

Slipped, Lost and Torn Extraocular Muscles

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Historical

- 1839 - Diefenbach reports the use of complete tenotomy of the medial rectus to cure esotropia
- 1965 - Knapp reports 8 cases of slipped and lost muscles
- 1970's - Metz, Apt, Rosenbaum, Bloom and Parks report on their experience with slipped and lost muscles

Etiology of the Detached EOM

- Iatrogenic
 - Slipped inside muscle capsule - “*SLIP*”
 - Lost after detachment at insertion - “*SNIP*”
 - Torn away from insertion - “*SNAP*” or “*PITS*”
- Traumatic
 - Torn
 - At insertion
 - Away from insertion

Slipped EOM

- Muscle apparently secured to globe at the end of surgery
 - Adjustable sutures
- Good immediate post-operative alignment for a few hours
- Progressive incomitant strabismus
 - Large over- or under-corrections
 - Limited eye movement in one direction
 - Widening of lid fissure in field of limited duction

Slipped Left Medial Rectus Muscle

Management of Slipped EOM

- Capsule attached to globe
- Belly slipped into capsule 5-6 mm behind intended insertion
- Muscle relatively easy to retrieve and to reattach
- Good surgical outcome, especially if recognized and treated promptly

Important Anatomical Facts

- Superior, inferior and lateral rectus muscles have intermuscular septal attachments to the oblique muscles
 - Attachments aid in retrieval of muscle
- Medial rectus only muscle that can retract completely if lost or torn

Lost EOM

- Muscle detached at insertion
- Becomes separated from suture and clamp
- Belly retracts back to entry of muscle through Tenon's capsule
- Difficult to retrieve at time of surgery

Management of Lost EOM

- Respect fascial planes to avoid fat adherence syndrome
- Attach fascia/muscle to the globe
- Recess ipsilateral antagonist
- Muscle transposition procedure
 - Same setting
 - Later

Locating the Lost EOM

- Computed tomography
- Cine- MRI
- Using the oculo-cardiac reflex
 - Withhold atropine
- Use the operating microscope
- Two assistants
- Malleable retractors
- Search along orbital wall

Torn EOM

- Iatrogenic
 - Strabismus surgery
 - Orbital Surgery
 - Vitreoretinal surgery
- No undue traction on muscle
- Underlying muscle pathology
- Prior muscle surgery or Botox injection

Case 1 - Torn Inferior Oblique

- 78 year-old lady
- Chronic Right SO palsy
- Left Head tilt
- 30 LHT
- Attempted Right IO recession
- Muscle torn without undue traction
- Procedure converted to IO myectomy
- Proximal stump submitted for histopathological evaluation
- Excellent post-operative clinical course

Case 2 - Torn Inferior Rectus

- 73 year-old lady
- Traumatic RD OS sparing macula and with inferior break
- Scleral buckling planned
- RIR torn without undue traction 15 mm posterior to insertion
- Attempted retrieval
- Sutured capsule and ?muscle
- Transposed RIO to RIR
- PPV
- Retina reattached
- Intermittent diplopia with good functional results

Case 3 - Torn LIR

- Trauma
- Torn inferior rectus
- Explored
- No globe laceration
- No treatment
- No significant motor deficit

Management of Torn EOM

- Capsular attachment at end of insertion may allow retrieval of proximal end of muscle
- Suture ends of muscle or capsule
- Muscle transposition
 - Verticals for horizontals
 - IO for IR

Preventing Tear of EOM

- Older patients
 - Degenerative and aging changes in muscles
- Patients with prior surgery
 - Shortened stiff muscles
- Prior Botox injections
- Systemic disease

Lost Muscles - Results

Slipped Muscles - Results

Torn Muscles - Results

Preventing Slippage and Loss of EOMs

- Keep in mind as possible complication
- Central bite and knot in recession
- Central bite in resection
- Double knots in resection
- Double sutures in resection

- Care in placement and removal of clamp
- Small careful bites in detachment of EOM