# Complications of Lateral Rectus Myopexy

Strabismus Society Meeting Auckland 2017

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# Spectrum of Lateral Rectus Heterotopy

 Abnormally positioned or directed lateral recti (demonstrated radiologically or intraoperatively) can cause or contribute to strabismus, including alphabet pattern strabismus.<sup>1</sup>

Congenital LR Heterotopy	Acquired LR Heterotopy
<ul> <li>Isolated LR Heterotopy:         <ul> <li>Normal orbits</li> <li>No other extraocular muscle heterotopy</li> <li>Not syndromic/No Craniosynostosis</li> </ul> </li> </ul>	<ul> <li>Heavy Eye syndrome:</li> <li>High Myopia</li> </ul>
<ul> <li>LR heterotopy with rotated orbits</li> <li>+/- Heterotopy of other Extraocular muscles</li> <li>Not Syndromic/No Craniosynostosis</li> </ul>	<ul> <li>Sagging Eye Syndrome         <ul> <li>Disruption of LR-SR Band</li> <li>[*Heavy Eye and Sagging Eye can co-exist in same patient]</li> </ul> </li> </ul>
• LR Heterotopy as a feature of Syndromic features/Craniosynostosis/Plagiocephaly (or from it's corrective surgery eg: Frontal Orbital Advancement)	<ul> <li>latrogenic with inferior or superior transposition of lateral recti during strabismus surgery</li> </ul>

<sup>1</sup> Demer JL, Clark RA, Kono R, Wright W, Velez F, Rosenbaum AL. A 12-year, prospective study of extraocular muscle imaging in complex strabismus. J AAPOS 2002; 6(6): 337–347.

<sup>2</sup> Tan KP, Sargent MA, Poskitt KJ, Lyons CJ. Ocular overelevation in adduction in craniosynostosis: is it the result of excyclorotation of the extraocular muscles? J AAPOS 2005; 9(6): 550–557.

<sup>3</sup> Chaudhuri Z, Demer JL. Sagging eye syndrome: Connective tissue involution as a cause of horizontal and vertical strabismus in older patients. JAMA Ophthalmology 2013;131(5): 619–625.

<sup>4</sup> Tan RJ, Demer, JL. Heavy eye syndrome versus sagging eye syndrome in high myopia. J AAPOS 2015; 19(6): 500–506

# Example s



**Excyclorotated Orbits** 

Incyclorotated Right Orbit

# Examples



Heavy Eye Syndrome

Sagging Eye Syndrome

# Surgical correction of an inferiorly displaced lateral rectus with equatorial myopexy



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Volume 20 Number 5 / October 2016

#### Complications associated with equatorial myopexy of the lateral rectus

2 cases

# <u>Case 1</u>

- 9 year old girl
- Best corrected visual acuity: 6/9 OU
- Refraction: OD -3.00 x 180 and OS +0.50/-1.50 x 165

#### Past history:

- V-pattern exotropia operated elsewhere at age 7.
  - 5 mm bilateral lateral rectus recessions
  - bilateral inferior oblique recessions

#### **Presenting Complaints:**

- Persistent V-pattern exotropia.
  - Distance exotropia:  $25\Delta$
  - Near exotropia: 30Δ
  - V-pattern of  $18\Delta$





LR Inferiorly displaced OU with Nasal displacement of IR

# Case 1: Surgery

### • Intra-operative findings:

- Lateral recti were found recessed 13.5 mm from the limbus
- Infero-temporally directed posterior muscle path.

### • Surgery done:

- Equatorial myopexy was performed on both lateral recti
  - Superior one-fourth of each lateral rectus was hitched to the sclera 5 mm superiorly with 6-0 Mersilene, 5 mm behind the new (recessed) insertion.
- Both medial recti were resected 5.5 mm with 6-0 Vicryl.

# Case 1: Post-op

#### At 2 weeks:

- $2\Delta$  exotropia for distance
- Developed **new** Right Hypertropia of 5∆, diplopia, and limitation of depression of her right eye.

#### <u>Re-surgery done at 4 weeks for diplopia:</u>

- Left LR myopexy suture had come undone; Right one was preserved.
- FDT: Resistance to depression of the Right eye.
- The right myopexy suture was also removed; FDT: No further resistance to depression

# Case 1: Post-op

#### At Final follow-up:

- Distance: 8∆ exotropia
- Near: 12∆ exotropia
- No diplopia

# Case 1 conclusion

- Equatorial myopexy done for infero-temporally directed lateral rectus muscle paths in a patient in whom the lateral rectus has already been recessed can cause induced vertical strabismus if one of the sutures comes undone.
- It can also cause limitation of depression of the eye with resistance to forced duction.
- It may be anticipated that unilateral or asymmetrical equatorial myopexy can be expected to sometimes cause these problems, though we are not aware of any such reports

# <u>Case 2</u>

• 71 year old lady

#### Presenting complaints and examination findings:

- Diplopia
- Acquired left esotropia
  - Distance:  $14\Delta$
  - Near: orthotropia

# Case Z -MRI

Left Eye Sagging LR with Disruption of LR-SR Band

# Case 2: Surgery

#### **Surgery done:**

- Equatorial myopexy of the left LR
  - 6-0 Mersilene, 8 mm behind the insertion, to a meridian at the level of the upper pole of the lateral rectus insertion.
- 3 mm left medial rectus recession with adjustable sutures

#### Post – Op 3 months:

- Developed a recurrent distance-only esotropia: 16  $\Delta$ 
  - Persistent uncrossed diplopia.
  - She also had 0.75D of induced astigmatism post-operatively that eventually resolved.

Case 2: Re- Surgery

#### **Intra-operative findings:**

 The lateral rectus muscle fibres posterior to the myopexy had been pulled up to the myopexy as expected. Sloping antero-inferiorly from the myopexy to the insertion was thinned muscle and tendon tightly 'glued' to the sclera.



# Case 2: Re-Surgery



- Red Arrow: Myopexy Suture
- White Arrow: Healthy Muscle Fibres posterior to Myopexy Suture
- Black Dots: Thinned, Abnormal Glued muscle anterior to the myopexy suture

#### **Muscular Structural Changes Following Fadenoperation**

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ultrastructural findings observed in an experimental animal model of the fadenoperation. Grossly, muscular fibrosis and musculo-scleral adhesions were well established after the second postoperative month. Histologic findings demonstrated the development of a granulomatous, foreign on around the musculo-scleral fixation suture,

in certain types of ptosis, and finally, as a complement i the rehabilitation of special types of eccentric fixations.13 This surgical technique has become very popular, mainly Since its original description by Cuppers and associates, the fadenoperation has been considered a harmless sur-

gical technique, relatively free of complications.3,5-7 Many authors consider the fadenoperation as an easily reversible technique, it being possible to achieve this by taking out the retroequatorial fixation suture of the muscle, after which

myoscleropexy is used widely in Europe but very little in the Americas. Proponents insist that it is reversible, but we do not agree. We have reoperated on some patients who had undergone this operation, and we found the muscle inserted on the sclera at the site of the sutures and adhered to the sclera from that point to the normal insertion site.

## Case 2

#### ABSTRACT

The authors describe the macroscopic, histological, and ultrastructural findings observed in an experimental animal model of the fadenoperation. Grossly, muscular fibrosis and musculo-scleral adhesions were well established after the second postoperative month. Histologic findings demonstrated the development of a granulomatous, foreign body reaction around the musculo-scleral fixation suture, collagenization of the muscle tissue from the first postoperative month and degenerative phenomena in the muscle fibers. Electron transmission microscopic study showed atrophy and angulation with distortion of the myofibrillar matrix, along with alteration of the Z bands of muscle fibers, mitochondrial alteration, and dilatation of the sarcotubular system. All these experimental findings suggest the relative irreversible effects of the fadenoperation after the early postoperative period and for the first time, demonstrated that this surgical technique alters the muscle structure.

1. Alio JL, Chacon M, Faci A, et al. Muscular structural changes following faden operation. J POS 1984; 21(3): 102– 109.

2. Prieto-Díaz J, Souza Dias C. Strabismus. 4<sup>th</sup> ed: Butterworth-Heinemann; 2000: page 476

Case 2: Re- Surgery

#### **Surgery done:**

• Left MR muscle was re-recessed 3 mm on an adjustable, and this improved her esotropia.

#### Post-op followup:

- At 1 month: Orthotropic with no diplopia.
- At 3 months:
  - Primary position ET:  $6\Delta$
  - Left Gaze ET 18 Δ,
  - Right Gaze: XT 8Δ

# **Case 2 conclusion**

- Myopexy can alter the integrity of the muscle and tendon anterior to it causing it to be irreversibly 'glued' to the sclera, interfering with it's action by producing an unplanned effective recession of the muscle to the point of the myopexy.
- This change in muscle anterior to the suture has been described previously in Faden.

1. Alio JL, Chacon M, Faci A, et al. Muscular structural changes following faden operation. J POS 1984; 21(3): 102–109.

2. Prieto-Díaz J, Souza Dias C. Strabismus. 4<sup>th</sup> ed: Butterworth-Heinemann; 2000: page 476

# Thank You