

Inferior oblique inclusion, Incidence Early detection and Prevention

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Abstract

Purpose: To evaluate the incidence of inferior oblique inclusion during hooking of the lateral rectus muscle and how to detect and prevent.

Methods : 50 patients (80) eyes operated upon lateral rectus muscles (recession 55 eyes resection 25 eyes) for correction of horizontal deviation (esotropia and exotropia) the incidence of inferior oblique inclusion during hooking of the lateral rectus muscle through fornix conjunctival incision was evaluated and managed.

Results: the incidence of inferior oblique inclusion was found in 17 eyes 21.25% (12 eyes 15% Partial inclusion and 5 eyes 6.25% total inclusion) the inclusion was detected and managed early. Post operatively no element of vertical deviation due to inferior oblique inclusion.

Conclusion: inferior oblique inclusion is a preventable complication if taken in consideration during hooking of the lateral rectus muscle.

Introduction:

After operation for horizontal comitant strabismus a vertical deviation or deficiencies of vertical rotation are significant predictors of inferior oblique inclusion into the lateral rectus insertion.

In repeat surgery involving the horizontal extra ocular muscles, it is frequently noted that the anterior fibers of the inferior

oblique muscle are inadvertently caught in the lateral rectus muscle insertion 1.

Re-operation to free the inferior oblique fibres often fails to reduce the vertical deviation, and hence there is a need for careful dissection of the inferior oblique during the primary surgery 4.

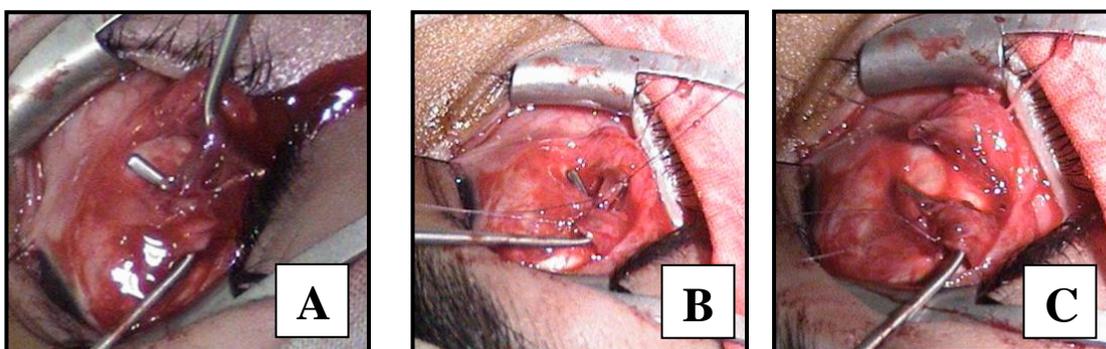


FIGURE1.

A- Inferior oblique muscle is inadvertently caught in the lateral rectus muscle insertion.

B- Preplaced suture for lateral rectus muscle before separation from inferior oblique.

C- Lateral rectus muscle after freeing the inferior border from inferior oblique.

It is concluded that the simple release of the IO muscle fibers included in the attachment of the lateral rectus muscle will have a significant impact on reducing the vertical deviation and may avoid the need for additional vertical muscle surgery 2.

Material and Methods:

Fifty patients (80 eyes) with horizontal deviation (esotropia 15 patients and exotropia 35 patients) were included in this study. The inclusion criteria include patients with horizontal comitant strabismus not associated with element of vertical deviation, inferior oblique over action or DVD.

Lateral rectus muscle is exposed through fornix incision as the following :

The eyelids are separated with eyelid speculum. The globe is fixated at the limbus. The conjunctiva is grasped with a toothed forceps. An incision is made into the conjunctiva as well as Tenon's capsule. If the incision does not completely penetrate Tenon's capsule and the intermuscular septum to the scleral surface of the eye, additional tissue (anterior Tenon's tissue or intermuscular septum) is grasped with the forceps, and an additional cut is made. A hook is passed into the incision and rotated so that it can be slide underneath the muscle insertion with the tip of the hook held tangential to the globe. When the muscle is secured with the hook the inferior edge of the lateral rectus muscle

are evaluated for inferior oblique inclusion which may be partially or totally included.

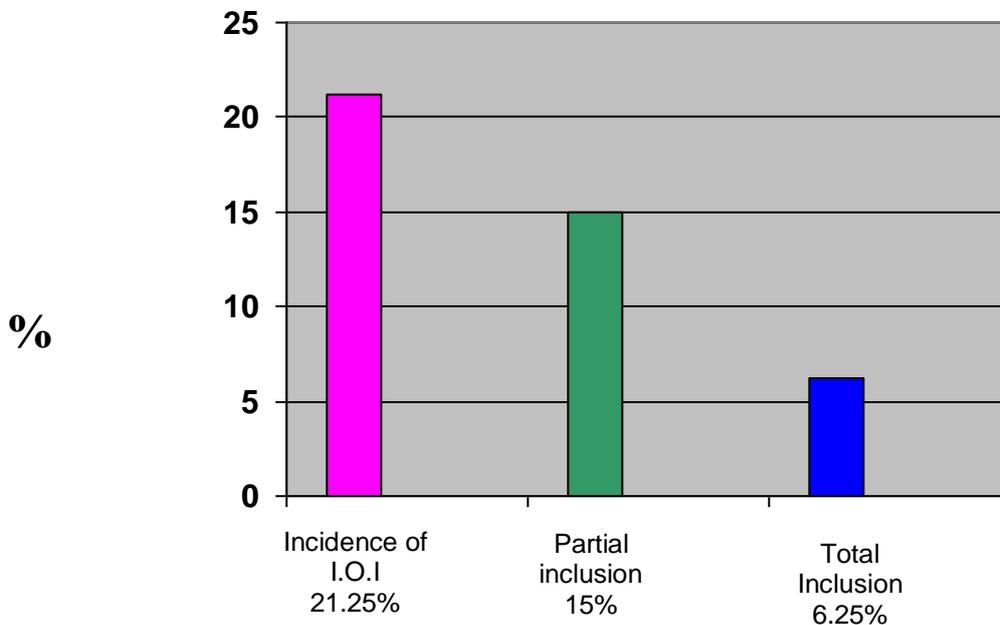
Primary management of inferior oblique inclusion undertaken as the following:

- Removal of the hook and rehooking of the lateral rectus just behind the location of the muscle insertion.
- Care is taken not to incorporate intermuscular septum or other adventitial tissue on the hook.
- Separation of facial attachment between lateral rectus and inferior oblique.
- Adequate visualization with avoidance of blind, posterior sweeps with a muscle hook when isolating the lateral rectus.

Results:

The incidence of inferior oblique inclusion was found in 17 eyes which represent 21.25% of all eyes undergone surgery for lateral rectus (12 eyes represent 15% was encountered with partial inclusion (the anterior fibers of inferior oblique included in the hook with lateral rectus) and 5 eyes represent 6.25% was encountered with total inclusion (the belly of inferior oblique included in the hook with lateral rectus) **Fig (2).**

FIGURE 2. The incidence of inferior oblique inclusion during lateral rectus exposure.



Inferior oblique...

In partial inclusion the anterior fibers of inferior oblique included in the hook with lateral rectus occurs when a muscle hook is placed under the lateral rectus muscle which may snag the septum and kink the fibers of inferior oblique as seen in **Fig (3)**.

FIGURE 3. Partial inclusion of I.O with lateral rectus.

In total inclusion the belly of inferior oblique included in the hook with lateral rectus muscle occurs when there is no adequate visualization with blind, posterior sweeps of the muscle hook .as seen in **Fig (4)**.



FIGURE 4. Total inclusion of I.O with lateral rectus

The inclusion was detected and managed by removal of the hook and rehooking of the lateral rectus just behind the location of the muscle insertion and separation of facial attachment between lateral rectus and inferior oblique muscle as seen in **Fig (5)**.

L.R

A

FIGURE 5. A-L.R after freeing from I.O

B

B- L.R recessed back safely

Post operatively there was no element of vertical deviation due to inferior oblique inclusion in all cases.

Discussion:

In more than one-third of lateral rectus muscles that reoperated after either previous lateral rectus recession or resection, the inferior oblique was found attached to the inferior insertion of the lateral rectus. Patients with this complication may have a hyperdeviation or hypodeviation of that eye in the primary position but usually have limited elevation and sometimes depression. There may also be limitation of adduction 5.

Anatomical consideration

The inferior oblique muscle is inserted beneath the inferior border of the lateral rectus muscle, approximately 12 mm from the insertion of the lateral rectus. Operative dissections show that a definite and constant fascial septum exists between the sheaths of the inferior oblique and the lateral and inferior recti **Fig (6)**.

Inferior oblique...

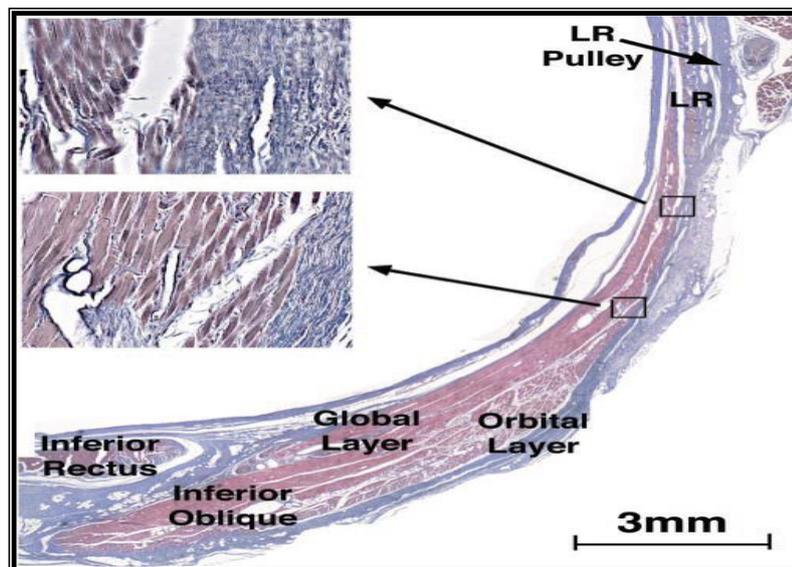


FIGURE 6. Coronal section of the left orbit of a nemestrina monkey stained with Masson's trichrome showing the region of the IO and inferior rectus (IR) pulleys, and the anterior part of the lateral rectus (LR) pulley. Note the smaller and more darkly stained orbital layer(OL) fibers, and the larger and more *bright-red*-stained global layer(GL) fibers. The IO is surrounded by a thick sheath of dense, *blue*-stained collagen. *Insets:* OL fibers in continuity with the collagenous IO sleeve. Superiorly, this sleeve becomes continuous with the LR pulley, and inferiorly, with the dense collagenous ring that constitutes the IR pulley.²

The clinical significance of this fascia is realized when it is pulled laterally, as its inner surface provides a guide to the inferior oblique sheath; also, when a muscle hook is placed under the lateral rectus muscle it may snag the septum and kink the inferior oblique and cause its inclusion. The fascia forms a sling for the inferior oblique sheath and helps to maintain its line of action.

For these reasons the intermuscular septum of the inferior oblique should be included in anatomical accounts of the ocular fascia and should be remembered during operations on the inferior oblique or lateral rectus muscles ².

After reoperation, despite freeing the inferior oblique from the lateral rectus, most patients had a persistent vertical deviation. Inadvertent inferior oblique inclusion can be avoided by inspecting the under surface of the lateral rectus and freeing any inferior oblique attachment before reattaching the lateral rectus to the globe during either resection or recession.

Conclusions:

Inferior oblique inclusion is preventable rather than treatable complication if taken

inconsideration during hooking of the lateral rectus muscle.

References:

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إنحشار العضلة المائلة السفلية, معدل الحدوث, الاكتشاف المبكر ومنع حدوثها

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يقيم هذا البحث معدل إنحشار العضلة المائلة السفلية أثناء تكليل العضلة الخارجية في عمليات تصحيح الحول الأفقي.

وتم إجراء البحث على خمسون مريضاً (80 عين) حيث وجد أن معدل الحدوث هو 21.25% (17 مريض).

وتم تقسيمهم إلى حالات إنحشار العضلة المائلة السفلية الجزئي وعددهم اثني عشرة عين ويمثلون 15% وحالات تضمن العضلة المائلة السفلية الكلي وعددهم خمسة أعين ويمثلون 6.25%.

وهذه الحالات تم تشخيصهم أثناء العملية وتم معالجتهم ومنع حدوث التصاق للعضلتين معاً. ويمنع إنحشار العضلة المائلة السفلية بالوقاية أكثر من العلاج.