Our case demonstrates that laser treatment of retinoschisis may be associated with retinal detachment due to the development of outer retinal layer defects.

David L. Johnson, MD  
Juan C. Nieto, MD  
Michael S. Ip, MD

Correspondence: Dr Johnson, Palmetto Retina Center, 124 Sunset Ct, West Columbia, SC 29169 (dljohnsonmd@gmail.com).

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Rectus Pulley Instability as a Cause of Y-pattern Exotropia Revealed by Magnetic Resonance Imaging

Y-pattern exotropia is a rare condition that cannot be corrected by conventional surgical methods used for V-pattern deviation. It has been proposed that lateral rectus (LR) muscle co-contraction during elevation causes Y-pattern exotropia. However, the precise mechanism is still not known. This article describes a patient with Y-pattern exotropia with pulley instability as revealed by magnetic resonance imaging (MRI). The patient’s condition was improved through rectus muscle transposition.

Report of a Case. An 8-year-old girl had exodeviation during upgaze since age 1 year. She did not have diplopia and had no history of strabismus surgery. She had orthophoria in primary position and downgaze. In upgaze, she had 40 prism dipters (PD) of exotropia at distance and at near. She showed no hyperdeviation in horizontal side gaze but had paradoxical abduction of the normally adducting eye in supraduction (Figure 1A).

High-resolution T1-weighted MRI was performed with a 1.5-T Sigma scanner (GE Healthcare, Milwaukee, Wisconsin). We used a 7.6-cm round surface coil to improve the signal to noise ratio. For obtaining a multipositional MRI, the scanned eye was occluded and the contralateral eye was fixing on the targets at 30° from primary position that were attached to the inside of the scanner magnet. Contiguous MRIs of the 9 cardinal positions of gaze were obtained in the quasi-coronal plane transverse to the axis of each orbit, at 2-mm thickness with a 256 × 192 matrix over a 10-cm² field of view. Digital MRIs were analyzed using the ImageJ program (http://rsbweb.nih.gov/ij/index.html). Analysis of the pulley position was performed as previously described. The pulley position was estimated as the area centroid 10 mm posterior to the globe center; this was compared with the normal range of the pulley position as reported in our previous study.

![Figure 1. Preoperative photographs of the 9 cardinal positions show 40 prism dipters of Y-pattern exotropia (A), and postoperative photographs of the 9 cardinal positions show improvement in Y-pattern exotropia (B).](image-url)
The positions of 4 rectus pulleys of both eyes were normal in primary position. The position of the right lateral rectus (LR) pulley was displaced downward in attempted abduction, supraducted adduction, and supraducted abduction. The position of the right superior rectus (SR) pulley was displaced laterally in attempted supraduction, supraducted adduction, and supraducted abduction (Figure 2). Thus, the patient showed instability of the right LR and SR pulleys in attempted supraduction and abduction. There was no significant displacement of all rectus pulley positions of the left eye in attempted supraducted abduction (C) compared with central gaze (D). MR indicates medial rectus; IR, inferior rectus. Diagram of the 4 rectus pulley positions 10 mm posterior to the globe center in central gaze (CG) and secondary gaze in the right (E) and left (F) eyes. The normal range for the location of the rectus pulleys lies in the wedge-shaped area between the dashed lines (black lines indicate SR; blue lines, LR; red lines, IR; and green lines, MR), with the distance from the orbital anteroposterior axis noted on the vertical and horizontal axes in centimeters. E, In the right eye, note the downward displacement of the LR pulley in attempted abduction (AB), supraducted adduction (SAD), and supraducted abduction (SAB) and the lateral displacement of the SR pulley in attempted supraduction (SUP), SAD, and SAB. F, In the left eye, no significant rectus pulley displacement was seen in any position of gaze. AD indicates adduction.

Comment. A previous study proposed that LR co-contraction during elevation might be the cause of Y-pattern exotropia and stated that LR supralacement is an effective treatment. As the functional origins of extraocular muscles, pulleys have important effects on extraocular muscle action. Pulley instability changes the innate pulling direction of the extraocular muscle. Oh et al reported that pulley instability occurs in some cases of incomitant strabismus. We revealed LR and SR pulley instability in Y-pattern exotropia using high-resolution MRI and then performed LR and SR transposition for the correction of this exotropia.

We suggest that temporal slippage of the SR in upgaze would cause an abducting vector and that inferior slippage of the LR in abduction would cause a depressing vector, resulting in fixation duress to the contralateral inferior oblique muscle. Therefore, the stabilization of pulley positions results in the improvement of Y-pattern strabismus during upgaze. In conclusion, we believe that the pulley instability manifested in our patient is one of the causes of Y-pattern exotropia.

Hwan Heo, MD
Seung Hyun Lee, MD
Kyung Chul Yoon, MD
Yeoung Geol Park, MD
Sang Woo Park, MD
The February 2008 article on sialidosis (mucolipidosis type 1) correctly states that a characteristic duo of clinical findings (cherry-red spot in the macula as well as haze in the corneal stroma) occurs in this storage disease, combining the individual clinical signs that characterize other storage disorders; specifically, the sphingolipid storage diseases (typically, cherry-red spot) and the mucopolysaccharide storage diseases (typically, corneal haze).

Corneal haziness was not described in the February publication, but, as the original article describing sialidosis showed, stromal haze is integral to the syndrome, just as macular cherry-red spot is. The mildness of the corneal haze results in its easily being overlooked in sialidosis. It would be of interest to know, therefore, if the case of sialidosis reported in the first reference did or did not have subtle haziness of the corneal stroma in addition to the obvious cherry-red spot in the macula.

Morton F. Goldberg, MD

Correspondence: Dr Goldberg, 727 Maumenee Bldg, The Wilmer Ophthalmological Institute, 600 N Wolfe St, Baltimore, MD 21287-9278 (mgoldbrg@jhmi.edu).

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In a well-written summary of results from the Endophthalmitis Vitrectomy Study (EVS), Doft states that the study found that systemic antibiotic administration does not provide benefit. It should be noted that Pavan and Brinser first demonstrated this fact clinically, and this led, over time, to a reduction in the delivery of antibiotics by this route. The EVS study, a multicenter effort, and its lead author deserve full credit for their seminal contribution, which greatly extends our knowledge in the diagnosis and treatment of bacterial endophthalmitis.

Jules L. Baum, MD

Correspondence: Dr Baum, Tufts University School of Medicine, 81 Maugus Ave, Wellesley Hills, MA 02481 (julesbaum@verizon.net).

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We thank Dr Baum for his kind comments. The EVS investigators also applaud the many workers, including Dr Pavan et al, who laid the foundation on which the study was built. Knowledge sprouts from seeds previously planted, and so it goes for the future!

Bernard H. Doft, MD

Correspondence: Dr Doft, Chair, the Endophthalmitis Vitrectomy Study, 3501 Forbes Ave, Pittsburgh, PA 15213.

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