Case report

Endogenous endophthalmitis secondary to hematogenous dissemination from a diabetic foot

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Endoftalmitis endógena secundaria a diseminación sistémica por pie diabético

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Abstract
Case presentation. A woman with a history of poorly controlled diabetes *mellitus* presented to the emergency department due to changes in skin color and discharge from her left foot, along with systemic symptoms such as vomiting and fever. During the physical examination, signs of severe infection were evident in the stump of the previously amputated left lower limb; additionally, examination of the right eye revealed findings suggestive of endophthalmitis. Radiological studies revealed subcutaneous gas and osteolysis in the metatarsals. Empirical antibiotic therapy and metabolic management were initiated. **Treatment.** During hospitalization, the patient required drainage of an abscess in the left foot and, subsequently, infracondylar amputation of the left lower limb due to the progression of the infection. Ocularly, she presented with blindness and severe inflammatory signs; a computed tomography scan of the orbit confirmed endogenous endophthalmitis, which was treated by evisceration of the right eyeball. **Outcome.** In the immediate postoperative period, the patient had a favorable course, with no signs of active infection at the surgical sites. Microbiological cultures from the foot and eye identified *Streptococcus agalactiae* as the causative agent. This case underscores the importance of early diagnosis, timely surgical intervention, and multidisciplinary care to prevent fatal complications in immunocompromised diabetic patients.

Keywords
Endophthalmitis, Diabetes *Mellitus*, Diabetic Foot, Amputation, Surgical.

Resumen
Presentación del caso. Mujer con antecedentes de diabetes *mellitus* de control irregular, quien consultó en emergencia debido a cambios de coloración y secreción en el pie izquierdo, junto a síntomas sistémicos como vómito y fiebre. Durante la evaluación física se evidenciaron signos de infección severa en el muñón del miembro inferior izquierdo, previamente amputado; adicionalmente, el examen del ojo derecho reveló hallazgos sugestivos de endoftalmitis. Estudios radiológicos revelaron gas subcutáneo y osteólisis en los metatarsianos. Se inició tratamiento antibiótico empírico y manejo metabólico. **Intervención terapéutica.** Durante la hospitalización, la paciente requirió drenaje de un absceso en el pie izquierdo y, posteriormente, amputación infracondílea del miembro inferior izquierdo por la progresión de la infección. A nivel ocular, presentó ceguera y signos inflamatorios severos; una Tomografía Axial Computarizada de órbita confirmó endoftalmitis endógena, tratada mediante evisceración del globo ocular derecho. **Evolución clínica.** En el posquirúrgico inmediato, la paciente presentó una evolución favorable, sin signos de infección activa en los sitios quirúrgicos. Los cultivos microbiológicos del pie y del ojo identificaron *Streptococcus agalactiae* como agente etiológico. Este caso subraya la importancia del diagnóstico precoz, la intervención quirúrgica oportuna y la atención multidisciplinaria para prevenir complicaciones fatales en pacientes diabéticos inmunocomprometidos.

Palabras clave
Endoftalmitis, Diabetes *Mellitus*, Pie diabético, Amputación Quirúrgica.

Introduction

Endophthalmitis is defined as severe inflammation of the ocular tissues and fluids caused by a bacterial or fungal infection.[1] This condition can seriously threaten vision if not diagnosed and treated promptly. It is classified into two main forms: exogenous and endogenous.[2] The exogenous form is the most common. It results from the direct entry of the pathogen into the eye, usually following eye surgery, penetrating trauma, or the spread of an adjacent infection.[1] In contrast, the endogenous form is less common but more severe, and occurs through hematogenous spread from a systemic infectious focus.[2]

Endogenous endophthalmitis has a low prevalence, estimated at 2 % to 8 % of all cases.[3] However, it can involve both eyes in up to 20 % of patients.[2] The causative agents depend on the geographic region. In Asia, *Klebsiella pneumoniae* is a common cause, frequently associated with liver abscesses and diabetes.[4] In North America and Europe, *Streptococcus spp.* predominates.[1] In hospital settings, *Staphylococcus aureus* and *Candida* species are common causative agents.[5]

Clinically, endogenous endophthalmitis can be confused with other inflammatory eye diseases, such as uveitis.[3] The diversity of clinical presentations complicates the diagnosis of endophthalmitis, which may be delayed in up to one-third of cases.[6] The retina is particularly vulnerable due to its limited capacity for regeneration.[2] In addition to direct damage from pathogens, inflammation and ischemia contribute to visual impairment.[1] Identifying the primary source of infection is essential for effective treatment.[2]

Predisposing factors for endogenous endophthalmitis include immunosuppression, diabetes *mellitus*, systemic infections such as infective endocarditis,[7] and prolonged hospital stays.[3] Hematogenous spread allows microorganisms to colonize the eye, where they replicate and trigger an inflammatory response.[2] Septicemia can cause endophthalmitis or panophthalmitis, and even hematogenous orbital cellulitis, although the latter is rarer.[8]

Successful treatment depends on rapid identification of the causative agent and immediate initiation of antimicrobial therapy.[1] Treatment may include intravitreal injections of antibiotics or antifungals and, in some cases, vitrectomy.[2] In addition to eliminating the pathogen, it is essential to control inflammation to prevent further damage.[9] In *Candida* infections, particularly in the context of the COVID-19 pandemic, an increase in incidence has been observed, likely due to immunosuppression induced by the disease and its treatments.[10]

Case presentation

A woman with a history of diabetes *mellitus* was receiving irregular treatment with 850 mg of metformin every 12 hours. Four years ago, she developed diabetic foot, managed with amputation of the fourth and fifth toes of her left foot. One month before presentation, she noted discoloration and discharge from her left foot. Three days before coming to the Emergency Department, she began experiencing vomiting, headache, low-grade fever, polyuria, and general malaise. On physical examination, her right eye showed eyelid ptosis, conjunctival erythema, and fibrin in the anterior chamber covering the iris and pupil (Figure 1A). At the previous left foot amputation site, edema, erythema, localized necrosis at the lateral margin, and purulent discharge were detected (Figure 1B).

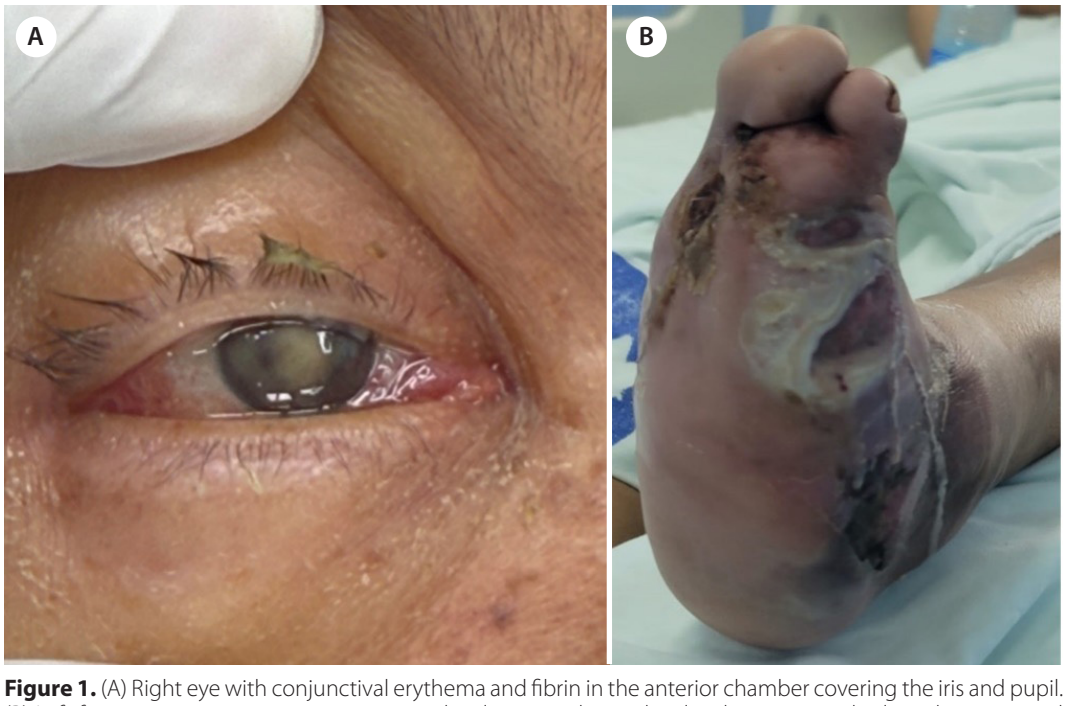

Figure 1. (A) Right eye with conjunctival erythema and fibrin in the anterior chamber covering the iris and pupil. (B) Left foot, at previous amputation sites, with edema, erythema, localized necrosis at the lateral margin, and purulent discharge.

Upon admission to the General Surgery Unit, the patient began antibiotic therapy with 2 g of ceftriaxone intravenously (IV) daily, 900 mg of clindamycin IV every eight hours, 30 mg of ketorolac IV every eight hours, and 40 U of enoxaparin subcutaneously (SC) daily. Subsequently, the internal medicine team prescribed regular insulin adjusted to blood glucose levels. Laboratory tests then revealed leukocytosis with neutrophilia and hyperglycemia (Table 1). Anteroposterior and lateral radiographs of the left foot revealed subcutaneous gas, lysis of the heads of all metatarsals, and involvement of the proximal third of the first, second, and third proximal phalanges (Figure 2A).

Treatment

On the second day of hospitalization, a fluctuating abscess was noted in the dorsal region of the left foot. It was drained, revealing abundant purulent discharge and lysis of the fourth and fifth metatarsals. On the fourth day, bone exposure of the right fifth metatarsal, prompting an evaluation by orthopedics, which recommended infracondylar amputation of the left lower limb. During surgery, subcutaneous gas extending to the ankle and extensive osteolytic changes in the metatarsals and proximal phalanges of the fourth and fifth toes were noted.

Subsequently, the patient presented with marked decreased vision in the right eye, ptosis, purulent discharge, and eyelid edema. A computed tomography (CT) scan of the orbit revealed a dense, echogenic image consistent with significant vitreous infiltration (Figure 2B), which was subsequently evaluated by Ophthalmology and led to a diagnosis of endogenous endophthalmitis. Evisceration of the right eyeball was performed, and samples were sent to the microbiology laboratory for culture (Figure 3A).

Outcome

In the immediate postoperative period, the antibiotic regimen was changed to cefalotin 1 g IV every six hours and metronidazole 500 mg IV every eight hours on an empirical basis, pending the results of the blood and culture tests. Tramadol 100 mg IV every eight hours and enoxaparin 40 subcutaneous units daily were added, resulting in a significant clinical improvement in the white blood cell count. The surgical wound from the infracondylar amputation and the right orbital cavity healed favorably, with no signs of discharge (Figure 3B). Cultures of discharge from the left foot and the right eyeball reported growth of *Streptococcus* agalactiae, which was susceptible to all antibiotics (Figure 4A and Figure 4B).

Clinical Diagnosis

Based on the findings of the physical examination, imaging studies, and microbiological tests, a diagnosis of endogenous endophthalmitis secondary to hematogenous spread from an infectious focus in a diabetic foot was established.

Table 1. Laboratory test results

Laboratory test	Days			
	1	5	9	11
White blood cells /mm^3	21 200	26 600	14 000	8 300
Neutrophils %	76.6	84.4	71.7	66.6
Hemoglobin g/dL	10.1	6.1	8.5	8.9
Hematocrit %	33.3	19.5	27.4	28.6
Platelets /µL	488 000	429 000	397 000	382 000
Glucose mg/dL	533	217	138	164
Urea nitrogen mg/dL	18.1	13.3	6.6	8.3
Creatinine mg/dL	1.45	0.94	0 .81	0.78
Sodium mEq/L	127.6	130.4	136.1	134.4
Potassium mEq/L	5.3	5.4	4 .4	4.4
Chlorine mEq/L	79.1	91.3	80.7	80.7

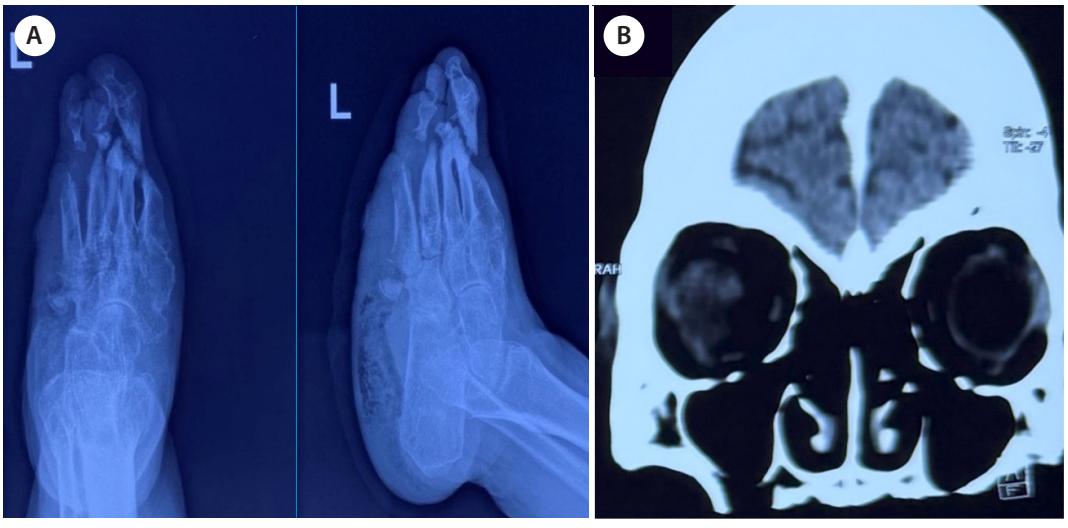

Figure 2. (A) Anteroposterior and lateral X-rays of the left foot, showing subcutaneous gas and lysis of the heads of all metatarsals, as well as the proximal third of the first, second, and third proximal phalanges. (B) Coronal CT scan of the orbit, showing a dense echogenic image corresponding to significant vitreous infiltration.

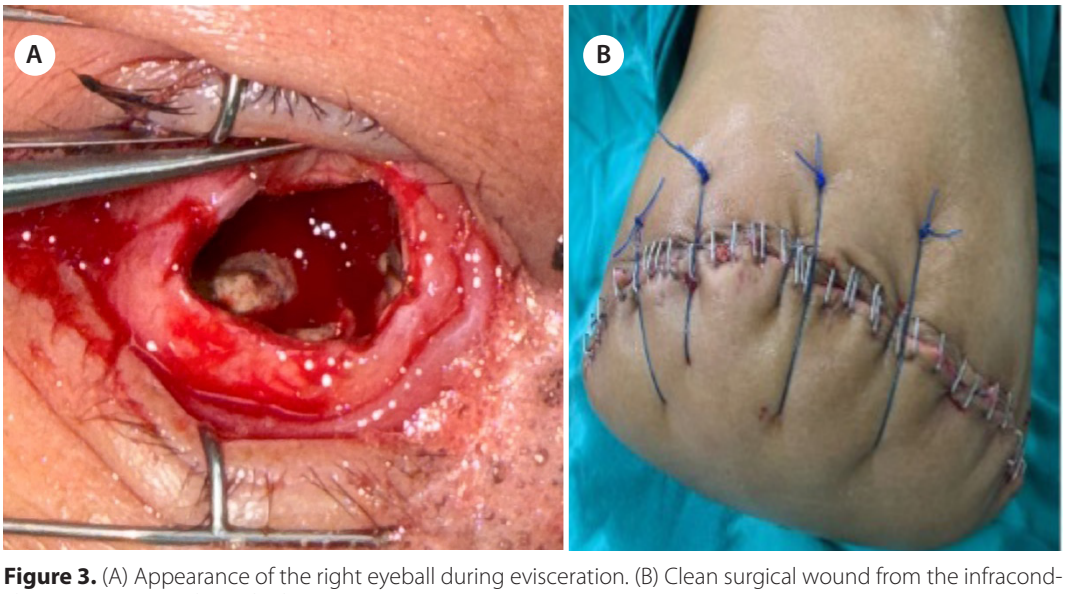

Figure 3. (A) Appearance of the right eyeball during evisceration. (B) Clean surgical wound from the infracondylar amputation, with no discharge.

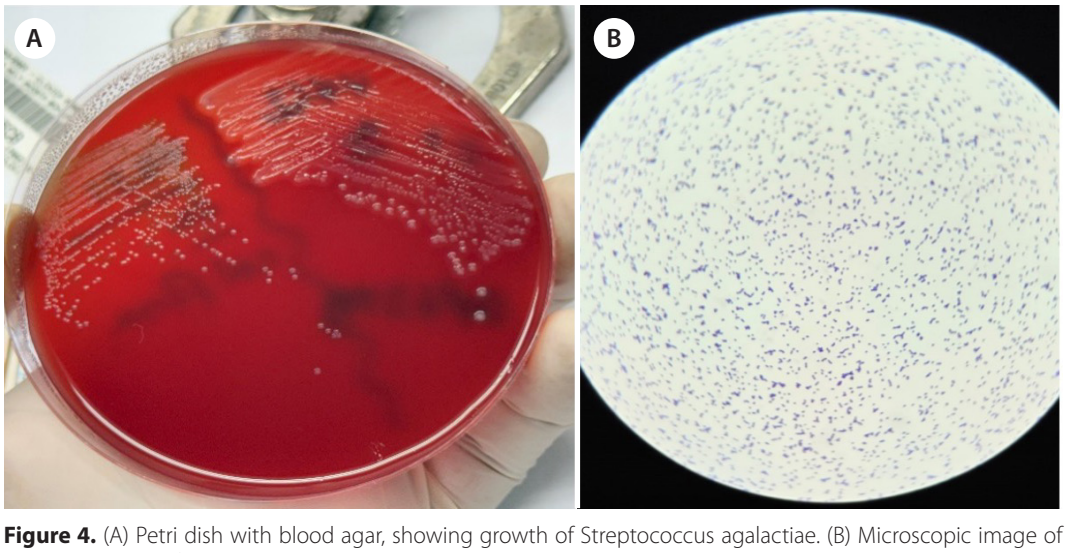

Figure 4. (A) Petri dish with blood agar, showing growth of Streptococcus agalactiae. (B) Microscopic image of Streptococcus agalactiae.

Discussion

Endogenous endophthalmitis is a serious intraocular infection caused by the hematogenous spread of microorganisms from a primary systemic focus.[2] Although its incidence is relatively low compared to exogenous endophthalmitis,[3] its impact on visual function and the patient's quality of life can be severe.[1] The main predisposing factors include chronic metabolic diseases such as diabetes *mellitus*, renal failure, malignant neoplasms, and immunosuppressed states.[7]

During the COVID-19 pandemic, an increase in cases of endogenous endophthalmitis was reported, primarily associated with the use of systemic steroids in hospitalized patients,[10] which increased the risk of opportunistic fungal and bacterial infections.[5] This shift in epidemiology highlights the importance of maintaining a low threshold for ocular screening in patients with systemic risk factors.[10] Added to this are prolonged hospital stays, the use of invasive devices, and exposure to multiple broad-spectrum antibiotics, which alter the host microbiota and promote colonization by opportunistic pathogens.

The etiology of endogenous endophthalmitis is diverse: *Streptococcus pneumoniae* and *Staphylococcus aureus* represent the main Gram-positive agents isolated,[1] while *Klebsiella pneumoniae* is the most common Gram-negative bacillus, especially in Asian patients.[4] In fungal infections, *Candida spp.* is the predominant pathogen.[5] The occurrence of *Streptococcus mitis* as a cause of endophthalmitis is rare, but it should be considered in patients with a history of recent dental procedures[11] or respiratory infections.[12] These findings reinforce the need to integrate dental and pulmonological evaluations when an atypical infectious focus is suspected.

From a clinical standpoint, the initial presentation of the disease may be subtle, with symptoms such as eye pain, progressive vision loss, and fever.[6] However, in some cases, systemic symptoms may be masked by the use of over-the-counter analgesics or anti-inflammatory drugs.[3] This situation underscores the need for early ophthalmologic evaluation in septic or immunocompromised patients.[7] Early diagnosis facilitates infection control and preserves useful vision, in addition to preventing the infection from spreading beyond the ocular tissues via the optic nerve, such as to the cavernous sinus.[2,6]

Endogenous endophthalmitis can arise from unusual infectious sources, as evidenced by recent case reports. Carbonaro *et al.*, described endophthalmitis secondary to an infected basal cell carcinoma, demonstrating that skin neoplasms can act as occult hematogenous foci.[13] On the other hand, Singh *et al.*, demonstrate how rare fungal agents, such as *Cladosporium spp.*, can mimic more common inflammatory diseases such as toxoplasmosis, which may delay the correct diagnosis.[14] Finally, Braga *et al.*, reported *Escherichia coli* endophthalmitis following bacteremia secondary to a urinary tract infection, and emphasized the importance of ophthalmologic surveillance in septic patients.[15] Cases secondary to diabetic foot are not as common; these highlight the need to maintain a high index of clinical suspicion and to adopt a broad diagnostic approach in the presence of atypical systemic infections to preserve vision and improve outcomes.

Standard treatment includes intravitreal administration of broad-spectrum antibiotics, commonly vancomycin in combination with ceftazidime,[1] along with systemic antibiotics tailored to culture results and antibiotic susceptibility testing.[2] In cases of severe infection or poor initial response, pars plana vitrectomy is considered necessary and significantly improves visual outcomes.[3] However, the visual prognosis remains guarded, with studies reporting that only 41 % of patients achieve vision equal to or better than 20/2001 while others report that approximately 19 % of cases require enucleation or evisceration.[2] In the case of the patient studied, there was a marked decrease in vision, and due to the severity of the infectious process and significant vitreous involvement, despite IV administration of antibiotics, it was decided to perform evisceration.

The use of oral and topical corticosteroids as adjuncts in treatment remains controversial.[9] Although they may modulate the intraocular inflammatory response and reduce tissue damage, their immunosuppressive effect can exacerbate concomitant systemic infections, including complications such as pseudoarthrosis in cases of bone infection.[16]

Endogenous endophthalmitis, although rare, poses a significant threat to ocular integrity and the patient's life due to its rapid progression and high visual morbidity. This clinical case highlights the importance of considering atypical systemic foci, such as an infected diabetic foot, as potential sources of hematogenous spread. Early diagnosis, immediate treatment with intravitreal and systemic antibiotics, and vitrectomy are essential for preserving

visual acuity in patients with endogenous endophthalmitis. However, despite these interventions, visual outcomes remain poor in many cases, and surgical procedures such as evisceration are essential for controlling the infection and preventing fatal complications. Furthermore, the isolation of *Streptococcus agalactiae* from both infection sites underscores the need for appropriate microbiological cultures.

Patients require adequate follow-up and supportive care from a multidisciplinary team of healthcare professionals, including ophthalmologists, infectious disease specialists, and primary care physicians, to minimize the impact of visual impairment on their quality of life. Finally, this case emphasizes the importance of close monitoring in immunocompromised patients to prevent devastating sequelae such as irreversible vision loss and the need for major amputations.

Future research should focus on improving early detection methods, defining the role of systemic and topical corticosteroid therapy, and evaluating the utility of empirical antifungal treatment in immunocompromised patients. It is recommended to evaluate the implementation of ophthalmic screening protocols in patients with sepsis, poorly controlled diabetes, or prolonged exposure to systemic steroids. There are many cases of infectious diseases in which antibiotics have been administered empirically, achieving satisfactory results. This case highlights the importance of appropriate surgical decision-making, combined with effective antibiotic therapy, which leads to a significant reduction in the patient's infection. To date, no publications have been found in El Salvador on endogenous endophthalmitis secondary to diabetic foot, so further research on the subject is suggested.

Ethical Considerations

Informed consent was obtained from the patient for the publication of this article, with a commitment to protect his privacy, in accordance with the Declaration of Helsinki.

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