

## Summary

A 31-year-old female with a stable left cranial nerve IV palsy was successfully fit in a custom soft contact lens with vertical prism for occupational purposes.

## Case Presentation

### Case History

A 31-year-old female presented with complaints of sudden onset vertical diplopia in April 2018. She regularly takes oral birth control, as well as Adderall XR 30 mg/day for anxiety and depression. Previous medications include Lamotrigine, Buspirone, and Effexor XR. She had no history of trauma, and all other ocular and medical history was unremarkable.

### Pertinent Findings

**Best Correct Visual Acuities:** 20/20 OD, OS and OU

**Pupils:** PERRL, no APD OD and OS

**EOMs:** Mild restriction down and to the right

Diplopia noted in right gaze, greatest in down gaze

No pain

**Cover Test:** 6Δ left hypertropia

**Maddox Rod:**

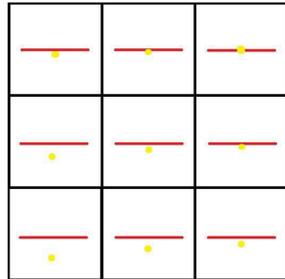


Image 1. Illustration of assessment of ocular alignment with a Maddox rod over the right eye.

**Vertical Vergence Ranges:** WNL

**Visual Fields:** Full OD, OS

**Anterior Segment:** Unremarkable

**Posterior Segment:** Optic nerves have distinct margins and good color with C/Ds of 0.2 round OD and OS. Maculas are flat with positive foveal light reflex.

The patient was diagnosed with a cranial nerve IV (superior oblique) palsy. An MRI was ordered to rule out a space occupying lesion.

### At Follow-Up

The 6Δ left hypertropia remained stable since the initial visit. Due to unremarkable MRI findings, she was prescribed Valtrex 1000 mg TID for 10 days to rule out a herpetic cause. A 4Δ base down (BD) Fresnel prism was applied to her glasses on her left lens. Upon follow-up, a viral etiology was ruled out due to lack of improvement after finishing a course of antivirals, and she was referred to a neuro-ophthalmologist for further evaluation but no underlying cause was established.

## Management

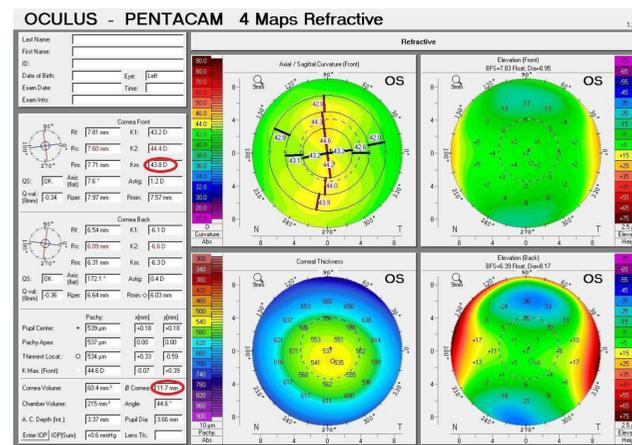


Image 2. Topography of left eye.

**Ks:** 43.20 D/ 44.40 D @ 97.6°

**Horizontal Visible Iris Diameter (HVID):** 11.7 mm

The patient's diplopia remained well controlled with a 4Δ BD Fresnel prism; however, her occupation requires her to work with children and she prefers to have contact lenses for this purpose.

The right eye was fit with a Coopervision Proclear soft contact lens and a custom soft contact lens was ordered from SpecialEyes for the left eye with the following parameters: 8.2 mm base curve/ 14.70 mm diameter/ 4Δ prism. An evaluation of her ocular alignment through these contact lenses revealed 1.50Δ BD of uncorrected hypertropia, which is comparable to her glasses.

When the patient returned for a contact lens follow-up visit, she reported good control of her diplopia; however, she noted mild discomfort due to the thickness of the left lens. The contact lens prescription was finalized and 4Δ BD prism was ground into the left lens of her glasses.

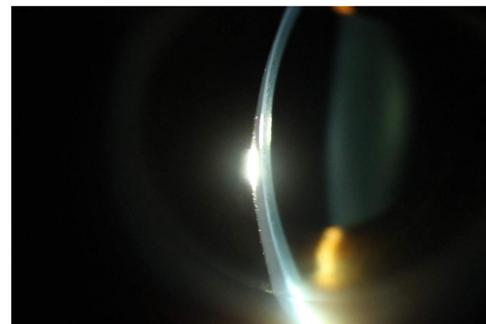


Image 3. Soft contact lens with prism in left eye.

## References

1. Bagheri N, Wajda BN, eds. The Wills Eye Manual. 7th ed. Philadelphia, PA: Wolters Kluwer; 2017.
2. Pisapia R, Rianda A, Mariano A, Testa A, Galgani S, Abdeddaim A, Olivia A, Narciso P. Varicella zoster virus infection presenting as isolated diplopia: a case report. *BMC Infectious Diseases*. 2013;13:138.
3. Tamhankar MA, Ying GS, Volpe NJ. Success of prisms in the management of diplopia due to fourth nerve palsy. *J Neuroophthalmol*. 2011;31(3):206-9.

## Discussion

### Diagnosis of Cranial Nerve IV Palsies

**Differential Diagnosis:** Myasthenia Gravis, Thyroid eye disease, Idiopathic orbital inflammatory syndrome, orbital fracture, incomplete third nerve palsy, Brown syndrome, Giant Cell Arteritis (GCA)

When a patient presents with an acquired vertical deviation, performing the Parks-Bielschowsky three step test can isolate the responsible cranial nerve. Vertical vergence ranges should also be evaluated to differentiate between an acquired palsy, which would reveal a normal vergence range, and a congenital palsy. This procedure was followed and a superior oblique palsy was identified as the cause of this patient's diplopia. CN IV palsy patients most often present with restriction of EOMs when looking down and in and hypertropia of the involved eye, resulting in complaints of diplopia. The patient may also exhibit a head tilt towards the contralateral shoulder to eliminate diplopia.

While the majority of fourth nerve palsies are congenital, there are a variety of etiologies for an acquired palsy, the most common of which is trauma. Other etiologies to be ruled out include vascular infarcts, demyelinating disease, tumor, hydrocephalus, aneurysms, and giant cell arteritis. Viral causes, such as the varicella zoster virus, have also been implicated in some cases and should be investigated even when there is no skin rash present.

### Diplopia Control

If an etiology is determined, the underlying cause of the CN IV palsy should be treated. However, if no cause can be established, the diplopia must be controlled. Prism in spectacles should be considered as initial therapy, with a high success rate in managing the patient's symptoms. While determining stability, Fresnel prisms can be applied as a temporary management option. If the diplopia resolves or the deviation changes, the Fresnel prism can be removed and/or changed as necessary.

Another option for diplopia control that is not often employed is the use of contact lenses. Patients with small vertical deviations are still candidates for contact lens wear. The same amount of prism in the patient's spectacles should be ordered in the contact lens for comparable results. The contact lens with the prism is to be worn on the eye with the hyper deviation as gravity will only allow a BD prism to remain stable on the eyes. Lens awareness due to the thickness of this contact lens is expected, and the patient should be made aware of this; however, comfortable contact lens wear with good control of diplopia is attainable.

## Conclusion

- Patients with vertical imbalance should not be overlooked as potential contact lens wearers.
- Custom soft contact lenses can be ordered for these patients with good outcomes.
- For small deviations, scleral lenses with prism may also be alternatives for these patients should they experience discomfort from the thickness of soft contact lenses.