CATARACT SURGERY IN A PATIENT WITH BILATERAL NECROTISING SCLERITIS AND PERIPHERAL ULCERATIVE KERATITIS ASSOCIATED WITH GRANULOMATOSIS WITH POLYANGIITIS (WEGENER’S GRANULOMATOSIS)

OPERACIJA KATARAKTE KOD PACIJENTA SA OBOSTRANIM NEKROTIZUJUĆIM SKLERITISOM I PERIFERNIM ULCEROZNIM KERATITISOM U SKLOPU GRANULOMATOZE SA POLIANGITISOM (WEGENEROVA GRANULOMATOZA)

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Cataract surgery in a patient with bilateral necrotising scleritis and peripheral ulcerative keratitis associated with granulomatosis with polyangiitis (Wegener’s granulomatosis)

Operacija katarakte kod pacijenta sa obostranim nekrotizujućim skleritisom i perifernim ulceroznim keratitisom u sklopu granulomatoze sa poliangitisom (Wegenerova granulomatoza)

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Running title: Phacoemulsification in a patient with coexisting uveitic cataract and extreme staphyloma
Abstract

Introduction. To describe a rare case of cataract surgery in a patient with an extreme, widespread anterior staphyloma following severe bilateral necrotising anterior scleritis associated with granulomatosis with polyangitis (GPA). Case report. A 61-year-old man with a history of GPA developed bilateral rapidly progressive necrotising scleritis and peripheral ulcerative keratitis (PUK). Inflammation compromised the entire anterior globe and peripheral cornea in both eyes. More than 90% of the surface area healed within 8 weeks following treatment with 3 pulsed doses of methylprednisolone in addition to cyclophosphamide treatment. Systemic steroid therapy was slowly tapered over 6 months. Extraordinary scleral loss with a uveal bulge developed following severe necrotising anterior scleritis associated with PUK. Once full remission had been achieved for 6 months, uncomplicated phacoemulsification was performed in his left eye; only the left eye was functional. Conclusion. Preoperative and postoperative control of inflammation, careful surgical planning and meticulous surgical techniques are critically important for optimal surgical outcomes. To our knowledge, phacoemulsification in a patient with coexisting uveitic cataract and severe anterior staphyloma has not been previously reported.

Key words: scleritis, peripheral ulcerative keratitis (PUK), staphyloma, cataract surgery granulomatosis with polyangitis.

Apstrakt


Ključne reči: skleritis, periferni ulcerozni keratitis (PUK), stafilom, operacija katarakte, granulomatoza sa poliangitisom.
Introduction

Granulomatosis with polyangiitis (GPA), formerly known as Wegener’s granulomatosis, is proteinase-3-ANCA-associated vasculitis with a presumed autoimmune aetiology. Necrotising scleritis is an uncommon inflammatory disorder of the sclera. This severe form of scleritis is almost always extremely painful and can lead to vision-threatening complications and visual loss. The presence of necrotising changes and inflammation of the adjacent cornea is highly suggestive of underlying systemic vasculitis, and GPA is the most common form (1). Here, we report a rare case of severe necrotising scleritis associated with peripheral ulcerative keratitis (PUK) that simultaneously occurred in both eyes of a patient with GPA. Recently, uncomplicated cataract surgery was reported in a patient with refractory GPA presented with scleral thinning; however, this was without any signs of associated inflammation or active necrosis (2). To our knowledge, here presented case is the first report of uneventful cataract surgery in a patient with extreme, widespread staphyloma following inflammation that compromised the entire anterior globe and peripheral cornea.

Case report

A 61-year-old man with a one-year history of GPA developed bilateral rapidly progressive necrotising scleritis and PUK. Acute exacerbation of ocular inflammation occurred during maintenance treatment with oral cyclophosphamide (CYP) (100 mg per day) and 3 months after the induction regimen with 6 CYP pulsed was given (1000mg monthly). The patient presented with extreme discomfort and visual loss. Upon admission, visual acuity was light perception with projection (L+P+) in the right eye and 20/200 (Snellen) in the left eye. An examination revealed white, thinned avascular areas of the sclera and conjunctiva. The area of inflammation involved the entire anterior globe and peripheral cornea of both eyes (Figures 1A and 1B). However, PUK was slightly less severe on his left eye, and a small part of the limbus was uninflamed in the upper temporal quadrant (Figure 1B). Slit-lamp biomicroscopy finding also included anterior chamber inflammation. There were no visible lentil opacities in the left eye; however, dense vitreous opacification was observed (vitritis). Fundus examination revealed no clinically significant abnormalities at the posterior pole. Progressive ocular inflammation was associated with a significant increase in serum levels of anti-proteinase-3 (anti-PR3) antibody titre, as well as inflammatory markers. Nonetheless, pulmonary and renal diseases were clinically stable.

Figure 1.
More than 90% of the surface area healed within 8 weeks following treatment with 3 pulsed doses of methylprednisolone (1000 mg per day) in addition to oral CYP. Systemic steroid therapy was slowly tapered over 6 months. During this time, the patient’s visual acuity further declined to L+P- in the right eye and L+P+ in the left eye. Although inflammation was halted in both eyes, advanced prolonged scleral necrosis associated with PUK led to vision loss in his right eye (no light perception) over a period of 12 months after disease onset. B-scan ultrasonography of the right eye revealed a large optic disc cup. Flat anterior chamber in this eye was caused by both extensive posterior synechiae that involved the entire lens surface and anterior peripheral ring-shaped iris synechiae (Figure 2). Pupillary block glaucoma and secondary angle closure may coexist in the eye as a consequence of severe anterior segment inflammation with uveitis.

![Figure 2.](image)

In the left eye, following resolution of PUK, the area of contiguous scleral necrosis developed into furrow-like corneal thinning with adjacent widespread anterior staphyloma (Figure 3). Corneal guttering extended circumferentially, leaving central corneal tissue unaffected. Mature cataract with extensive posterior iris synechiae precluded fundus examination (Figure 3D). Visual acuity in the left eye was L+P+. B-scan ultrasound showed a relatively smaller optic disc cup in the left eye than in the fellow eye. Intraocular pressure was within the normal range in both eyes (up to 21 mmHg) during the follow-up of the patient. Active inflammation may suppress ciliary body function, whereas scleral necrosis and consequent scleral thinning may lead to increased aqueous outflow and decreased pressure.
Once full remission had been achieved for 6 months, cataract surgery was performed in his left eye; only the left eye was functional. We adopted a perioperative immunomodulatory drug regimen from Foster et al. (3) that has been proposed to control inflammation when cataract surgery is performed in uveitic eyes. Oral steroid prophylaxis (0.5 mg /kg/day) was started 1 day before surgery and continued with tapering to the preoperative level over the following month (10 mg/day) while maintaining the dose of concurrent immunsuppressive therapy (CYP, 50 mg per day). In addition, topical dexamethasone 0.1% drops were frequently administered 1 day prior to surgery. Topical steroids were continued with tapering 2 months postoperatively.

Surgery was performed under topical anaesthesia using the Infiniti Vision Phaco System (Alcon, Inc.). A nearly square clear corneal incision of 2.4 mm width was made at the 10 o’clock meridian with a stainless steel keratome. Corneal incision entry was placed at the inner edge of the peripheral corneal gutter in the nasal eye quadrant corresponding to the area of less severe adjacent anterior staphyloma (Figures 3A and 4). Another 0.6 mm side incision was created in the clear cornea, nearly 90 degrees from the main incision, and the anterior chamber was expanded with a viscoelastic substance comprising sodium hyaluronate 1% (Healon, AMO, Santa Ana, California, USA). Massive posterior iris synecia were gently loosened by a conventional iris spatula. Next, additional viscoelastic substance was injected to achieve adequate mydriasis. Trypan blue was used to enhance visualisation of the anterior lens capsule. Continuous curvilinear capsulorhexis measuring approximately 5.5 mm in diameter was performed with microforceps. After hydrodissection, phacoemulsification of the nucleus was performed in torsional mode using a 0.9 mm mini/flared aspiration by-pass system (ABS; Alcon, Inc.) with a 45° Kelman tip with an ultrasleeve on an Infiniti Vision System (Alcon, Inc.). Torsional ultrasound amplitude was set at a maximum of 100% with linear control. Longitudinal phaco was off, and Intelligent Phaco was turned on. Surgery was performed with low fluidic parameters (aspiration flow rate 25 cc/min, bottle height 60 cm and vacuum 350 mm Hg). The same parameters were used for direct chopping and quadrant removal. Following unimanual aspiration of the residual cortex, a foldable hydrophilic IOL (LEDAphil IOL, Optix) was
implanted in the capsular bag with an injector through the main incision. The method for IOL implantation was strictly consistent with product manuals. Additional 10-0 nylon interrupted sutures were placed along the corneal guttering to provide adequate wound closure (Figure 4). Following cataract surgery, visual acuity slightly improved from L+P+ to 20/400 (Snellen). Fundus examination revealed untreatable findings, including a pale, atrophic optic disc and retinal gliosis.

Figure 4.

The patient underwent regular clinical, serological, and immunologic examinations for disease activity and extent, as well as for treatment-related side effects. Serum anti-PR3 antibody titres and inflammatory markers were within the normal range before cataract surgery and during the 1-year follow-up after cataract surgery. Two years after the initial presentation and one year following cataract surgery, the patient remained in remission with an uncorrected visual acuity of 20/400. The mechanisms contributing to vision loss in the right eye and restricted vision in his left eye most likely included vascular occlusion and inflammatory destruction of the retina and optic nerve, as well as retinal findings related to the underlying GPA disease associated with prolonged inflammation, loss of structural tissue and secondary glaucoma.

Discussion

The management of GPA-associated PUK is challenging and lacks definitive guidelines. Rituximab and CYP, either alone or in combination with other agents, are the most successful agents in controlling inflammation (1). In our patient, the introduction of high-dose pulsed methylprednisolone in addition to maintenance doses of prednisone and increased oral CYP treatment arrested bilateral necrotising scleritis and PUK with generalised GPA associated with ophthalmic inflammation refractory to CYP induction regimen.

Presence of long-standing anterior uveitis associated with severe scleral tissue necrosis as well as chronic corticosteroid usage may lead to the formation of a cataract. Uneventful cataract extraction or any other surgical procedure can precipitate necrotising scleritis in patients with an underlying autoimmune vasculitic systemic disease (4, 5). Therefore, surgery should be attempted only in the absence of scleral inflammation and during remission of systemic disease.

Although the diagnostic value of a positive PR-3 ANCA (c-ANCA) for GPA is well established, the usefulness of measuring ANCA titres in assessing disease activity and guiding therapy is somewhat controversial. In one study of 20 patients with refractory ophthalmic GPA, disease relapse seemed to be predicted by rising anti-PR3 titres (6). However, this finding was not confirmed in another similar study on ocular GPA (7).
Nevertheless, since increases in ANCA occur in some patients prior to relapse, serial measurement of the cANCA titre was performed in our patient. Serum anti-PR3 antibody titres were within the normal range before cataract surgery and during the follow-up period after cataract surgery, which lasted 12 months.

Successful surgery generally requires a quiet eye devoid of active inflammation for at least 3 months (1). In our patient, phacoemulsification was performed 6 months after full remission of ocular disease activity had been achieved. Preoperative addition or increase in systemic therapy, mainly corticosteroids, seems to be mandatory in eyes at risk of developing disease recurrence, such as necrotising scleritis or PUK. In a study by O’Donoghue (8), patients who had recovered from SINS and required further ocular surgical procedures were given perioperative pulsed methylprednisolone to protect against the recurrence of necrotising disease. Here, we demonstrated that standard perioperative oral steroid prophylaxis that is currently proposed to control inflammation for cataract surgery in uveitic eyes was also sufficient to prevent SINS.

Phacoemulsification using a clear corneal approach is generally preferred in patients in remission from PUK (1). O’Donoghue et al. (8) showed that surgically induced necrotising scleritis usually occurred after cataract surgery and that the disease site was closely related to the wound site; 80% of these sites were limbal. This finding suggests that greater relative vascular disruption associated with the limbal approach may be a contributing factor in scleral disease development (8). Dick et al. (9) also demonstrated that compared to surgery through a sclerocorneal incision, cataract extraction through a clear corneal incision results in less inflammation in the immediate postoperative period. Generally, we make a clear corneal incision temporally. Here, a clear corneal incision was rotated to the nasal eye quadrant. In this area, the adjacent anterior staphyloma was slightly less severe than the extreme scleral thinning in both superior and temporal eye quadrants (Figures 3B and 3C). A corneal incision was made on the corneal guttering; thus, single corneal sutures with 10-0 nylon were required to ensure adequate wound closure (Figure 4). Interestingly, although necrotising scleritis after ocular surgery has been described in patients after cataract surgery via a corneal incision, O’Donoghue and coauthors found that sutures used to close the wound had entered the sclera (8).

To increase the safety of cataract surgery, reduce trauma to the surrounding tissue, and particularly to avoid rupture of the ciliary staphyloma, we combined lower fluidic parameters and a low bottle height with a torsional ultrasound setting. For uncomplicated cataract surgery, we generally prefer to use higher fluidic parameters, such as flow rate 35 cc/min, bottle height 100 cm, and vacuum limit 550 mmHg. Vasada et al. (10) evaluated the impact of different flow rates on corneal thickness (CCT), anterior segment inflammation, and endothelial cell density (ECD) using longitudinal ultrasound. These authors found that compared with high flow parameters, lower aspiration flow rates resulted in a reduced rate of increased CCT in the initial week after surgery and decreased anterior segment inflammation. Another important benefit of low aspiration flow rates and low bottle height is lower intraoperative IOP associated with these parameters (10,11). Although relevant in all eyes, this benefit is particularly important in eyes with glaucoma or other vascular compromise (10), as well as in patients with extensive anterior staphyloma.
In conclusion, phacoemulsification can be successfully performed in a patient with coexisting uveitic cataract and staphyloma of the entire anterior globe following necrotising scleritis with PUK. Preoperative and postoperative control of inflammation, careful surgical planning and meticulous surgical techniques are critically important for optimal surgical outcomes. The final visual outcome depends on the posterior segment complications of necrotising scleritis associated with GPA.

FIGURE LEGENDS

Figure 1. Clinical pictures of the right (A) and left eye (B) showing severe bilateral necrotising scleritis associated with PUK. Inflammation affected the entire anterior hemisphere of the sclera and peripheral cornea, leaving a central corneal island uninvolved in both eyes.
Slightly less severe PUK on his left eye with a small part of the unaffected limbus (asterisk) in the upper temporal quadrant (Figure 1B).

Figure 2. Slitlamp examination of the patient’s right eye showing flat anterior chamber (arrow) associated with corneal scaring following resolution of a severe anterior segment inflammation.

Figure 3. Clinical photograph of the patient’s left eye, examined in daylight, showing the extensive area of anterior staphyloma and an inactive corneal gutter (arrow) following resolution of a severe sclerokeratitis episode (A). Clinical pictures of the upper scleral hemisphere of the left eye (B) and temporal scleral region in the same eye (C). Of note is the extraordinary degree of scleral loss with a uveal bulge (arrows). This uvea is covered by remaining scleral fibres and a thin layer of conjunctival epithelium only (B and C). Slit-lamp examination showing uveitic cataract with extensive posterior synechiae (D).

Figure 4. Slit-lamp examination of the patient’s left eye one week after uneventful cataract surgery. A clear corneal incision was made in the nasal eye quadrant at the edge of the remaining central corneal island (arrow).

REFERENCES

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