CASE REPORT

Phacoanaphylactic Endophthalmitis: A Rare Cause of Postoperative Intraocular Inflammation.

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Abstract
Phacoanaphylactic endophthalmitis (PE) is an uncommon and rare immune response to retained lens material after cataract surgery. This case involves a 71-year-old diabetic man who developed PE following a complicated cataract surgery with posterior capsule rupture (PCR) and retained lens fragments. The patient initially presented with mild postoperative inflammation, but eventually developed granulomatous uveitis, vitritis, and vasculitis.
The diagnosis was made based on clinical findings and intraoperative evidence of retained lens material during pars plana vitrectomy (PPV) and anterior chamber washout, which led to resolution of inflammation and improvement in vision, though anterior chamber and vitreous chamber tap were not performed. Early recognition and timely surgical intervention are crucial in managing PE, especially in diabetic patients prone to postoperative complications.

Keywords: *Cataract surgery, diabetes mellitus, lensectomy, phacoanaphylactic endophthalmitis, vitrectomy surgery.*

Introduction

Phacoanaphylactic endophthalmitis is rare autoimmune inflammatory response to lens protein that occurs under special conditions and involves an abrogation of tolerance to lens protein [1]. It most often occurs after traumatic or surgical lens injury [2]. The clinical features of PE are not easily distinguished from other forms of postoperative uveitis. [3] PE can be diagnosed clinically through a thorough history and clinical findings.[2] Diagnostic confirmation can be achieved with a needle biopsy histopathological examination or aqueous humor cytology [4]. Cytological analysis typically demonstrates a granulomatous inflammatory response characterized by macrophages, epithelioid cells, and polymorphonuclear leukocytes surrounding fragments of lens material, a finding highly suggestive of lens-induced uveitis [5].

Case presentation

A 71-year-old man with moderate non-proliferative diabetic retinopathy (NPDR) and macular oedema, previously treated with intravitreal ranibizumab, underwent left eye phacoemulsification complicated by posterior capsule rupture during fragment removal. An anterior chamber intraocular lens (ACIOL) was implanted following anterior vitrectomy. On postoperative day 7, his intraocular pressure (IOP) was elevated at 25 mmHg with corneal haze, anterior chamber cells (2+), and a small retained nuclear fragment was observed near the pupil. He was started on 4-hourly topical steroids, antibiotics, and antiglaucoma drops including oral prednisolone 40 mg (0.5 mg /kg/day) in tapering dose.

One month after cataract surgery, the patient presented with left eye redness and a curtain-like visual defect, with a visual acuity of counting fingers (CF), and not improved with pinhole. Examination revealed granulomatous anterior uveitis with mutton-fat keratic precipitates, vitreous haze, and sclerosed retinal vessels. A series of blood investigations, including full blood count, renal profile, Venereal Disease Research Laboratory (VDRL) test, antinuclear antibody (ANA), rheumatoid factor, chest X-ray, and Mantoux test, were performed to exclude infectious and autoimmune causes, all of which yielded unremarkable results. A retained lens fragment was noted behind the anterior chamber intraocular lens (ACIOL), and a diagnosis of phacoanaphylactic endophthalmitis was made. Pars plana vitrectomy (PPV), lensectomy, and anterior chamber washout were performed, revealing dense vitritis, retained nuclear material within the vitreous cavity and at the ciliary body, vitreous haemorrhage, and a retinal tear with surrounding scarring. Cryotherapy and 360-degree endolaser were applied. Postoperatively, the patient was restarted on high-dose oral corticosteroids (40 mg, 0.5 mg/kg/day) with a tapering regimen to control postoperative inflammation and prevent reactivation of immune-mediated uveitis following surgical removal of the retained lens material. On postoperative day 1 following PPV, lensectomy, and anterior chamber washout (Fig. 1A, 1B), the findings were similar to those observed preoperatively. One week later, the vision improved to 6/60 (pinhole 6/24), with resolution of anterior uveitis and keratic precipitates (Fig. 1C). Left eye funduscopic examination showed a pink optic disc, improved sclerosed vessels, and visible laser marks (Fig. 1D). This case highlights a classic course of PE with anterior and posterior segment involvement in a diabetic eye. The delayed onset, granulomatous inflammation, and retained lens material support the diagnosis. However, definitive management would require surgical removal of all lens fragments.

Discussion

Phacoanaphylactic endophthalmitis is often misdiagnosed with infectious endophthalmitis, iritis, and sympathetic ophthalmitis [6]. Diabetic patients, especially those with diabetic retinopathy, are at an increased risk of postoperative inflammation and macular oedema, which can further complicate the diagnosis and

management of phacoanaphylactic endophthalmitis. In such patients, differentiating phacoanaphylactic endophthalmitis from infectious or non-infectious uveitis is crucial to guiding appropriate treatment strategies. Diabetes mellitus causes chronic microvascular breakdown and endothelial dysfunction, which disrupts the blood-aqueous and blood-retina barriers even before surgery. As a result, during or after cataract extraction, inflammatory mediators such as prostaglandins, vascular endothelial growth factor (VEGF), and cytokines can easily penetrate intraocular tissues, amplifying the inflammatory response. This accelerated response predisposes diabetic eyes to a prolonged anterior chamber reaction and an increased risk of cystoid macular oedema (CME) in the postoperative phase [7]. The incidence of phacoanaphylactic endophthalmitis is unclear. [8] The incidence of dropped lens fragments during phacoemulsification is reported to range from 0.3% to 1.8%. With the increasing popularity of phacoemulsification for cataract surgery, the overall number of cases involving retained lens material has consequently risen [9]. Lens fragments may also be retained in the anterior or posterior chambers during seemingly uncomplicated cataract surgery [10]. Ocular inflammation can develop when there is residual cortex after cataract excision, regardless of whether the posterior capsule is intact [4].

This patient, a 71-year-old man with diabetic retinopathy, initially presented with mild anterior segment inflammation and borderline elevated intraocular pressure (IOP) following cataract surgery. The condition subsequently progressed from granulomatous anterior uveitis to panuveitis, with vitreous and retinal vascular involvement. Despite an initial response to topical steroids and anti-glaucoma medications, the persistence of inflammation led to further evaluation and surgical intervention. The presence of a retained nuclear fragment raised suspicion of a phacogenic inflammatory response. A crucial diagnostic clue was the progression to granulomatous anterior uveitis with posterior segment involvement (vasculitis and vitritis). The delayed onset of symptoms, history of a complicated surgery, and presence of retained lens material helped distinguish PE from infectious endophthalmitis, which typically presents more acutely with severe pain, hypopyon, and more fulminant inflammation. The most definitive treatment for lens-related uveitis is to remove inflammatory cells and lens fragments within the anterior chamber or vitreous by anterior chamber irrigation or vitrectomy [9]. Early diagnosis and timely treatment typically result in a positive visual outcome. Untreated chronic intraocular inflammation carries a poor prognosis due to multiple complications, including corneal oedema, endothelial damage secondary to uveitis, rubeosis iridis, secondary glaucoma, cystoid macular oedema, vitreous traction bands, retinal vasculitis, and, in severe cases, phthisis bulbi [9]. In the published case reports [2 -4, 6, 8-10], the most frequently observed presentations comprised anterior chamber inflammation accompanied by hypopyon, ocular discomfort, and diminished visual acuity, characteristics that could closely resemble infectious endophthalmitis, thus complicating the initial clinical assessment [2, 8]. This overlap frequently required meticulous diagnostic evaluation, which included anterior chamber tap or cytological analysis, to differentiate sterile phacoanaphylactic inflammation from genuine infection [3, 4]. The initial management outlined in most reports highlighted the aggressive control of intraocular inflammation through the use of topical or systemic corticosteroids, along with the reduction of intraocular pressure utilizing aqueous suppressants, aimed at minimizing structural damage and preserving visual potential [2, 3, 6]. Surgical intervention, particularly the extraction of residual or disrupted lens material, was reserved for instances where inflammation continued despite medical treatment or when retained cortical or nuclear fragments were distinctly identified [2, 9]. The outcomes reported across these cases were generally positive when recognition was prompt and both medical and

surgical interventions were implemented in a timely manner, often leading to significant visual recovery [2, 8]. In contrast, outcomes were unfavourable in cases that were delayed or unsuspected, especially those linked with long-standing retained lens material, where irreversible ocular damage and even enucleation were documented [9]. These findings highlight the critical importance of early clinical suspicion, timely differentiation from infectious endophthalmitis, and the definitive removal of antigenic lens proteins to optimize prognosis [2, 3].

Conclusion

Phacoanaphylactic endophthalmitis should be addressed if intraocular inflammation persists or worsens after cataract surgery, particularly if there are posterior capsule rupture or residual lens fragments. PE differs from infectious endophthalmitis in that it develops gradually with granulomatous uveitis, vitritis, and vasculitis rather than immediately with severe pain, hypopyon, and purulent inflammation. While corticosteroids and intraocular pressure control may be beneficial, definitive treatment frequently necessitates pars plana vitrectomy (PPV) and anterior chamber washing to remove residual lens material. Diabetic patients are at higher risk of postoperative inflammation and macular oedema, therefore early identification and appropriate care are critical to preventing vision loss.

Ethical considerations

Consent was obtained or waived by all participants in this study.

Conflicts of interest

In compliance with the ICMJE uniform disclosure form, all authors declare the following

Funding info

All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships

All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships

All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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Authors' contributions

L.K.A. was responsible for collecting the clinical information, performing the literature review, preparing the images, and drafting the manuscript. K.A.I. and Z.A.R. provided clinical guidance, critically revised the manuscript, and provided overall supervision. All authors read and approved the final manuscript.

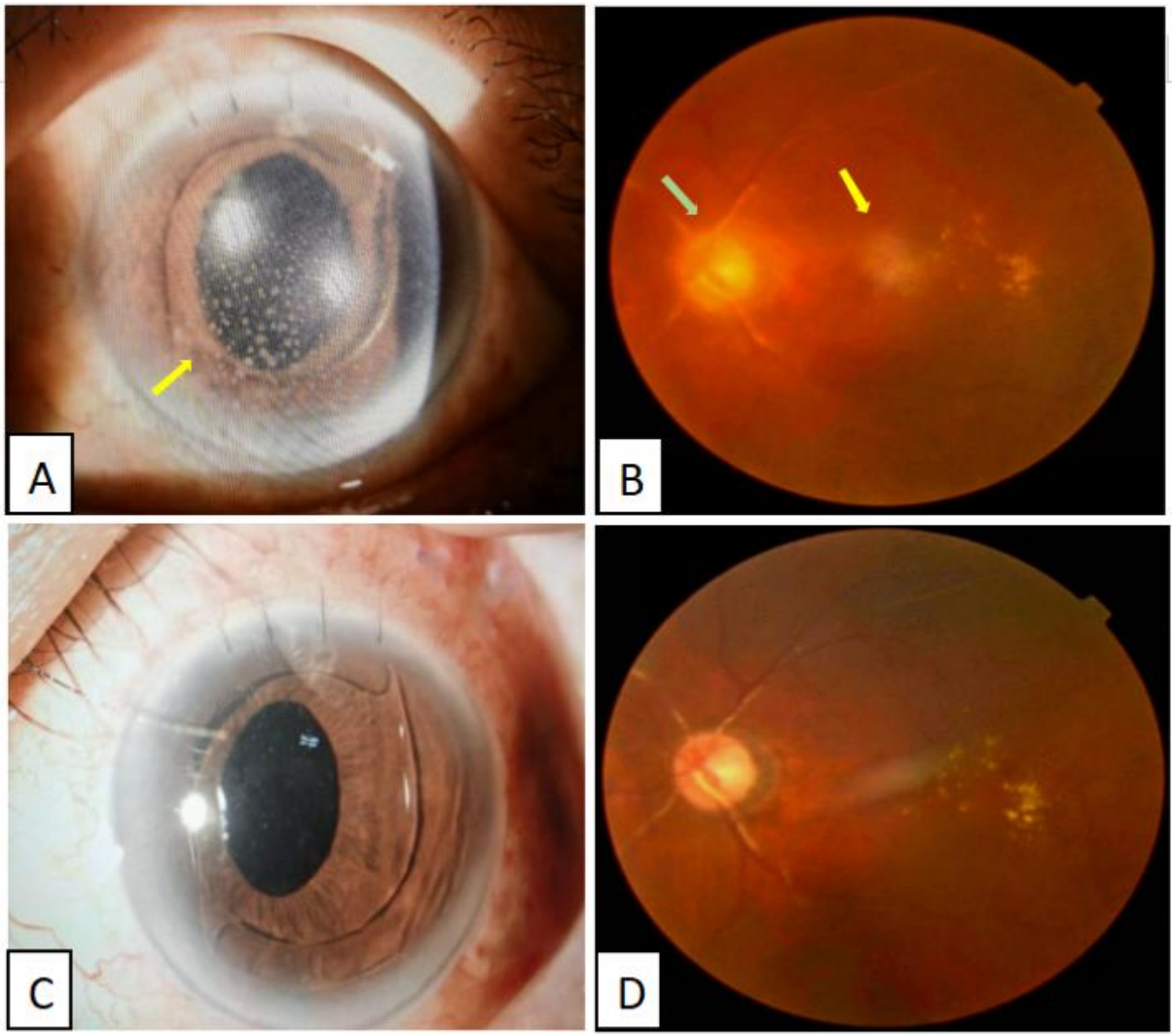

Figure 1. Multimodal images of the patient with postoperative left eye pars plana vitrectomy (PPV), lensectomy, and anterior chamber (AC) washout.
Day 1: (A) Slit-lamp photograph showing multiple keratic precipitates (yellow arrow) and corneal haze following PPV, lensectomy, and AC washout.
(B) Widefield fundus photograph demonstrating an indistinct optic disc (green arrow) with extensive exudates (yellow arrow) and diffuse retinal involvement.
Day 7: (C) Slit-lamp photograph showing improved corneal clarity with complete resolution of keratic precipitates.
(D) Widefield fundus photograph showing a clearer view of the optic disc and retinal details, indicating partial resolution of the inflammatory process.

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