

Lateral rectus muscle strangulation: a new weakening technique in cases of exotropia

Introduction:

Strabismus is a Greek word that means "eyes looking obliquely" and misaligned. ⁽¹⁾

So, strabismic eyes are "squinting eyes," "crossed eyes," ⁽²⁾

Its prevalence is 2% to 5% in the general population. ^(3,4)

The pathogenesis of squint is not completely clear. Ocular motility involves extraocular muscles, cranial nerves, supranuclear pathways, and their cerebral controls. All can be implicated in the development of squint. The most popular theories are:

- Claude Worth's theory: an inherent absence of cortical fusional potential is considered the cause. ⁽⁵⁾
- Chavasse theory: motor alignment leads to a poor sensory status, which, if un-treated, leads to squint. This makes clear that early treatment for squint will lead to sustained improvement in binocular single vision (BSV). ⁽⁶⁾

About muscle action, there are 2 laws of ocular motility:

- Sherrington's law of reciprocal innervation: Increased innervation to a muscle is accompanied by decreased innervation to its antagonist. Exception: Duane retraction syndrome. ⁽⁷⁾
- Herring law of equal innervation: Equal and simultaneous innervation flows through synergistic muscles during any conjugate eye movement. Exception: Dissociated vertical deviation. ⁽⁸⁾

Heterophoria is defined as an ocular deviation kept in control by a fusional mechanism. **Heterotropia** is defined as the deviation that is present on the corneal reflex test itself. This is the manifest deviation that can be related to underlying amblyopia ⁽⁶⁾

Exotropia - This is a divergent strabismus in which the eyeball deviates temporally. ⁽¹⁾

The main aim of treatment is to restore proper ocular alignment. The secondary aims are to treat amblyopia, maintain binocular single vision, and eliminate diplopia if present. There are many modalities of treating strabismus which are: ⁽⁹⁾

Observation, correction of refractive errors, amblyopia treatment, orthoptics, prismatic correction, botulinum toxin and extraocular muscle surgery ⁽⁹⁾ which either: weakening procedure, strengthening procedure and vector adjustment procedure (transposition procedure) ⁽¹⁰⁾

weakening of the extra ocular muscle is used to decrease the effective strength of muscle action. ⁽¹¹⁾ In 1922, Jameson introduced the scleral suturing technique (muscle recession) as a graded method for extraocular muscle weakening ⁽¹¹⁾

Then many weakening procedures have been described. Muscle recession is still the standard and often most commonly used technique in which we disinsert the muscle from its original insertion and moving it posteriorly away from the limbus. ⁽¹²⁾ there are many complications from this surgery related to suturing and muscle disinsertion. ⁽¹²⁾

Other weakening procedures are retro equatorial myopexy or posterior fixation (Faden procedure), marginal myectomy, and myectomy (disinsertion).⁽¹³⁾

Recently, extra ocular muscle fenestration is considered as a new surgical technique for weakening of the extraocular muscles without using sutures or botulinum toxin.⁽¹³⁾

The fenestration technique weakens the muscle by removing a block of the muscle close to its insertion which is done in between 2 peripheral muscle strips. It is a promising simple technique that might avoid the complications of using sutures such as foreign body reactions and granuloma formation.⁽¹⁴⁾

The disadvantage of muscle fenestration as it is irreversible maneuver. So, we modify anew technique which is muscle strangulation in which we strangulate a block of muscle near to its insertion using proline 10/0 so it will be weakened by this technique and this part will act as a tendon.

This study is aiming to evaluate the efficacy and safety of strangulation as a weakening maneuver to horizontal extra ocular muscle (lateral rectus muscle) in the surgical management of exotropia.

Material and methods:

Ethical consideration:

This study will obtain approval of the Ethics Committee of the Research Institute of Ophthalmology, Sohag, Egypt, and it is conducted in accordance with the Declaration of Helsinki. A written informed consent will be taken from each patient or his/her guardians (if the patient was unable to participate in the consent process).

Type of study: Case- Series study.

Inclusion criteria: cases of exotropia which are not recurrent nor consecutive.

Exclusion criteria: 1- recurrent cases.

2- consecutive cases

3- paralytic and restricted muscle.

Interventions: After sterilization and draping of the eyes, an eye speculum is inserted. The muscle is exposed and hooked through either a fornix-based or limbal-based incision. Careful dissection is carried out to delineate the muscle edge, a previously measured block of the lateral rectus muscle is sutured (strangulated) with proline 10/0.

Statistical analysis:

The statistical analyses of the research data were carried by making use of SPSS V.26 (IBM Inc., Chicago, IL, United states of America). Quantitative data were supplied in the form of mean and standard deviation.

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