Case Report

Posterior Scleritis Mimicking Orbital Cellulitis: A Report of the Three Cases

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Objective: To report on three cases of posterior scleritis presenting as orbital cellulitis.

Case Report: The authors retrospectively reviewed the medical records of three patients who were diagnosed as posterior scleritis but initially presented as orbital cellulitis. All patients were young males who presented with pain, unilateral proptosis, eyelid swelling with redness, and limitation of ocular movement. Initially, the diagnosis of orbital cellulitis was suspected and patients had been treated with systemic antibiotics but with no clinical improvement. Systemic work-up for infections and autoimmune diseases were negative. The orbital computed tomography (CT) scans showed severe posterior eyewall thickening with associated soft tissue edema. Ultrasonography showed a typical T-sign, compatible with posterior scleritis. Specific cause of scleritis or an association with systemic disease was not established. Systemic corticosteroids (1 mg per kg per day) were administered, and all patients improved within several days.

Conclusion: Posterior scleritis is a rare and severe ocular inflammatory disorder that can mimic orbital cellulitis. Early detection and prompt treatment is crucial.

Keywords: Posterior scleritis, Orbital cellulitis, Non-specific orbital inflammation, Orbital computed tomography scan, T-sign ultrasonography

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Scleritis is a rare, sight-threatening inflammation of the sclera and can be divided into two broad categories, anterior and posterior scleritis. Posterior scleritis refers to the inflammation of the sclera posterior to the ora serrate, which can be caused by infection, inflammatory diseases, or idiopathic[1]. Patient with posterior scleritis usually presents with acute vision loss, pain on eye movement, and the presence of exudative retinal detachment and choroidal effusion. However, due to its posterior location, clinical presentation of posterior scleritis can be subtle, variable, and may resemble to diverse ocular and orbital disorders. This can lead to misdiagnosis[1-4]. In the present report, although rarely, the three cases presented with signs and symptoms resembling orbital cellulitis. The timely recognition of posterior scleritis is crucial as the early treatment may prevent visual loss and improve severe pain in this condition.

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Case Report

Between 2015 and 2020, the authors have been treating three newly diagnosed posterior scleritis patients that initially presented as the orbital cellulitis. After receiving an ethical approval from the Chiang Mai University Ethical Committee (EXEMPTION-5964/2561), the medical records were retrospectively reviewed. Demographic data, clinical presentation, and disease progression were collected and discussed. All three patients were young Thai males without any history of trauma, surgery, or any risk for orbital cellulitis.

Case 1

A 15-year-old male presented with lid swelling and redness of his right eye for two weeks. Initial

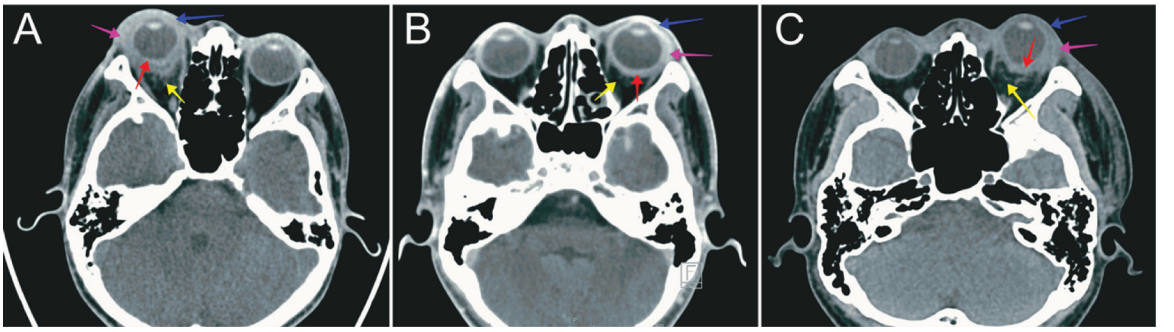

Figure 1. Orbital computed tomography scans show posterior eyewall thickening (red arrow), periocular soft tissue swelling (blue arrow), intraconal fat stranding (yellow arrow) and lacrimal gland swelling (magenta arrow) in each patient. A: case 1 (right eye); B: case 2 (left eye); C: case 3 (left eye). Anterior eyewall thickening was also noticed in case 1 and 3.

visual acuities were 6/24, 6/6. Anterior segment examination showed marked conjunctival chemosis with limited ocular movement upon upgaze. No relative afferent pupillary defect (RAPD) was noticed. Anterior chamber showed 3+ cells. Fundus examination revealed dilated and tortuous retinal vessels and marked disc swelling in the right eye. The initial diagnosis of orbital cellulitis was made. He was treated with intravenous ceftriaxone 2 g daily and clindamycin 600 mg every eight hours for three days, then oral amoxycillin clavulanate (625 mg) three times per day for one more week. However, no clinical improvement was noticed. Computed tomography (CT) scan showed thickening of posterior eyewall with pre- and post-septal tissue swelling (Figure 1A). Optic nerve enhancement, mild enlargement of lacrimal gland and diffuse enlargement with homogenous enhancement of lateral rectus muscle were also noticed. Ultrasonography showed thickening of posterior sclera with T-sign, compatible with posterior scleritis. Oral prednisolone 1 mg per kg per day and topical prednisolone acetate four times per day were started, together with intravenous amoxicillin clavulanate 1,200 mg every eight hours for three days. A significant clinical improvement was detected on the following day after starting oral prednisolone. His vision returned to 6/6 within one week with marked improvement on ocular examination. Oral prednisolone was gradually tapered 5 mg every two weeks. Amoxycillin clavulanate was switched to oral form and discontinued after two weeks. Mild disc swelling persisted during three years of follow up without significant defect in visual field.

Case 2

A 19-year-old male presented with blurred vision, lid swelling and redness, conjunctival chemosis and marked proptosis of his left eye for ten days. Initial visual acuities were 6/6, 6/18. Positive RAPD and limitation of medial gaze on the left eye were noticed. Fundus showed mild disc swelling. The initial diagnosis was orbital cellulitis, intravenous amoxicillin clavulanate 1,200 mg every eight hours was given for two days. Because of a lack of clinical improvement, CT scan was done and showed thickening and enhancement of the left posterior eyewall, optic nerve enhancement, intraconal fat stranding, and lacrimal gland and pre-septal tissue swelling (Figure 1B). Ultrasonography showed thickening of posterior sclera with T-sign, compatible with posterior scleritis. The treatment was switched to intravenous methylprednisolone (IVMP) 1 g per day and a single dose of clindamycin 600 mg. There was significant clinical improvement on the next day following the IVMP injection. Oral prednisolone 1 mg per kg per day was given after three days of IVMP and gradually tapered 5 to 10 mg every two weeks. His vision returned to 6/9 within one week and 6/6 in one month. However, there were recurrences of the inflammation twice in the first year of treatment. IVMP 1 g per day for three days followed by oral prednisolone 1 mg per kg per day with additional methotrexate 15 mg per week were given. The inflammation was controlled and oral prednisolone could be gradually tapered.

Case 3

A 20-year-old male presented with blurred vision, lid swelling and redness in his left eye for one week. Initial visual acuities were 6/6, hand motion. Anterior segment examination showed marked conjunctival chemosis, 2+ cells in anterior chamber, limitation of eye movement in all directions (Figure 2, Panel A), and positive RAPD on the left eye. Fundus examination

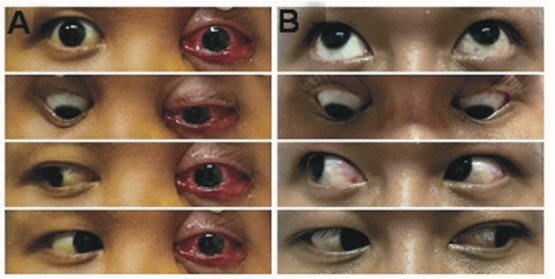

Figure 2. Panel A. Photographs show left proptosis, chemosis and limitation of ocular movement in all direction at the initial presentation in case 3; Panel B. Clinical improvement was noted within one month after systemic corticosteroids.

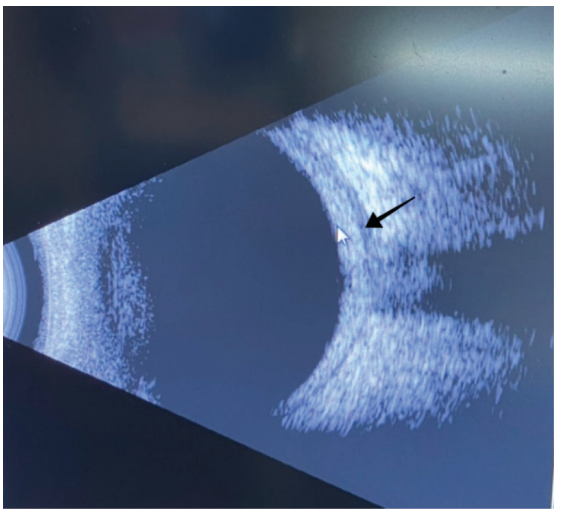

Figure 3. Ultrasonography shows scleral thickening (white arrow) with fluid collecting in the posterior episcleral space extending around optic nerve (black arrow) or T-sign in case 3.

revealed 1+ cells in vitreous, chorioretinal fold and diffuse disc swelling. The initial diagnosis was orbital cellulitis. He was treated with intravenous ceftazidime 1 g every eight hours and vancomycin 1 g every 12 hours for three days, but no clinical improvement. CT scan was done and showed marked posterior eyewall thickening, intraconal fat stranding, lacrimal gland and pre-septal soft tissue swelling (Figure 1C). Ultrasonography demonstrated scleral thickening with T-sign (Figure 3), compatible with posterior scleritis. IVMP 1 g daily was given for three day, followed by oral prednisolone 1 mg per kg per day. Topical prednisolone acetate 4 times per day were also administered. Proptosis, ocular inflammation, and visual acuity improved in the next two days after IVMP treatment. His vision returned to 6/9 with full range of ocular movement in one month with residual small chorioretinal fold and vitreous cells (Figure 2, Panel B). However, there were three recurrences of inflammation in the first and second year of treatment. Each time, IVMP 1 g per day for three days followed by oral prednisolone 1 mg per kg per day with additional cyclophosphamide 100 mg per day and mycophenolate 2,000 mg per day were added. His vision returned to 6/6 in four months. The inflammation was controlled, and oral prednisolone could be gradually tapered.

The clinical and laboratory examinations of all three patients are illustrated in Table 1.

Discussion

The authors reported that posterior scleritis can be misdiagnosed as orbital cellulitis. The present patients exhibited similar characteristics where all patients were young males who presented with unilateral proptosis, eye movement abnormalities, and optic disc swelling. The condition was not improved with systemic antibiotic therapy but improved significantly with systemic corticosteroids. Lastly, besides the soft tissue swelling and fat trapping, all CT scans showed obvious posterior eye wall thickening, which is not encountered in orbital cellulitis.

In the past decades, two case reports on posterior scleritis mimicking orbital cellulitis were published from England and Australia[5,6]. Both patients were elderly females with mildly decreased vision and rapidly responded to systemic corticosteroids, without additional immunosuppressive treatment, which is contrary to the present report. All the authors' patients were younger age and male gender, which may contribute to more severe clinical presentation, multiple recurrences, and additional treatment of immunosuppressive agents. A study of posterior scleritis in children from Singapore indicated similar features, including male predilection, Asian ethnicity, absence of infections or inflammatory disease, and beneficial response to corticosteroids with some additional immunosuppressive therapy[7]. These imply that the disease activity of posterior scleritis of unknown origin that manifest in young Asian males is likely to be more aggressive.

The exact etiology of posterior scleritis in the authors' series remains undetermined. According to previous reports, posterior scleritis may be considered as a clinical spectrum of anterior non-specific orbital inflammation (NSOI)[8]. However, the present cases exhibited a posterior scleral thickening with intraocular inflammation. This convinced us that

Table 1. Clinical presentations and treatment outcomes of three Thai males with posterior scleritis mimicking orbital cellulitis

Case	Age (year)	Initial VA	Ocular movement	Hertel measurement in right and left eyes (mm)	RAPD	Anterior scleritis	Posterior segment abnormalities	Laboratory examinations*	Initial treatment	Computed tomography finding (affected eye)	Outcome	Follow-up (month)	Final VA
1	15	6/24	Limited on upgaze	18, 15	Negative	Yes, with 3+ anterior chamber cell	Disc swelling, dilated and tortuous vessels, no vitreous cell	Unremarkable	Oral prednisolone, IV amoxicillin clavulanate and topical prednisolone acetate	Periocular soft tissue swelling, intraconal fat stranding, thickening of posterior eyewall, enhancement of the intraorbital optic nerve and mild swelling of lacrimal gland	Controlled without any steroids or immunosuppressive drug	36	6/6
2	19	6/18	Limited on medial gaze	15, 18	Positive	No	Mild disc swelling, no vitreous cell	Unremarkable	IV amoxycillin clavulanate, clindamycin and IVMP	Periocular soft tissue swelling, intraconal fat stranding, thickening of posterior eyewall, enhancement of the intraorbital optic nerve and swelling of lacrimal gland	Recurrent twice then, controlled with methotrexate and gradually tapered oral prednisolone	24	6/6
3	20	HM	Limited on all direction	15, 19	Positive	Yes, with 2+ anterior chamber cell	Disc swelling, chorioretinal fold and 1+ vitreous cell	Leukocytosis of 16,500 cell/mm^3	IV ceftazidime vancomycin, IVMP and topical prednisolone acetate	Periocular soft tissue swelling, intraconal fat stranding, marked thickening of eye wall, enhancement of the intraorbital optic nerve and swelling of lacrimal gland	Three recurrences but controlled with cyclophosphamide and mycophenolate and gradually tapered oral prednisolone	18	6/6

VA=visual acuity; HM=hand motion; RAPD=relative afferent pupillary defect; IV=intravenous; IVMP=intravenous methylprednisolone

* Investigations included: erythrocyte sedimentation rate, C-reactive protein, complete blood count, urine analysis, blood urea nitrogen, creatinine, electrolyte, liver function tests, rheumatoid factor, antinuclear antibody, cytoplasmic-antineutrophil cytoplasmic antibody, perinuclear-antineutrophil cytoplasmic antibody, human immunodeficiency virus antibody, tuberculin skin test, toxoplasma immunoglobulins, stool exam for parasite, venereal disease research laboratory test, treponema pallidum hemagglutination, and chest X-ray

the sclera was a primary inflammatory location, not the extraocular tissue. The authors agree with the previous hypothesis that the inflammation had spread anteriorly, involving anterior sclera, lids, and orbit, resulting the clinical manifestation mimicking orbital cellulitis[6].

Although the gold standard in diagnosing posterior scleritis is based on ultrasonogram, and the value of CT was believed to be limited, in the present cases, a CT scan is considered an investigation of choice as it was more informative to make the diagnosis and to exclude life-threatening conditions such as orbital celluliti or malignancy[9,10]. Thus, the authors emphasize the role of CT scan as a diagnostic tool for the atypical posterior scleritis. However, due to the cost-effectiveness, the role of CT scan for follow-up or ensure the remission of the disease is likely to be limited.

Due to the low prevalence and variable presentation, the diagnosis of posterior scleritis is challenging. The eyewall thickening on CT is a key leading to correct diagnosis of posterior scleritis when masked by signs of orbital cellulitis.

Conclusion

Posterior scleritis is a rare and severe ocular inflammatory disorder that can mimic the orbital cellulitis. Early detection and prompt treatment are crucial.

What is already known in this topic?

According to the low prevalence and atypical presentation, the diagnosis of posterior scleritis is based on clinical presentation, radiological finding, and suspicion of the physician. The presence of T-sign in ultrasonography is a gold standard but the diagnosis may be delayed due to lack of ultrasound machine in some hospital or misdiagnosed as another disease initially.

What this study adds?

With the availability of CT scan and its importance as a diagnosing tool in orbital condition, the presence of eyewall thickening in CT scan could be another diagnostic finding in posterior scleritis.

Patient perspective

"I felt painful and double vision in my left eye. The eye is also protruded. The doctor also told me that I have atypical presentation of the disease. However, I felt much better after receiving medication. My eyes returned to normal and vision came back."

Conflicts of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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