



## Efficiency of Non-Suture Myectomy Technique for Large-Angle Horizontal Strabismus Surgery

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### Abstract

Myectomy for large angle strabismus more than fifty-five prism dioptre.

**Aim:** The authors will evaluate alternative surgical technique for large angle horizontal strabismus more than fifty-five prism diopter (55 < PDs) instead of traditional one.

**Methods and Material:** A retrospective random study on forty (40) cases (14 - 60) years old, at different hospitals, non-suture myectomy Surgery is done for both eye under local anaesthesia. we documented forty (40) cases, thirty-eight (38) primary strabismus patients (XT-ET) and two (2) secondary cases re-operated. All patients were evaluated clinically, and imagery and the Follow-up were conducted after the first month every six months for up to three years.

**Results:** Out of 40 cases, (95%) 38 were successful (less than 10 PDs) with good ocular motility within one month, under correction only appeared in (5%) 2 of the cases. no persistent diplopia in central 30° field, one case re-operated, no overcorrection, no major complications were recorded during and after the surgeries. The results are supported by documents and images.

**Conclusion:** This technique is remarkable in our ophthalmic field because it didn't interrupt the natural integrity of the normal ocular motility, and it's simpler, easier, with higher success rate, require shorter time, without suturing much more efficient, with lesser complications, and short learning curve.

**Keywords:** Horizontal Strabismus; Myectomy; Large-Angle Strabismus Surgery

### Introduction

Huge Strabismus is a grey zone for surgeons and there are no clear surgical rules and very frequently re operated many times and the results are unpredictable. the laws of the classical strabismus surgery are determined mostly by changing in the mechanical action of the horizontal muscles by resections or recessions of more than two muscles in large angle strabismus surgery. far from this the check ligaments and intermuscular membrane play a role [1], and there is a neurological supranuclear pathway that controls the ocular muscles movement including the pathway in the brainstem and cerebellum and their connection [17].

### Background

The game of strabismus surgery is to make the eye relative to each other by restoring the alignment of it [2] and that's my lead to restore the patients' binocular vision [3,4] and definitely bring

their confidence back [5,6]. the surgery is done by many ways, weakening (recession, myectomy,..) tightening (resection, advancement,..) repositioning the extra ocular muscles which depend on every case [2,7-10] and at the same time many extraocular muscle three or four may be operated on [9,27], before surgery the surgeon calculates where to reattach the muscles depending on the traditional mechanical surgical roles [10]. the main complications is globe perforation, Studies mentioned that it occurs up to (8% - 12%) in patients undergoing strabismus surgery [12], and the risk of happening is at highest during reattaching the muscles to the sclera, sometimes it can lead to retinal detachment [13], major complications like globe perforation or infection and endophthalmitis are common to occur and even retinal or optic nerve damage can happen [13,14]. Some minor complications like bleeding, allergy to the sutures, and change in pupil sizes also happen [13,14] and expected complication of the general anaesthesia [11]. Over-

correction and under correction are very common and expected to occur after the surgery [10]. The variations of the success rate for every case depends on its individual situation, and in a lot of times an additional surgery is required [8]. Several large case of series report successful surgical readjustment rates of (63% to 81%) in adults up to one year after surgery [21,26].

## Subjects and Methods

By coincidence I lost a patient with loose adjustable suture for ten days. he came back with good ocular motility and there's no need to readjust the suture. I observed ten cases of loose adjustable suture during first week of surgery ( a loose adjustable suture is a loop created from the disinserted muscle to the original insertion of it out of conjunctival incision margins) Figure 2a and figure 2b, and I found that the eye motility and alignment are good and improving and there is no need to readjust or tying the sutures and that is during recession surgery only.

A retrospective random study on 40 cases of large angle strabismus (more than 55 PDs) visual acuity is equal or two lines deference, unilateral or alternating, all documented and filtered from more than 200 cases and from my previous published abstract [1], in different hospitals in Syria, Libya and Saudi Arabia in the last ten years, ages 14 - 60 years, sex is not defined, full ophthalmological examination and medical history is made, and internal medicine and anesthesia consultation is done and the necessary lab tests were demanded. I operated thirty-six (36) primary strabismus patients (exotropia-esotropia) and four (4) secondary residual cases, using this technique. Follow-up were conducted every six months for up to three years. The study has been approved by hospitals where the surgeries were done, all patients have oral and written agreement and the patient's privacy is preserved. The surgical technique was as follows: under local anesthesia drops and subconjunctival lidocaine injection (0,2% with adrenaline 0.5 - 1 ml) near the muscle, we injected all patients with Atropine by anaesthesiologist IM or IV (1 mL/0.5 mg) (for children light general anesthesia also done), conjunctiva and tenon's capsule incision (8 mm) at insertion of the muscle is done and by muscle hook we losing the muscle from the eyeball, Mosquito clamps hold the muscle prior to severing to avoid bleeding, full myectomy (2) mm from insertion is done, no cutting of check ligament, figure 3a, I ask the patient to move his eyes after every step of surgery to estimate and to see whether he need dissection or tractional suture particularly in a very large angle strabismus, tractional suture which is U shape (5-0 Polyester) suture from the limbus to the outer canthal area

in the opposite direction of the strabismus was performed for one or two week and for one or two muscle as needed to adjust the final position of the eye, the conjunctival incision is closed by bipolar diathermy. orbital CT scan figure 3b was performed within 24 hours after the surgery to evaluate the adjustment of the muscles and confirm that it's in place and not slipped away. I found similar myectomy technique without suture that has been done in 1983 by Prof. Caleb Gonzalez of bilateral sixth nerve palsy with strabismus fixus, disinsertion and myectomy of OU medial rectus and releases it in the orbit [21] and also many others in last two century (18<sup>th</sup> - 19<sup>th</sup>) did it [18], and I found that to many American Oculist doctors who come close to this procedure in the 19-century, as Samuel David Gross, and James Bolton, and they published it [26] with good results!. essentially, I used Krimsky test to calculate the degree of strabismus, and some extreme cases by Hirschberg test, the number of each case of those made, the type of strabismus, the preoperational degree (deviation), the procedure and other procedure, outcome, and the distance of resection are shown in the (Table 1).

## Results

Out of 40 cases, 38 (95%) were successful (less than 10PD) with good ocular motility within one month. We find under correction only in 2 cases (5%) no overcorrection, One case re-operated (because she lost tractional suture early) and became orthotropic, the other patient rejected reoperation, the other procedure tractional suture (62%) was done, no any major complications during or after the surgeries, no persistent diplopia in central 30° field, outcomes are documented by images and video.

## Discussion

To show that this procedure for large angle strabismus is superior than the traditional one as (Table 2), there were both better results and lesser complication and our study respect both criteria if we considered a success rate of (98%), While the best rates ranges from (68% to 85%) when we use the traditional techniques [14,15], Residual or recurrent strabismus is common problem found after large angle strabismus operations [18]. The incidence of under correction and recurrence after the correction of Esotropia (ET) varied from (20% to 40%) [17,25] and the incidence of under correction and recurrence after the correction of Exotropia (XT) varied from (22% to 59%) [18]. While in our research the percentage is (5%) under correction and no overcorrection for Esotropia or Exotropia. The reoperation percentage in our technique is (5%), while in the traditional technique is (7.9%) [23].

No. of Cases	Deviation (≥, ≈ Prism Diopters')	Muscle myectomy 2 mm from insertion	Other procedure (dissection, tractional suture)	Outcome
14	Alternating Exotropia 55-65	OU lateral rectus Myectomy	Traction suture 4-7 day for more deviated eye only. (7cases)	Orthotropy
10	Alternating Exotropia (65-85)	OU lateral rectus Myectomy	Traction suture for (5cases) more deviated eyes only, for 7-12day	Orthotropy
2	Right Residual constant Exotropia 60	OU lateral rectus myectomy	Tractional suture for right eye for 12 day.	Orthotropy
8	Esotropia (55-75)	OU medial rectus Myectomy	Dissection and Tractional suture for 6 eyes, 4-7days	Orthotropy
1	Alternating Exotropia 95 Figure-1 (a) (b)	OU lateral rectus Myectomy	Re-myectomy for under corrected eye and Tractional suture for 10 days	Orthotropy Figure-1 (c) Video-1 (e)
2	Crossed Esotropia 85-95, Video-2 (a)	OU medial rectus Myectomy Video-2 (b)	OU Dissection and Tractional suture 14 days for both patients.	Orthotropy Video-2 (c)
1	Alternating Esotropia 75	OU medial rectus Myectomy	OU Tractional suture for one week. (refuse re-operation).	Right Esotropia 30 PD
2	Residual constant Esotropia 65	OU medial rectus Myectomy	Dissection and tractional suture for 7 eyes for two patients.	Orthotropy

Table 1

Due to nonexistence of suturing during this surgery we prevent one of the worst complications which is scleral perforation that traditional techniques may cause it [12-14], as it may occur in (8% - 12% ) of patients operated [12], that and can lead to severe complications, time needed to do the our surgery in this technique is

not more than (15) fifteen minutes, while the traditional approach ranges for at least one to two hours. This technique didn't require general anesthesia, except for children under fourteen, and lastly the simplicity of these procedures which provide minimal surgical manipulation and short learning curve.

	Success Rate (less than10PDs)	Under Correction	Re-operation Percentage	Scleral Perforation	Time
Traditional Technique	68% - 85% [14,15]	20% - 59% [17,18]	7.9% [23]	8% - 12% [12]	1 - 2 hours
Our Technique	98%	5%	5%	No Scleral Perforation	10 - 20 min

Table 2

**Summary**

**What was before**

Large angle strabismus surgery is a gray zone and it's treated in many ways with long time under general anesthesia either two or three or four horizontal muscles surgery with lots of complication there are no agreement in literature who to deal and correct it and there is variable success rate (68% - 85%).

**What this study adds**

There were both better results and lesser complication and, in our study, we respect both criteria with a success rate of 98%, simpler, only myectomy on two muscles, easier, require lesser time, non-suture technique, under local anesthesia, shorter learning curve.

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**Conflicts of Interest**

There are no conflicts of interest.

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