Successful surgical management of sixth nerve palsy by transposition of a previously snapped and retrieved inferior rectus muscle

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Abstract

Purpose: To report a case of intraoperative rupture of inferior rectus muscle, which was retrieved and later successfully transposed for management of sixth nerve palsy.

Methods: Case report.

Results: A 36-year-old woman presented with traumatic right sixth nerve palsy and esotropia following a car accident five years earlier. During the originally planned vertical transposition surgery, the inferior rectus muscle snapped, but was retrieved and resutured to the sclera 3 mm posterior to the original insertion. After a few months, the second attempt of transposition of vertical recti (including the previously snapped and reattached inferior rectus) was successful, and the patient achieved satisfactory postoperative alignment.

Conclusions: Intraoperative rupture of an extraocular muscles is a rare and serious complication encountered during strabismus surgery. However, if successfully retrieved, this muscle has still the chance of future re-operation.

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Keywords: Sixth nerve palsy; Snapped muscle; Vertical transposition

Introduction

Intraoperative rupture of extraocular muscles is a rare, challenging complication of strabismus surgery. Although it may occur in normal subjects without known risk factors, there are several conditions associated with higher risk of snapped muscle. The most common predisposing factors are previous ocular surgery, cranial nerve palsies, and advanced age. A patient with traumatic sixth nerve palsy who had intraoperative rupture of inferior rectus that was retrieved and repaired and later successfully transposed laterally to correct the patient's esotropia is reported.

Case report

A 36-year-old woman presented in 2011 with the complaint of ocular deviation after a car accident five years earlier. The best corrected visual acuity was 20/20 in both eyes. The patient demonstrated right face turn. Strabismus examination showed 55 PD right esotropia with no abduction beyond midline and forced duction test showed free globe movement (Fig. 1, A-C). With the diagnosis of traumatic sixth nerve palsy in the right eye, vertical rectus transposition of the right eye was planned for treatment of the patient.

During the surgery, inferior rectus muscle snapping occurred. After exploration, the proximal part of the snapped inferior rectus muscle was found, secured with 6/0 Vicryl sutures, and sutured to the sclera (Fig. 2). The retrieved inferior rectus muscle was recessed 3 mm to compensate for...
the muscle shortening. The distal part of the inferior rectus muscle was resected from the insertion site. No other extraocular muscle was operated on.

Four months after the surgery, the patient still had the same amount of esotropia in primary position (Fig. 3, A-D). Neither inferior rectus underaction nor vertical deviation in primary position was present after the first surgery.

At this time, we planned vertical rectus transposition for the patient. After peritomy, the inferior rectus muscle was isolated. The adhesions around the inferior rectus muscle were released. To perform augmented vertical rectus transposition, the sclera was marked at the superior and inferior borders of the lateral rectus muscle, 8 mm posterior to its insertion. Then with 5/0 Dacron polyester sutures, two scleral passes were made in the site of markings.

At this time, two interrupted 6/0 Vicryl sutures were placed 1 mm from the insertion of the superior rectus muscle, and the muscle was disinserted. Then the temporal pole of the superior rectus muscle was sutured to the sclera adjacent to the superior part of lateral rectus muscle insertion. The nasal pole of the muscle was sutured to the sclera at the same distance from the limbus. Similarly, the inferior rectus muscle was sutured, 1 mm from the insertion, with two interrupted 6/0 Vicryl sutures, and disinserted. The inferior rectus muscle was sutured to the sclera, 3 mm posterior to the inferior part of the lateral rectus muscle insertion, in a similar manner to the superior rectus muscle.

Then the 5/0 Dacron polyester sutures were passed through the adjacent parts of the superior and inferior rectus muscles and tied. Subsequently, 10 IU botulinum toxin type A (Dysport) was injected in the medial rectus muscle. The conjunctiva was repaired with 8/0 Vicryl sutures. On the first postoperative day, the patient had right exotropia and limitation of abduction and adduction. In the last follow-up visit two years later, the limitation of abduction was improved to −2. There was mild limitation of adduction. The patient's eyes were aligned in far and near, with no horizontal deviation and mild hypertropia in right gaze (Fig. 4, A-C).

Discussion

Rupture of an extraocular muscle during ocular surgery is a serious complication. When a muscle breaks during manipulation (not being intentionally cut) so that a small tuft of insertion remains attached, the term “snapping” could be used. This is alternatively referred to as “pulled-in-two” syndrome. This complication is very uncommonly

Fig. 1. Preoperative photographs in right gaze (A), primary position (B), and left gaze (C) showing esotropia.

Fig. 2. Intraoperative photograph showing distal part of the snapped right inferior rectus muscle.

Fig. 3. Postoperative appearance four months after the first operation, showing esotropia almost unchanged compared to the preoperative examination. (A): right gaze, (B): primary position, (C): left gaze, (D): down gaze.

Fig. 4. Photographs taken two years after the second surgery show mild hypertropia in right gaze (A), orthotropia in primary position (B), and left gaze (C).
encountered, almost once during every 10 years of practice, or one out of 14000 strabismus operations.

Several risk factors are associated with snapping of extraocular muscles including previous ocular surgery, cranial nerve palsy, advanced age, thyroid eye disease, trauma, metastatic infiltration, pathological myopia, congenital exotropia, strabismus fixus, myasthenia gravis, osteogenesis imperfecta, Down syndrome, mitochondrial myopathy, and congenital fibrosis of the extraocular muscles. However, it has also been reported in patients without known risk factors, especially with inferior rectus muscle which is particularly vulnerable due to its unique anatomical features including its relationship to the inferior oblique, the capsulopalpebral system, and Lockwood’s ligament.

Our patient had one known risk factor for “pulled-in-two” syndrome, namely cranial nerve palsy (sixth nerve palsy in our case). Interestingly, in previous reports, snapping of the paretic muscle itself, its antagonist, or the muscle being transposed have all been observed. The last scenario is similar to what occurred in our patient.

Theoretically, any extraocular muscle may rupture at any point along its course. However, the most commonly involved muscles are medial and inferior recti, and the most probable site of rupture is between 4 and 9 mm from the point of insertion, located near the tendon-muscle junction.

Management in cases of snapped muscles is challenging and largely depends on finding the proximal retracted portion of the ruptured muscle. If exploration allows recovery of the proximal portion of the muscle, the preferred management is its reattachment to the distal portion or the globe (sclera). Fortunately, this was possible in our case. However, if the ruptured muscle is lost and impossible to retrieve, choices include recession of its antagonist or transposition surgery.

The special aspect of our case was a successful second surgery (transposition) on a muscle that was snapped in the prior operation but retrieved and reattached to the globe. Reports of reoperation on snapped muscles are scarce. In the only instance found in the literature, the paretic inferior rectus of a patient with hypertropia was snapped during resection, but was successfully retrieved, resected, and reattached. Subsequently, re-resection was performed on the same muscle to correct residual hypertropia which resulted in satisfactory alignment. The difference with the present case is the type of the second operation, which was resection in the former and transposition in the latter.

Our findings suggest that a previously snapped and retrieved muscle has the chance to be successfully re-operated in future, although some surgeons might consider it weak, fragile, and unfit for further manipulation.

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