occurrence of this feared complication.[2,3]

In summary, dramatic cases of postoperative endophthalmitis present a complex challenge for ophthalmologists and multidisciplinary teams. Early diagnosis and treatment are critical for preserving ocular integrity, visual function, and ultimately, the patient's well-being. Additionally, appropriate follow-up and visual rehabilitation are essential steps towards achieving satisfactory functional recovery. Continuous research and exploration of enhanced strategies in diagnosis, treatment, and rehabilitation are essential to improve outcomes in these challenging cases.

CASE REPORT

A 73-year-old male patient presented at the outpatient clinic with a visual acuity (VA) of 20/30 in the right eye (OD) and 20/200 in the left eye (OS). Due to the significant visual impairment in the OS, the patient was recommended for phacoemulsification surgery with intraocular lens implantation. The patient underwent surgery initially in the OS, with intracameral infusion of moxifloxacin for endophthalmitis prophylaxis, without complications. On the first and seventh postoperative days, the patient's recovery was uneventful, with good progress, achieving a VA of 20/20 on the seventh postoperative day.

On the 21st postoperative day, the patient sought urgent ophthalmological care, reporting ocular discomfort and decreased vision for the past five days, accompanied by the presence of whitish discharge. Upon anterior segment biomicroscopy of the OS, the examination revealed whitish discharge, ocular warmth, corneal edema, nasal superior corneal infiltration affecting the visual axis, corneal melting with imminent risk of perforation, shallow anterior chamber, and hypopyon (Figure 1). The patient's VA in the OS was limited to perception of light. In an urgent manner, intravitreal fluid was collected for culture, which was later deemed insufficient for culturing. Intravitreal injections of amikacin and vancomycin were administered, but there was no significant improvement.

The following day, a sample of the corneal ulcer was collected for *Gram* staining and culture, but the results came back negative for the growth of microorganisms. The patient was under topical moxifloxacin and dexamethasone every hour and oral antibiotics. Daily reevaluation showed progressive deterioration of the corneal ulcer with worsening edema, in line with the initial findings from the urgent visit (Figure 2).

On the 31st postoperative day, the patient experienced corneal perforation. Considering the inflammatory presentation and the goal of preserving the eye, conjunctival covering was performed (Figure 3), despite the indication for evisceration. After controlling the inflammatory process, the patient underwent penetrating

Figure 1. Anterior segment biomicroscopy of the left eye showing whitish discharge, corneal edema, nasal superior corneal infiltration affecting the visual axis, corneal melting with impending risk of perforation, shallow anterior chamber, and presence of hypopyon.

Figure 2. Progressive deterioration of the corneal ulcer with increasing edema observed during daily reevaluation, consistent with the initial findings from the urgent visit.

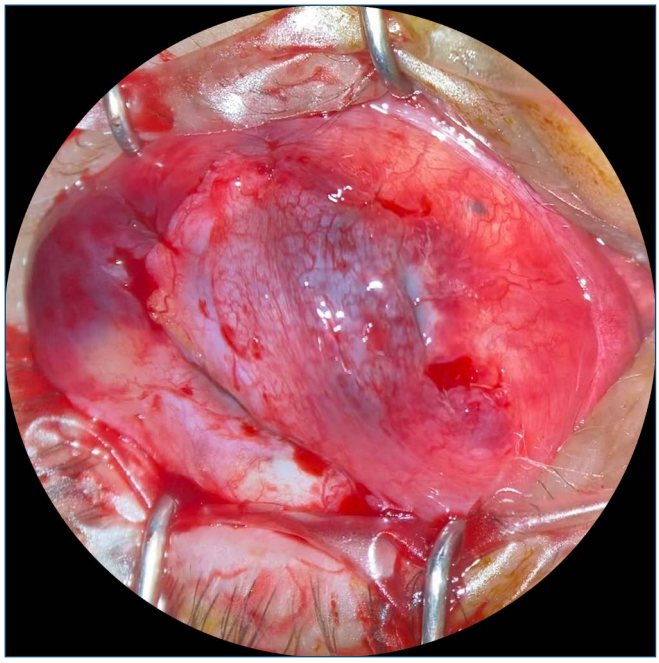

Figure 3. Conjunctival covering procedure performed to preserve the eye, in response to the inflammatory presentation.

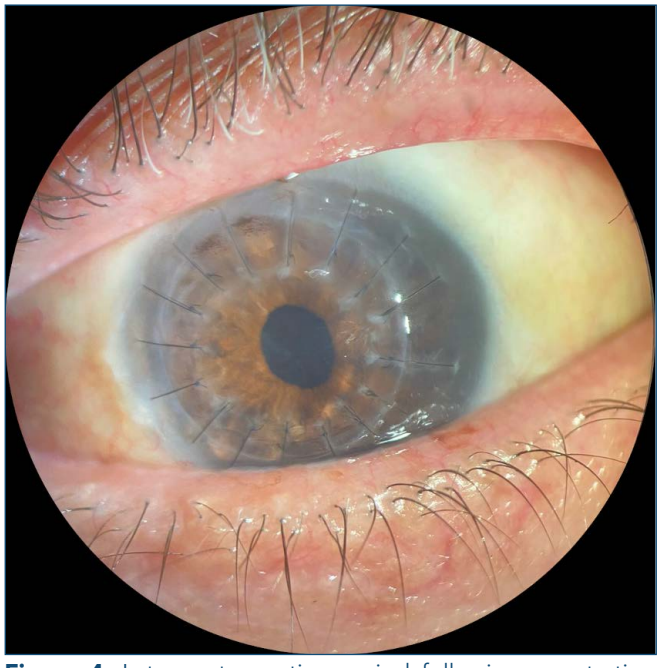

Figure 4. Late postoperative period following penetrating keratoplasty with 16 radial corneal sutures, demonstrating long-term surgical outcome.

keratoplasty (PK) with maintenance of 16 radial corneal sutures (Figure 4).

During the immediate post-PK follow-up, the patient achieved a VA of 20/200 in the OS, with a refractive error of -6.50 (-3.50x180) due to induced astigmatism from the sutures. The patient continued to be monitored in the cornea department, with selective suture removal determined through serial corneal topographies. Currently, the patient maintains a VA of 20/40 in the OS, with a refractive error of -1.50 (-4.50x60),

demonstrating good graft appearance and no signs of graft failure.

DISCUSSION

Cataract surgery, the most frequently performed elective surgical procedure in many Westernized countries, is generally considered safe with favorable visual outcomes.[2] However, surgical complications, including the feared postoperative endophthalmitis, can occur due to the introduction of microorganisms into the eye during or after the surgical procedure.[3] Fortunately, recent advancements in aseptic techniques have significantly reduced the incidence of this infectious condition.[2,3]

Postoperative endophthalmitis can be further divided based on the timing of its occurrence. Acute postoperative endophthalmitis represents the majority, while chronic forms are less common. They are considered chronic when more than 6 weeks elapse between the onset of endophthalmitis and the preceding intraocular procedure. Typically, they are associated with the entry of less virulent microorganisms at the time of the intervention.[4] More aggressive pathogens, such as *Streptococcus*, *Staphylococcus*, and *Escherichia coli*, are commonly observed in acute events.[4,5] This case report highlights the challenges in managing acute postoperative endophthalmitis following cataract surgery. Acute postoperative endophthalmitis is characterized by rapid onset of clinical findings and ocular symptoms after intraocular procedures. In our case, the patient presented with acute endophthalmitis symptoms on the 21st postoperative day, including ocular discomfort, decreased vision, and whitish discharge. The prompt manifestation of symptoms emphasizes the need for close surveillance and follow-up to detect complications like endophthalmitis.

The majority of culture-proven cases of acute postoperative endophthalmitis are caused by *Gram*-positive bacteria, specifically *Staphylococcus* epidermidis and other coagulase-negative staphylococci, which are commonly found on the surface of the eye.[6] Among them, streptococci are considered highly virulent and associated with the poorest outcomes.[5,6] Despite some variations, *Gram*-positive organisms continue to be the main cause of postoperative endophthalmitis, with an increasing incidence of *Enterococcus* species in recent years, leading to poor visual outcomes.[6]

Fungal endophthalmitis is rare and usually linked to contaminated intraocular solutions and hospital environments.[7] However, recent studies in India show fungi accounted for up to 21.8% of culture-positive postoperative endophthalmitis cases, highlighting their prevalence in developing countries.[8]

Another differential diagnosis is endogenous endophthalmitis, in which over 40% of cases lack an identifiable primary infection focus.[9] Studies show that up to 44% of patients with candidal and 42% with bacterial endophthalmitis have no other infection sites.[10] This condition typically affects immunocompromised individuals, including those with neutropenia, organ transplants, malignancies, HIV, diabetes, those undergoing hemodialysis, and recent surgery, complicating diagnosis and treatment.[9]

The prophylaxis of endophthalmitis is guided by the European Society of Cataract & Refractive Surgeons (ESCRS) study, which identifies several risk factors for endophthalmitis, including the absence of intracameral antibiotics, surgical complications, clear cornea incisions, male gender, and silicon intraocular lens implantation.[11] Meticulous surgical preparation, such as lid hygiene and preoperative irrigation with povidone-iodine and chlorhexidine in the periocular area, is highly recommended to prevent postoperative endophthalmitis. However, the potential corneal toxicity of chlorhexidine limits its widespread use. In postoperative endophthalmitis, the primary source of bacteria is the patient's conjunctival flora, which enters the anterior chamber through surgical incisions. However, it is important to consider the potential contamination of surgical equipment, including instruments, supplies, prepared solutions, surgical fields, and artificial intraocular lenses.[12] The ESCRS recommends the use of intracameral cefuroxime for postoperative endophthalmitis prophylaxis due to its high intraocular antibacterial coverage and optimal concentrations.[12] Subconjunctival injection of vancomycin and ceftazidime has shown effectiveness in reducing the risk of post-cataract endophthalmitis, despite limited penetration into the vitreous.[13] Studies support the use of intracameral cefuroxime, cefazolin, vancomycin, and moxifloxacin to reduce the risk of post-cataract endophthalmitis.[2,14] Despite maintaining a sterile and controlled intraoperative environment and using moxifloxacin, as recommended in the literature, the occurrence of endophthalmitis in this case suggests a potential lack of adherence to postoperative instructions. While intracameral antibiotics have shown efficacy in reducing the risk of post-cataract endophthalmitis, patient compliance with postoperative care, including topical antibiotics and regular follow-up, plays a significant role in preventing complications. This case emphasizes the importance of patient education, adherence to postoperative guidelines, and continuous evaluation of

prophylactic protocols to optimize outcomes and minimize postoperative complications.

Early recognition of postoperative endophthalmitis is crucial for prompt treatment and improved visual outcomes. Clinical diagnosis of endophthalmitis is further supported by paraclinical tests, such as vitreous culture and B-Scan ultrasonography. Although approximately 30% of post-operative endophthalmitis cases may have negative cultures, isolating the causative organism remains the cornerstone of treatment. This objective is achieved through timely sampling of aqueous and vitreous humor for gram staining, culture, and polymerase chain reaction (PCR) testing.[15] In our patient's case, the cultures performed were negative, and no corneal material culture was conducted after transplantation. Consequently, the causative microorganism was not identified. The therapeutic decision-making was influenced by the recommendations of the Hospital Infection Control Committee (HICS) based on local antimicrobial susceptibility patterns and empirical treatment guidelines. Collaboration with infectious disease specialists and the use of institutional protocols contributed to the selection of an appropriate antimicrobial regimen. This case emphasizes the importance of an interdisciplinary approach, including ophthalmology and infectious diseases, to guide treatment decisions in culture-negative endophthalmitis cases and optimize patient outcomes.

In the management of endophthalmitis, intraocular administration of antibiotics is considered a crucial step.[16] Initially, a combination of broad-spectrum antibiotics like vancomycin and ceftazidime or vancomycin and amikacin is injected intravitreally as first- and second-line therapies, respectively.[17] The benefit of systemic antibiotic therapy is still a matter of debate.[16,17] The ESCRS recommends adjunctive systemic antibiotic therapy for acute postoperative endophthalmitis.[11] The choice of systemic antibiotics depends on their ability to cross the blood-ocular barrier. Corneal ulcer, endogenous endophthalmitis, and poor initial VA showed a strong association with the need for evisceration or enucleation. Therefore, it is crucial to emphasize prompt referral to ophthalmologists, early intervention, and close monitoring of disease progression in cases of corneal ulcer. These measures are essential to effectively control ocular inflammation and prevent vision loss.[18]

The treatment of chronic postoperative endophthalmitis presents challenges due to delayed diagnosis caused by variable clinical manifestations and diverse potential causative organisms.[16] Patients typically experience moderate pain and decreased VA, while the persistent presence of low-level cell and flare in the anterior chamber serves as a hallmark. Treatment options for chronic endophthalmitis include intravitreal antibiotics, intraocular lens extraction, capsule bag removal, and vitrectomy.[16,17]

The present case report discusses a challenging case of acute postoperative endophthalmitis with corneal ulcer following cataract surgery. Despite the initial successful surgery, the patient developed severe complications necessitating corneal transplantation and subsequent suture adjustment. Close postoperative monitoring and timely intervention were crucial in preserving the patient's vision and achieving a favorable outcome. The decision to perform conjunctival covering during the active inflammatory phase played a vital role in preserving the integrity of the patient's globe. This emphasizes the importance of individualized and multidisciplinary management in complex ocular complications, highlighting the need to consider alternative approaches, such as conjunctival covering, during the active inflammatory process to safeguard ocular integrity.

AUTHORS' CONTRIBUTION

In this study, Abreu CB made significant contributions, playing a pivotal role in patient follow-up, case report writing, and critical content review. Merlo BFC was instrumental in the study, providing valuable research input and contributing to the case report writing. Deseta LAS, Meurer LS, and Varandas AM were essential for patient follow-up and photographic documentation, ensuring detailed information and accurate visual records. Varandas VS played a crucial guiding role and contributed to the critical analysis of the study, enriching the research with expertise and insights. All authors approved the final version of the manuscript and are responsible for all aspects of the manuscript, including ensuring its accuracy and integrity.

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