# GNZ Case 1 2023

**Learning Objectives:**

- Recognise the presenting symptoms and clinical signs of Posner Schlossman Syndrome (PSS)
- Formulate a list of differential diagnoses with reasons for exclusion
- Become familiar with the aetiology and epidemiology of PSS
- Describe the management strategies for patients with PSS
- Explain the long-term prognosis for patients with PSS

**Case Presentation:**

A 42 year-old male presents acutely to your practice with a sore right eye (described as a mild ache). He has noted that over the past day or so the vision in the right eye is more blurred than normal, but he is still able to perform his day-to-day activities. His partner has pointed out that his right eye has looked a bit red and suggested he goes to see his optometrist.

His previous ocular history includes a couple of similar episodes in the past (unsure of timepoints), but he did not see anyone for an assessment at these times because the pain stopped and his vision went back to normal after a few days to a week. He is not sure but thinks that both previous episodes may have also affected his right eye. He has no history of ocular injury or surgery, and has never been prescribed eye drops. He has glasses he wears as needed for distance and near (prescribed overseas) but has not seen an optometrist in over five years.

He reports good general health, and his only current medication is escitalopram for anxiety. He has a family history of wet age-related macular degeneration (mother) but no known history of glaucoma or other eye disease.

Initial examination findings are below:

| | **Right Eye** | **Left Eye** |
|---|---|---|
| **Aided distance vision** | 6/7.5-2 | 6/4.8 |
| **Pinhole visual acuity** | No improvement | N/A |
| **Refraction** | +1.00/-2.00 x 091 | +0.75/-1.25 x 083 |
| **Colour Vision (Ishihara Plates)** | 14/14 | 14/14 |
| **Pupils** | No RAPD. RE sluggish response. | |
| **IOP (Goldmann at 10:45 am)** | 49 mmHg | 16 mmHg |
| **Slit-lamp examination** | Grade 1 diffuse conjunctival injection. Mild corneal stromal haze, with trace inferior faint white keratic precipitates on corneal endothelium. Van Herick 1.0. Grade 1+ cells in anterior chamber. Vitreous quiet. | Ocular media clear, anterior chamber deep and quiet |
| **Corneal Pachymetry** | 602 μm | 573 μm |

| | | |
|---|---|---|
| **Gonioscopy** | Open angles (Schafer grade 4 all quadrants), with moderately pigmented trabecular meshwork. No peripheral anterior synechiae. | Open angles (Schafer grade 4 all quadrants), with moderately pigmented trabecular meshwork. |
| **Fundus examination** | See optic nerve photo (Figure 1a). Macula clear. Peripheral retina clear and flat | See optic nerve photo (Figure 1b). Macula clear. Peripheral retina clear and flat |
| **Visual Fields** | See visual fields (Figures 2a and 2b) | |
| **OCT** | See RNFL analysis (Figure 3) and GCC scan (Figure 4) | |

**Question 1: Describe the baseline optic nerve appearance, visual fields and OCTs.**

**Answer 1:**

The optic nerve photographs show an average size optic nerve (although the L ONH is slightly larger than the R). Cupping is moderately deep, and the cup-to-disc ratio is approximately 0.7 in the right and 0.6 in the left. There is some thinning of the rim superior-temporally in the right eye, and no focal thinning of the neuroretinal rim in the left (although the superior-temporal region is borderline). There is some mild pallor of the temporal rim in the right eye, but this was less evident clinically. Blood vessels appear healthy and there is no optic disc haemorrhage.

SITA-Standard 24-2 Humphrey visual fields show reliable tests in both eyes. In the RE there is an early inferior arcuate relative scotoma, although the mean deviation is only -0.24 dB. In the left eye, there are a few points inferior nasal that are very mildly reduced relative to age-normal, but mean deviation and pattern standard deviation are within normal limits. Both eyes have glaucoma hemifield tests 'outside normal limits'. The early inferior defect in the RE is in keeping with the superior rim thinning noted on optic nerve head examination.

Both the RNFL and GCC scans are of high signal strength, with no artefacts and show accurate segmentation of the retinal layers. The RE RNFL scan confirms thinning of the superior-temporal RNFL, and reduced neuroretinal rim thickness in this sector. There is also temporal rim thinning and RNFL loss, particularly at the 9 and 10 o'clock positions. The LE has some mild superior-temporal and temporal rim and RNFL loss. There is significant asymmetry, with average RNFL thickness in 71 μm in the RE and 85 μm in the LE.

GCC analysis shows marked thinning in the superior sectors in the RE and more mild thinning inferiorly. Again, this is consistent with the clinical and visual field findings. In the left eye there is mild superior thinning and borderline inferior nasal thinning of the GCC.

**Answer 1 ends**

**Question 2: What are your differential diagnoses?**

**Answer 2:**

| Condition | Comment (1) |
|---|---|
| **Glaucomatocyclitic Crisis (Posner Schlossman Syndrome (PSS))** | History and clinical findings consistent with PSS, including patient symptoms of blurred vision and a red, uncomfortable eye. There is unilateral elevated IOP and mild anterior chamber inflammation and corneal oedema. Anterior chamber angles are open. There is evidence of early glaucomatous optic neuropathy in the RE>LE. |
| **Acute angle-closure glaucoma (AACG)** | Although patients with AACG can present with similarly elevated IOP, corneal oedema and anterior chamber inflammation, there is no evidence of angle closure on gonioscopy in this patient. Our patient does not have a fixed, dilated pupil and the pain is mild rather than severe. There is no accompanying nausea or vomiting. |
| **Uveitic Glaucoma** | There are features of uveitic glaucoma that overlap with PSS. Generally, in patients with uveitic glaucoma, the inflammation is more likely to be more chronic and severe. It may be possible to differentiate between the two clinically, although in some cases aqueous or serological testing is required. |
| **Chronic angle closure glaucoma** | As above, there is no evidence of angle closure or peripheral anterior synechiae on gonioscopy. |
| **Fuchs' heterochromic iridocyclitis** | Our patient does not have iris heterochromia or iris atrophy. In Fuchs', patients are often asymptomatic, but do have low grade anterior chamber inflammation. Posterior subcapsular cataract is common in Fuchs'. Treatment with corticosteroids is generally not effective in Fuchs' heterochromic iridocyclitis. |
| **Primary Open Angle Glaucoma (POAG) and ocular hypertension (OHT)** | Patients with POAG and OHT have consistently elevated IOP. There is no anterior chamber inflammation in POAG or OHT. Patients with POAG are more likely to be older. |
| **Herpetic Iridocyclitis (both HSV and VZV)** | In herpetic iridocyclitis, the IOP may not be elevated as significantly, and either sectoral or diffuse iris atrophy may be present, alongside a more severe anterior chamber inflammatory reaction. Patients may also have a history of a vesicular rash and dendritic ulcers. |

**Answer 2 ends**

**Question 3: What is the typical presentation of a patient with Posner Schlossman syndrome?**

**Answer 3:**

Glaucomatocyclitic crisis, also known as Posner Schlossman syndrome (PSS), was first described in 1948. The characteristic features of PSS are recurrent attacks of unilateral significantly elevated IOP associated with mild, non-granulomatous anterior uveitis (2). Although the attacks are unilateral, around 50% of patients will have involvement of the fellow eye at some point during the course of the disease (2). PSS is a clinical diagnosis.

Patient symptoms at presentation include:

- Blurred vision in one eye (vision is generally only mildly blurred)
- Ocular discomfort in the affected eye
- Haloes around lights
- Mild redness in the affected eye (may be present or absent)

Clinical signs of PSS include:

- Significantly elevated IOP (generally over 40 mmHg) – This elevation in IOP precedes inflammatory signs and can persist for hours to weeks if untreated
- Mild anterior chamber cells
- Fine white keratic precipitates
- Mild corneal oedema
- Minimal conjunctival injection
- Mydriasis
- Open angle and an absence of peripheral anterior synechiae on gonioscopy
- Glaucomatous optic neuropathy may or may not be present, depending on the patient's clinical course

**Answer 3 ends**

**Question 4: What is the aetiology of Posner Schlossman syndrome?**

**Answer 4:**

The exact aetiology of PSS is unknown. It is thought that a combination of infection, injury and autoimmune factors can all contribute to the development of PSS.

A number of infectious organisms have been described in PSS case studies, but the largest body of literature supports cytomegalovirus (CMV) as the leading infectious cause of PSS (1). CMV is an ubiquitous infection and the anterior chamber is a prominent site of involvement in the immune-competent eye. In a Singapore study of 48 patients undergoing aqueous biopsy, 37.5% tested positive for CMV DNA on PCR testing. Tested patients had presented with a variety of uveitic conditions, including PSS, but 75% of the positive biopsies were in PSS patients. Other studies have found positive aqueous CMV tests for between 26 and 71% of patients with PSS, although the prevalence tends to differ based on geographical location.

A Korean study found that *helicobacter pylori* infection was more common in patients with PSS (3), although the link between a systemic disease and a unilateral ophthalmic condition has not been elucidated.

**Answer 4 ends**

**Question 5: What is the epidemiology of Posner Schlossman syndrome?**

**Answer 5:**

PSS is a rare condition, generally affecting young to middle-aged patients (usually between 20 and 50 years). It more frequently affects males. Without treatment, PSS will usually spontaneously resolve within days to weeks. There is limited literature on the prevalence and incidence of PSS. One population study from Finland found that the incidence of PSS was 0.4/100,000 and the prevalence was 1.9/100,000 (4).

**Answer 5 ends**

**Question 6: How is Posner Schlossman syndrome managed?**

**Answer 6:**

There are two aims in the management of PSS: controlling the IOP and decreasing the inflammation. First-line agents include topical beta-blockers (eg. timolol), alpha-agonists (eg. brimonidine), and carbonic anhydrase inhibitors (eg. dorzolamide). Patients require long-term ongoing management due to the potential for chronic IOP elevation (2).

In addition to lowering IOP, inflammation also needs to be managed with topical corticosteroids, such as prednisolone acetate 1% QID. Anti-inflammatories should be used while there is active inflammation, and not prophylactically (2). Miotics (eg. Pilocarpine) should not be used in the treatment of PSS as they may exacerbate possible trabeculitis.

Due to the significantly elevated IOP this patient was referred the same day for ophthalmological assessment. Although prostaglandin analogues effectively lower IOP, they are generally not indicated as first line treatment in PSS due to their pro-inflammatory properties. This patient was treated with a combination of topical and oral therapies: Topical combination brimonidine 0.2% + timolol 0.5% twice a day in the right eye only, and oral acetazolamide 500 mg twice daily. To control inflammation, the patient was instructed to instil one drop of prednisolone acetate 1% four times a day in the right eye.

The patient was reviewed the next day and IOP had dropped to 18 mmHg. Mild anterior chamber inflammation was still present. Acetazolamide was reduced to 250 mg twice daily, and a review for 1 week later was arranged. At the follow-up, IOP was 12 mmHg in the RE and there was no evidence of anterior chamber inflammation. Diamox was discontinued but the patient was advised to continue taking combination brimonidine + timolol. Prednisolone acetate was tapered by one drop per week

over three weeks. At the one month review, IOP on topical antihypertensives was 16 mmHg in the right eye, and the anterior chamber was quiet. Due to evidence of disc damage, and the possibility of further attacks, the patient was advised to continue brimonidine + timolol. He tolerated the eye drop well and did not show signs of allergy.

**Answer 6 ends**

**Question 7: What is the long-term prognosis for patients with Posner Schlossman syndrome?**

**Answer 7:**

Patients with PSS may continue to have recurrent attacks of elevated IOP (1). As symptoms can be relatively mild, patients may not immediately seek treatment. Once a diagnosis has been made, patients should be instructed to present to their optometrist/ophthalmologist promptly if symptoms recur.

Glaucomatous optic neuropathy at presentation has been reported to be observed in up to 45% of patients with PSS. Our patient had evidence of early glaucoma at the initial examination, as well as a history supporting previous episodes.

As would be expected, increasing disease duration is associated with an increased likelihood of glaucoma (5). Patients with higher peak untreated IOP, poorer mean deviation scores on visual field testing and lower baseline RNFL thickness have been found to be more likely to need glaucoma surgery (6). However, age of onset, and the number of previous attacks has not been found to be predictive of glaucoma progression.

In one study, 17% of patients required glaucoma filtration surgery, and this was more common in patients with CMV-positive disease.

**Answer 7 ends**

**Question 8: Are there any useful ancillary tests in Posner Schlossman syndrome?**

**Answer 8:**

All patients should have visual field testing, optical coherence tomography and optic disc photographs at baseline. Iris angiography, not routinely available, can demonstrate localised iris ischaemia during an acute attack. Optic nerve topography and flowmetry (used in research settings) can show changes in disc morphology and blood flow during attacks, compared with pre- or post-IOP elevation.

Corneal confocal microscopy has also been investigated in PSS and found higher levels of Langerhans cells compared with HLAB27 positive anterior uveitis and acute primary angle closure, but similar corneal inflammatory findings to patients with herpes simplex keratitis (7). It is unlikely that confocal microscopy of the cornea would be useful in the routine clinical diagnosis or management of PSS.

OCT-Angiography of the macular and peripapillary circulation of patients with PSS has been studied, with patients imaged at the time of presentation and one week post-treatment (when IOP was under control) (8). Although there was an average reduction in IOP of 26 mmHg, there was no significant difference in any of the macular or peripapillary OCT-A measures pre- and post-treatment.

**Answer 8 ends**

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The patient moves overseas and is lost to follow-up. When he returns to New Zealand three years later, he comes back to see you for another assessment. When asked, he mentions that his adherence to his eye drop routine has been poor and there have been long periods of time that he did not take his ocular medication. He thinks he has had two to three more episodes of PSS during this time, all affecting the right eye. At the time of his visit he is not on any medication, but his eyes feel comfortable and his vision is 6/4.8 in each eye with glasses. His IOP is 21 mmHg in the RE and 14 mmHg in the left.

Please review his optic disc photos (Figures 5a and 5b), visual fields (Figures 6a and 6b), RNFL OCT (Figure 7) and GCC OCT (Figure 8).

**Question 9: Describe the findings from the patient's most recent examination.**

**Answer 9:**

Compared with baseline optic disc photos, there does not appear to be a clinically significant difference, with no obvious change in cup-to-disc ratio, rim width or blood vessel appearance. There is no optic disc haemorrhage.

At follow-up, visual field testing was performed with the SITA-Faster 24-2 C algorithm, which tests an additional 10 points centrally (within the central 10 degrees from fixation). It is not possible to directly compare between the 24-2 SITA Standard and SITA Faster tests. The right eye test is reliable, and shows an early arcuate defect inferiorly, similar to baseline assessment. The glaucoma hemifield test is outside normal limits. The left eye test is unreliable due to 50% fixation losses. The test is within normal limits across all parameters.

OCT scans are of excellent quality. RNFL OCT assessment shows that the global average RNFL thickness is now 67 µm (previously 71 µm) in the RE, showing a downward trend, but more tests would be needed to confirm true progression. There is a similar pattern of RNFL and rim thinning in the superior and temporal sectors in the RE. The LE average RNFL thickness is 87 µm (previously 85 µm), indicating a stable test. GCC parameters appear stable compared with previous.

**Answer 9 ends**

**Question 10: How would you continue to manage this patient?**

**Answer 10:**

Overall, there is evidence that glaucomatous optic neuropathy in the RE may be continuing to slowly progress. This could be due to repeated attacks of PSS in the prior three years. There is also asymmetric IOP, with the RE 50% higher than the LE. As the patient had previously responded well to combination brimonidine + timolol therapy, the decision was made to re-start these eye drops twice a day in the RE only. Review was arranged for 6 weeks later to confirm a response to therapy.

The importance of compliance was reiterated, and the patient was advised to present to the practice immediately if he noticed symptoms of another attack.

**Answer 10 ends**

**Required Reading (some of the MCQs relate to this paper):**

- Megaw R, Agarwal PK. Posner-Schlossman syndrome. [Review]. Survey of Ophthalmology. 2017;62(3):277-85.

**References:**


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7. Hong Y, Wang M, Wu L. In vivo Confocal Microscopy of Posner-Schlossman Syndrome: Comparison with herpes simplex keratitis, HLA-B27 anterior uveitis and acute attack of primary angle closure. Scientific Reports. 2017;7(1).
8. Liu D, Fan C, Zhang E, Yang J, Zhang Y, Jiang J. Evaluation of Macular and Peripapillary Blood Flow in Response to Intraocular Pressure Reduction in Patients With Posner-Schlossman Syndrome. Frontiers in Physiology. 2022;13.