Managing a Case of Hypotropia With a Positive Traction Test

Participants: David Robbins Tien, MD; Daniel T. Weaver, MD

Wagner: Following repair of a left orbital floor and medial floor fracture, a 25-year-old woman had hypoglobus with a 25-prism diopter hypotropia and 20-prism diopter exotropia in primary gaze in her affected left eye (Fig. 1). She initially had visual loss from the accident, which left her with counting fingers visual acuity due to retinal damage. She has a larger hypotropia and can elevate well in right gaze but is unable to elevate the left eye in the adducted position. An orbital computed tomography scan shows a repaired floor fracture with no entrapment of the inferior rectus muscle and there is a poor view medially. You can't determine the position of the muscles or see what's going on superiorly in the adducted position, but there was a lot of trauma in that area. She wants to improve her strabismus and the oculoplastic surgeon wants to see if we can get her eye to align better before proceeding with any more corrective plastic surgery. What would be your initial approach to this patient?

Weaver: When I see a patient like this, I want to know the structural status of the orbit. So I always look at the coronal and axial computed tomography scans for entrapments. This patient could have some lower eyelid retraction and the globe could be retropulsed when she is looking up. It would be nice if we could do forced duction testing in the office and see how much restriction there is versus neurogenic change. I also would like to know how much enophthalmos there is because that can accentuate the ptosis.

Wagner: Have you had much success doing forced duction testing on patients in the office?

Weaver: It depends on the patient and on their motivation. With a patient like this it may not be particularly helpful.

Wagner: Dr. Tien, what would your initial approach be for this patient?

Tien: Assuming that the oculoplastic surgeon's work is completed and he doesn't think he has anything else to offer, I'd try to address the strabismus. In terms of doing forced duction testing in the office, an adult should be able to give you a lot of information prior to surgery. She may have a restrictive hypotropia much worse in adduction, similar to an anti-elevation syndrome. The computed tomography scan did not show whether the inferior oblique was injured?

Wagner: You couldn't tell from the scan. There didn't appear to be entrapment.

Tien: It looks like she can elevate much better when the eye is abducted, which makes me wonder if the inferior oblique is affected. But looking at the upper eyelid, the injury obviously extends to the upper part of the orbit.

Wagner: She also had a medial fracture. We didn't have a definite plan for surgery because we weren't sure what we were going to find on examination. She was brought to the operating room, forced duction testing was performed, and there was a restricted forced duction to elevation in the adducted position. The eye could...
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elevate in abduction but not in adduction. What would your next step be?

**Weaver:** As Dr. Tien said, at that point I would be concerned about oblique involvement, certainly with the different restriction in adduction versus abduction. I also like to talk to the patient about the eyelid position. Was there any eyelid retraction when the patient looked down?

**Wagner:** Not particularly.

**Weaver:** So the eyelid position wasn’t particularly bothersome to her, it was mostly just the position of the eye?

**Wagner:** Yes.

**Weaver:** Sometimes by palpation you can feel a tight superior oblique tendon across the top of the globe. I think if you can get the patient straight horizontally, sometimes the hypotropia is less bothersome. So I would probably explore the lateral rectus muscle and correct 25 to 30 prism diopters of exotropia. I will recess that muscle. I will also try to decide which muscle is most restricted. If she’s looking up maximally and there’s no inferior rectus entrapment on the scan, I might end up doing a superior oblique tenotomy or tenectomy if the tightness is confined to the upper inner quadrant.

**Tien:** Because this is a patient who has poor vision, we’re not so concerned about diplopia or her fusional status, but rather the alignment. I would also look at the lateral rectus, assuming I’m going to want to recess it, and that will offer the chance to look at the inferior oblique to make sure there’s nothing unusual about its position or its anatomy. Certainly if there is restriction to elevation in adduction, weakening the superior oblique tendon if it’s tight would make sense. If the superior oblique is completely normal and you don’t think a tenotomy will improve much, you might consider an inferior oblique strengthening procedure. I’ve never done one so I can’t say it’s something that would come to mind right away, but I wonder if it might help the eye go up. But the more standard approach would be to try to loosen the superior oblique.

**Weaver:** I have seen one inferior oblique strengthening procedure performed with Joe Calhoun as a fellow. That’s the only time I’ve ever seen it done and it worked beautifully.

**Wagner:** I think these are the types of cases in which it’s important to point out to the patients and family that you don’t know what you’re going to find in the area where the fracture occurred and you may not be able to do anything if it’s restricted or tight. I’ve seen some cases where there’s been invasion of the orbital fat that caused adhesion and the patient wasn’t able to move the eye.

In this case, I did the exact approach that you recommended. We approached the superior oblique via a superior limbal incision, hooked the superior rectus muscle as you normally would, and found the superior oblique to be extremely tight. I’ve seen cases with superior oblique palsy and I remember remarking to the resident that sometimes they’re floppy and you can tell it’s paretic and therefore they need a tendon

*Figure 1.* (A) Left hypotropia in primary gaze. (B) Poor elevation of left eye in up gaze. (C) Increased left hypotropia in gaze up and to the right.
tuck to be done. In a case like this, it was so tight that it was difficult to get a hook under it. Once I got a hook under it, I wasn’t worried about inducing torsional diplopia because she had poor vision. So we did a tenectomy and it immediately created forced duction. At the same time, for the reasons you both mentioned, I recessed the lateral rectus muscle. It relieved the hypotropia and improved the exotropia. Had there been negative forced ductions, I think the approach you mentioned might have been useful.

Weaver: Was there scarring superiorly?

Wagner: It just was a tight band and I think the tightness was probably occurring closer to the trochlea and you really couldn’t get at it.

Tien: If you found the forced ductions to be normal, another approach to correct the hypotropia might be to recess the lateral rectus and resect the medial and then do a large superior placement of both tendons to bring the eye up. I’ve found that to be helpful in some cases of sensory exotropia where there’s also a vertical component and I’m doing two horizontal muscles for the exotropia.

Wagner: This case was interesting because of the unusual findings and I think it illustrates that you have to be prepared for the unexpected.

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