

What a L o n g Strabismus Trip It's Been

Surgical Lessons Learned Since I Began My Practice

Lessons From Melbourne

Lionel Kowal

'Lessons' in this bold red italic font

Disclosures

No financial disclosures

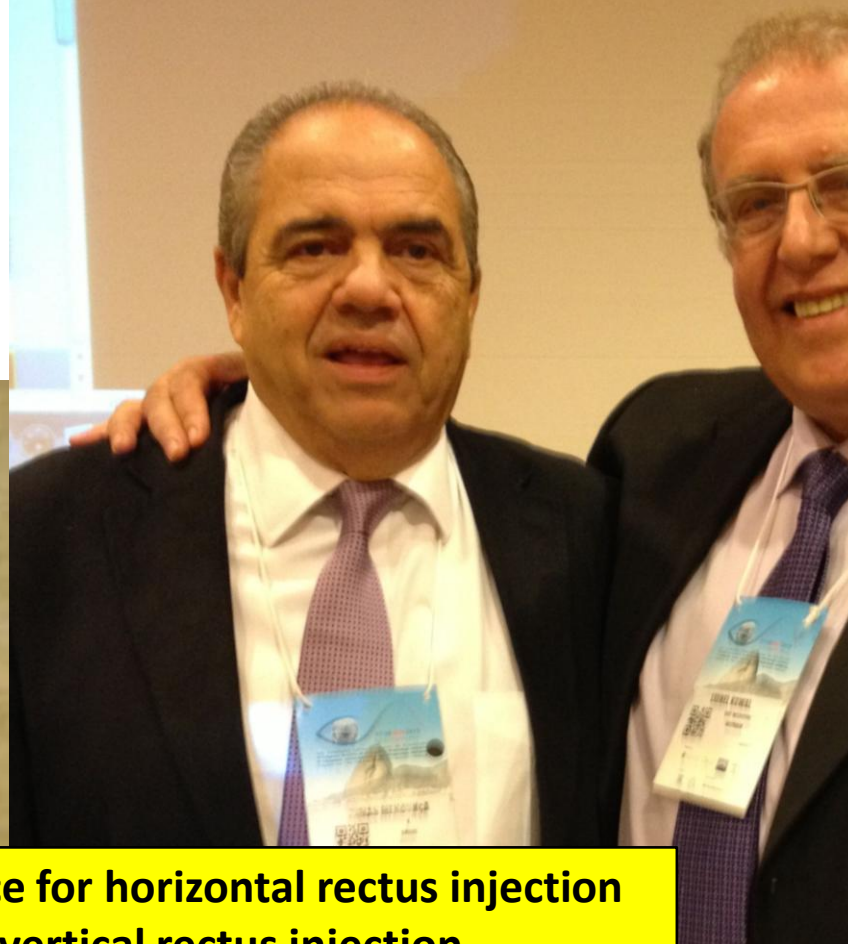
Unfortunately

Surgical lessons learned....

Injecting Botox:

Mendonça forceps:

a non-EMG technique.



These forceps are as good as EMG guidance for horizontal rectus injection
EMG guidance may be better for vertical rectus injection

Comparação entre os métodos de injeção de toxina botulínica em músculo ocular externo com o uso do eletromiógrafo e com o uso da pinça de Mendonça

Electromyograph assistance and Mendonça's forceps - a comparison between two methods of botulinum toxin A injection into the extraocular muscle

Injecting Botox:

Mendonca forceps:
a non-EMG
technique.

F108A Gomez forceps

Are commercially available



Rosario Gomez de Llano forceps (strabismus)



Anesthetise with 5 drops oxybuprocaine
Test anesthesia with one drop of Betadine

Surgical lessons learned...***Bimedial elevation*** ***[BME]*** in absence of A-pattern



This creates a V pattern

- 1. $BME \pm Rs$ for ***CI***: .. for the near XT'.

Adjustable LR recess OU for the distance XT

- 2. $BME + Rc$ in acquired ***ET, D>N***, if prism testing suggests a risk of XT' with regular doses of ET surgery

Bimedial elevation [BME] in absence of A-pattern For Rx of convergence insufficiency

in Plager et al Strabismus Surgery, Oxford University Press, 2004

COMMENT

Edward G. Buckley, MD

There is a group of older individuals who develop convergence insufficiency that does not seem to be amenable to the usual orthoptic-type exercises. I have used supraplacement of the medial rectus muscles, in combination with small resections, with some success. In essence, these patients are being treated as if they had an A pattern, and supraplacing the medial rectus muscles helps create more of an effect on down gaze, as opposed to the primary position used for distance viewing. This allows small resections to become more effective for reading. The amount of supraplacement is usually a tendon width to achieve the maximal effect.

Inferior Oblique surgery

1. One suture IO recess

- Use only one suture through anterior corner to reduce risk of anti-elevation

One suture

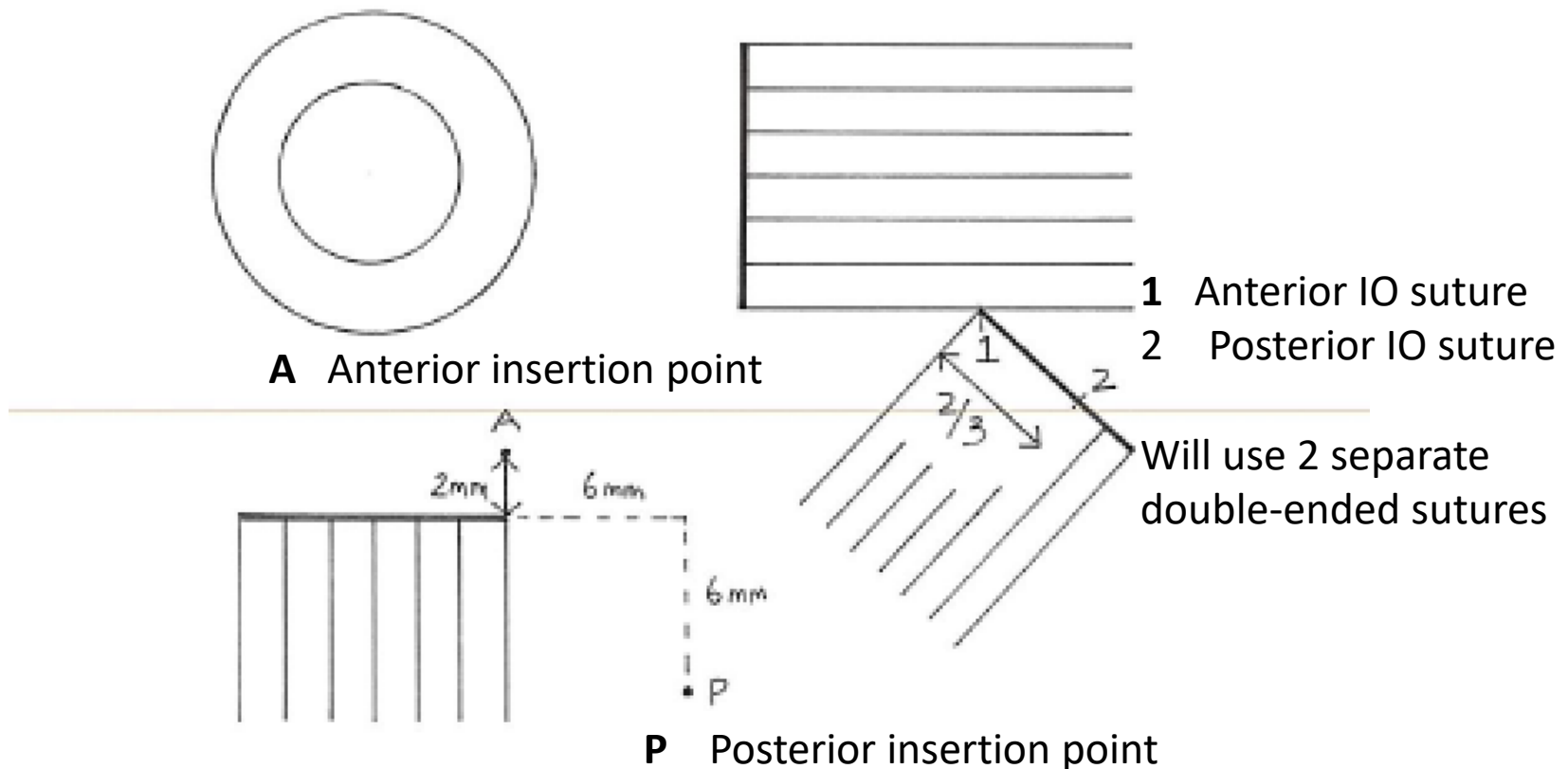
Posterior corner of IO slopes backwards. N-V bundle not under tension – less likely to restrict elevation

Inferior Oblique surgery:

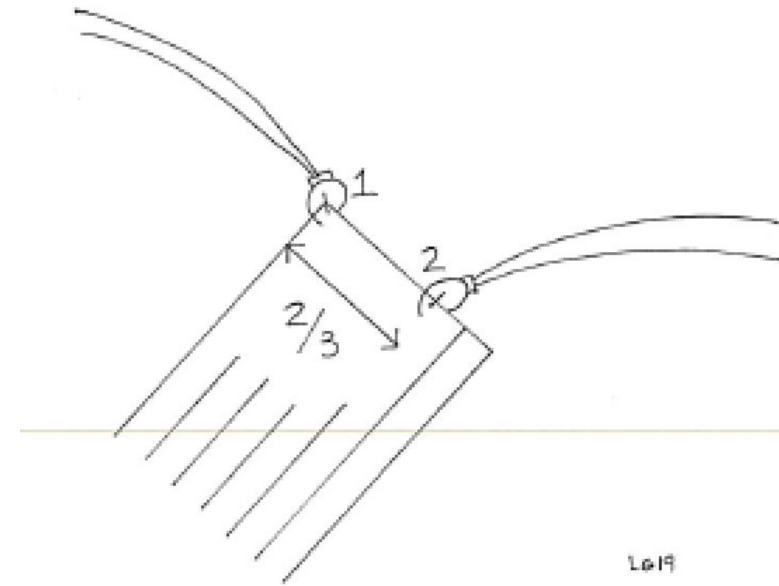
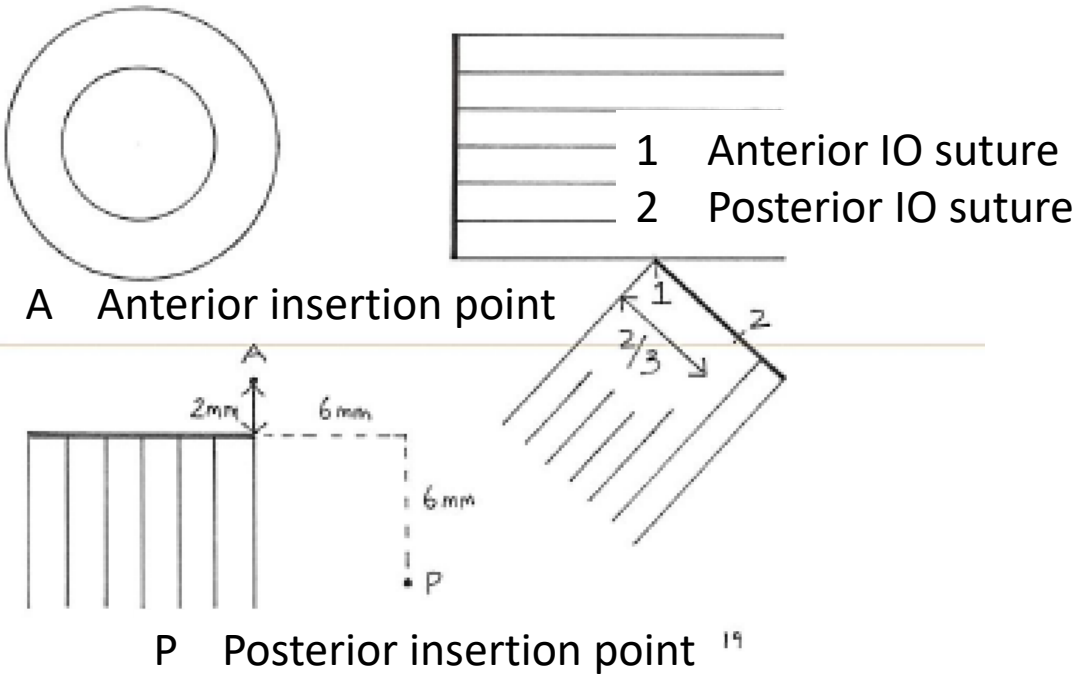
2. *Adjustable Inferior Oblique Recession*

..where accuracy is important eg adult diplopia

Based on a technique of Alan Scott

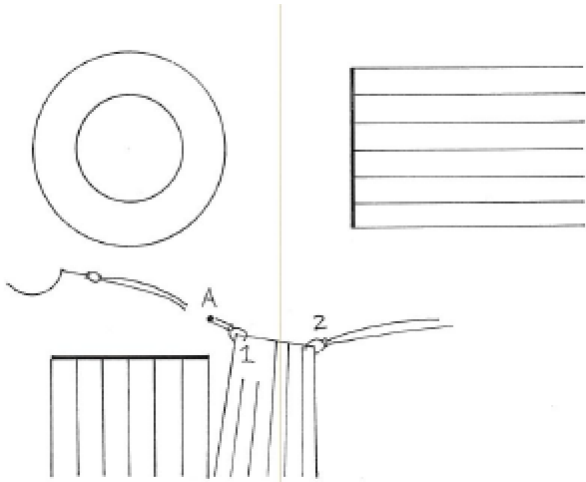


2. Adjustable Inferior Oblique Recession

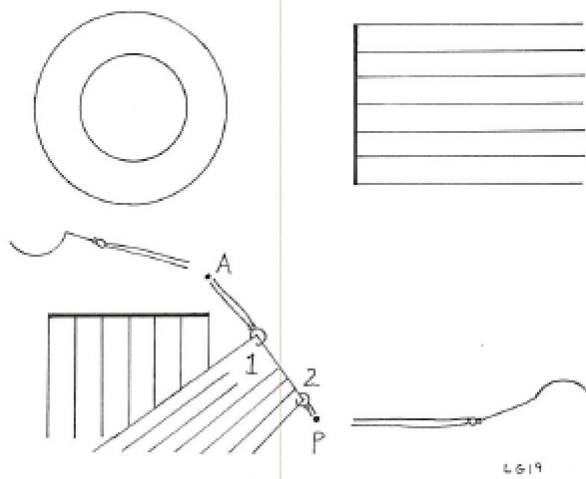


Suturing the IO
2 separate double-ended sutures

2. Adjustable Inferior Oblique Recession

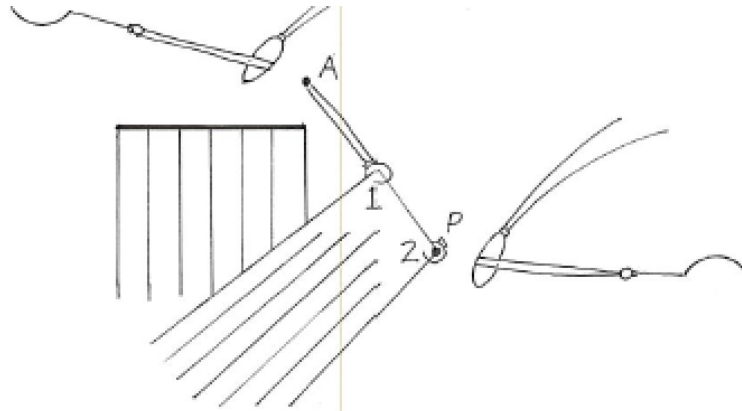


- Adjustable suture
- Ant suture: Scleral pass @ A



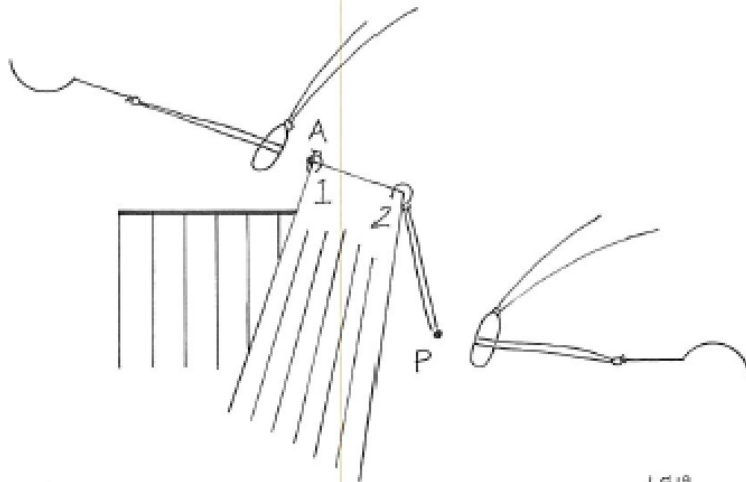
- Adjustable suture
- Post suture: Scleral pass @ P

2. Adjustable Inferior Oblique Recession



8-10 Δ recession:

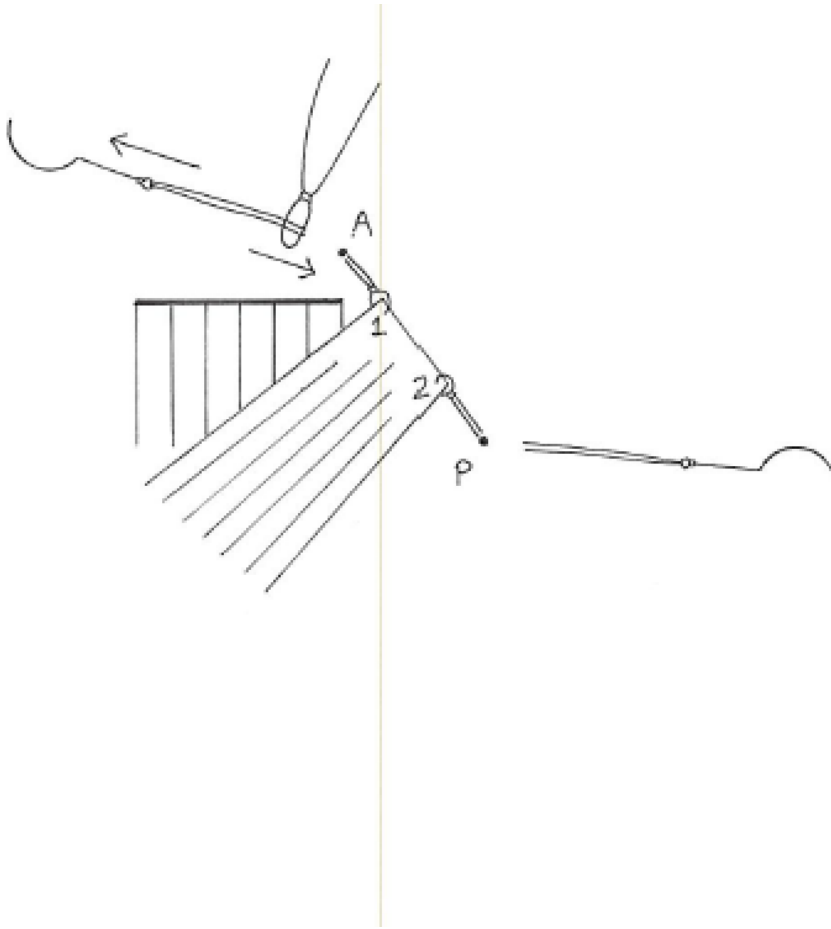
- Leave the IO abutting the new Posterior insertion



18+ Δ recession:

- Leave the IO abutting the new Anterior insertion

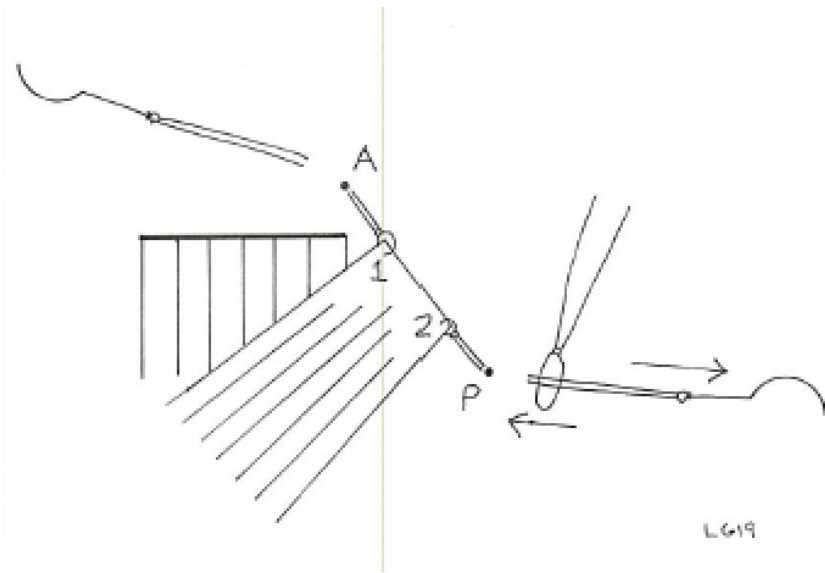
2. Adjustable Inferior Oblique Recession



To augment IO recession effect : Move IO towards A, new Anterior insertion

Release sliding knot @ P
Advance suture 1 by pulling its slip knot posteriorly

2. Adjustable Inferior Oblique Recession



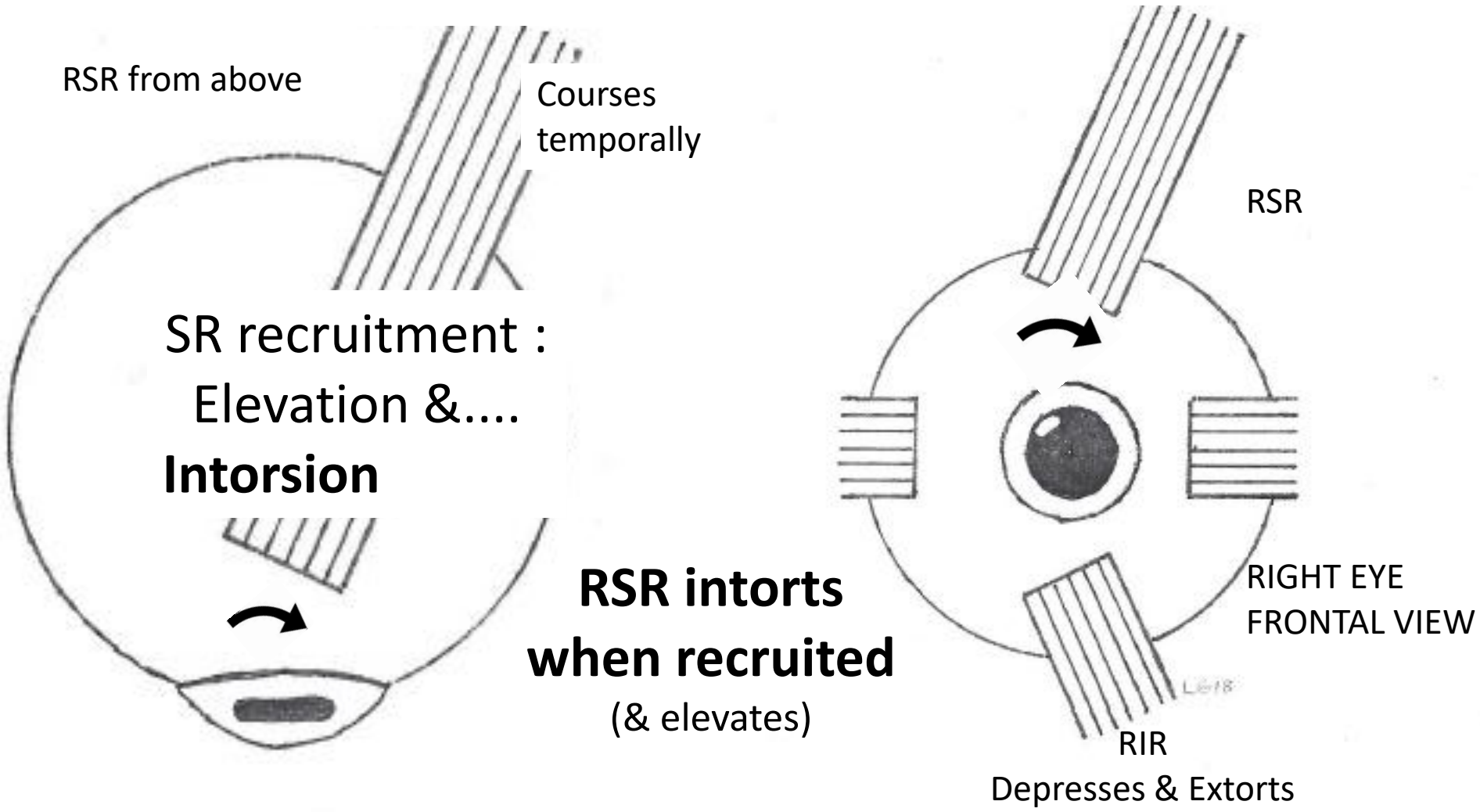
- To lessen IO recession effect : Move IO towards P, new Posterior insertion
- Release sliding knot @ A
- Advance suture 2 by pulling its slip knot anteriorly

Surgical lessons learned...

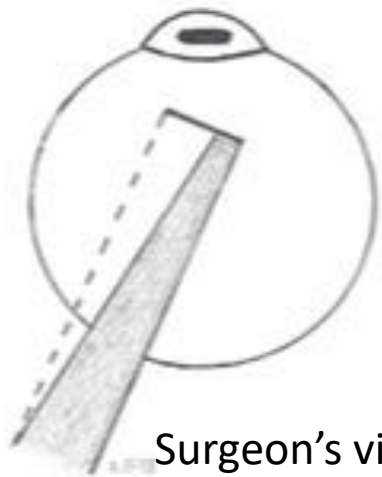
Partial tenotomies to treat torsion:

- 1. ..of vertical recti for in-/ex- cyclotropia
- 2. .. of ant $\frac{1}{2}$ of IO insertion for excyclotropia
- 3. .. of ant $\frac{1}{2}$ of SO insertion for incyclotropia

RSR courses anteriorly and temporally to an oblique insertion



Temporal transposition of RSR: Augments intorsion / reduces extorsion



Surgeon's view R eye



Frontal view R eye

Shifting the effective insertion to the temporal edge of original insertion augments intorsion by about 2° with little vertical effect

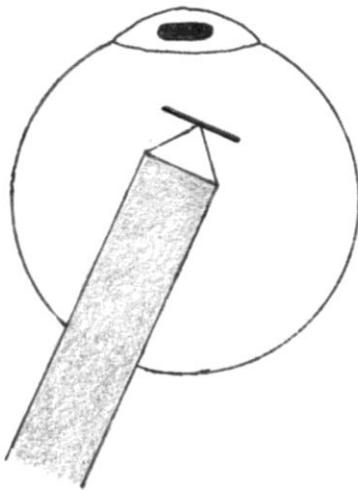
You can do this by :

- 1. tenotomy- bunch up- resuture to edge of insertion, or...**
- 2. 50+% tenotomy @ the insertion**

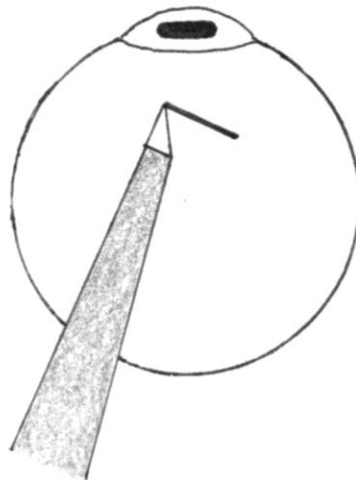
Recessing the RSR: an intorter

This will also lessen intorsion

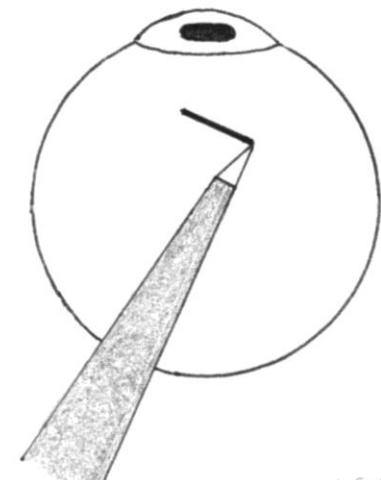
Reduces intorsion



Nasal shift:
Lessens intorsion
further



Temporal shift:
Intorsional effect:
**Compensates for the
torsional effect of recession**



Little net torsion

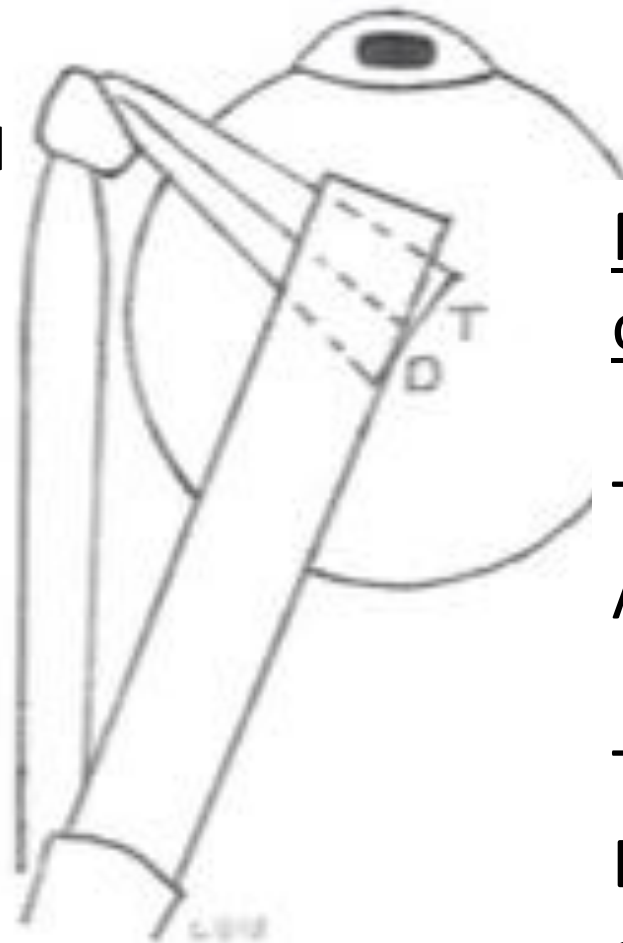
Compartments of Sup Obl

Torsion; Depression

Demer, Clarke

Non-overlapping dual
nerve supply to sup
oblique muscle.

***Separate supply to
torsion and to
depression actions***



Modify torsion effect
of Sup Obl

To increase intorsion:
Advance T = [H-Ito]

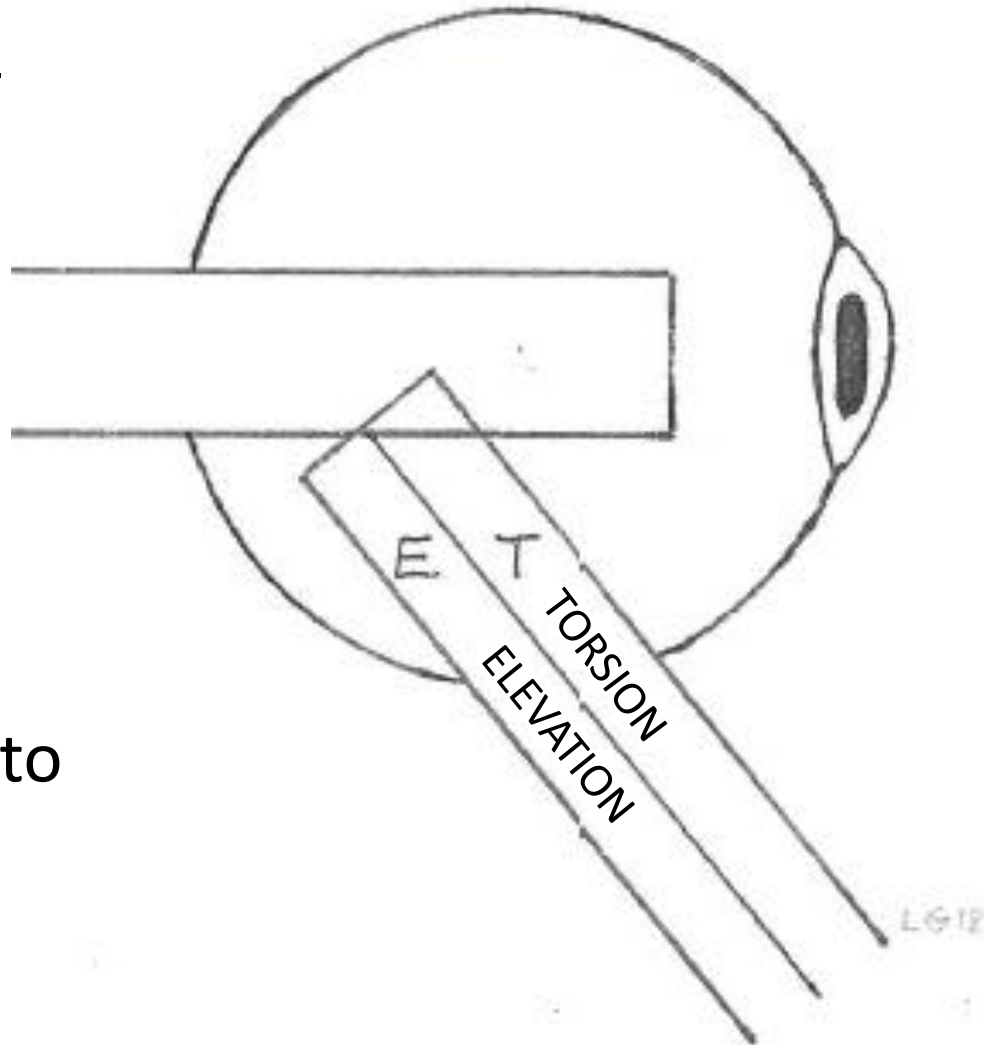
To decrease intorsion:
Excise distal 5mm of T
section

Compartments of Inferior Oblique

Torsion, Elevation

Demer, Clarke

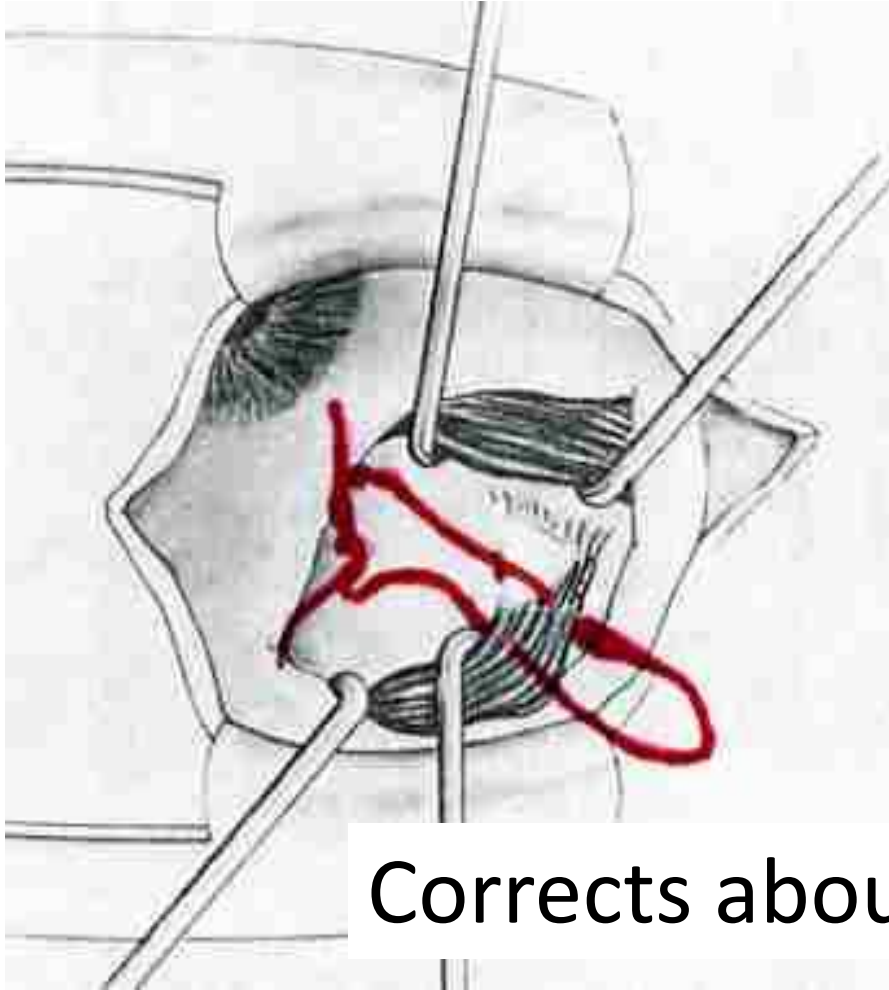
Non-overlapping dual nerve supply to the inf oblique – separate supply to ex-Torsional and to Elevation actions



IO Surgery for Torsion

Anterior 2/3 Disinsertion

Burt Kushner



- 6/0 vicryl lasso to prevent the disinserted 2/3 to re-adhere to original insertion

Corrects about 3-5 ° Excylo

Surgical lessons learned...

When you can (unexpectedly) do resection / plicate

- *Resection in Thyroid Eye Disease*
- *Resection in Duane's*

Resection in Thyroid eye disease

Horizontal

Yoo SH, Pineles SL, Goldberg RA, Velez FG.
J AAPOS 2013;17:9-15.

Major Articles

Rectus muscle resection in Graves' ophthalmopathy

Sylvia H. Yoo, MD,^a Stacy L. Pineles, MD,^a Robert A. Goldberg, MD,^a and Federico G. Velez, MD^{a,b}

BACKGROUND

In the treatment of Graves' ophthalmopathy, rectus muscle resections generally are avoided because of the concern of reaggravating inflammation and creating excessive extraocular muscle restriction. In patients with large-angle strabismus and in patients with residual strabismus after maximal recession surgery, however, rectus muscle resection may be considered. We report a series of 8 patients with Graves' ophthalmopathy who underwent rectus muscle resections.

METHODS

The records of 270 patients with Graves' ophthalmopathy who had undergone strabismus surgery were retrospectively reviewed. Data from subjects who had undergone rectus muscle resections were collected, including age at surgery, duration of disease, duration of diplopia, previous eye or strabismus surgeries, history of radioactive iodine or corticosteroid treatment, current thyroid medications, current use of corticosteroids, tobacco use, and signs and symptoms used to diagnose Graves' ophthalmopathy.

RESULTS

Eight patients (5 females) were identified (mean age, 51.1 ± 17.6 years). Preoperatively, 4 patients had a horizontal deviation and 4 patients had both horizontal and vertical deviations in primary gaze. Mean preoperative horizontal deviation was $27.9^\Delta \pm 15.2^\Delta$ and mean vertical deviation was $6.3^\Delta \pm 5.4^\Delta$. At final follow-up examination, 7 patients were orthotropic in primary gaze; 1 patient had a larger deviation from slippage as the result of a broken suture within the first postoperative week. None of the patients were overcorrected or developed atypical inflammation.

CONCLUSIONS

In this series, patients with Graves' ophthalmopathy were successfully treated with the use of rectus muscle resections as part of the surgical plan. Careful ocular motility assessment and patient selection is critical if this option is contemplated. (J AAPOS 2013;17:9-15)

Vertical

Surgical outcomes of unilateral recession-resection for vertical strabismus in patients with thyroid eye disease

Ju-Yeun Lee, MD, Kyung-Ah Park, MD, PhD, Kyung In Woo, MD, PhD, Yoon-Duck Kim, MD, PhD, and Sei Yeul Oh, MD, PhD



- In 4 / 6 patients, final vertical deviation $<4^\Delta$
- No postoperative inflammation or increased restriction of the resected muscle

DEL MONTE et al 20 cases

Adjustable resection or plication as a subsequent procedure

18/20 : good/excellent (fusion or $< 10^\Delta$ deviation)

Presented @ *Eye on the Future, L.V Prasad Eye Institute, Hyderabad, 2017*

Summary

Resect / plicate in TED

- Good results for [esp] vertical strabismus
- ? best considered as a 2nd [or 3rd] procedure if the 1st is inadequate
- Avoid a radiologically abnormal muscle

Surgical lessons learned...

LR Resect / plicate in Duane's

3 papers by Steve Kraft 2001, 2010, 2011

Kraft criteria

ET 25Δ or more

Poor aBduction [not past primary position]

LR resect $\leq 4\text{mm}$

No MR UA

On aDduction, up- /down- shoots are mild / absent

Mild co-contraction, enophthalmos

Not in very young children

The Sagging Lateral Rectus with Distance Diplopia = Sagging Eye Syndrome 25% of new pts with diplopia over 60y Japan, CA, Melbourne

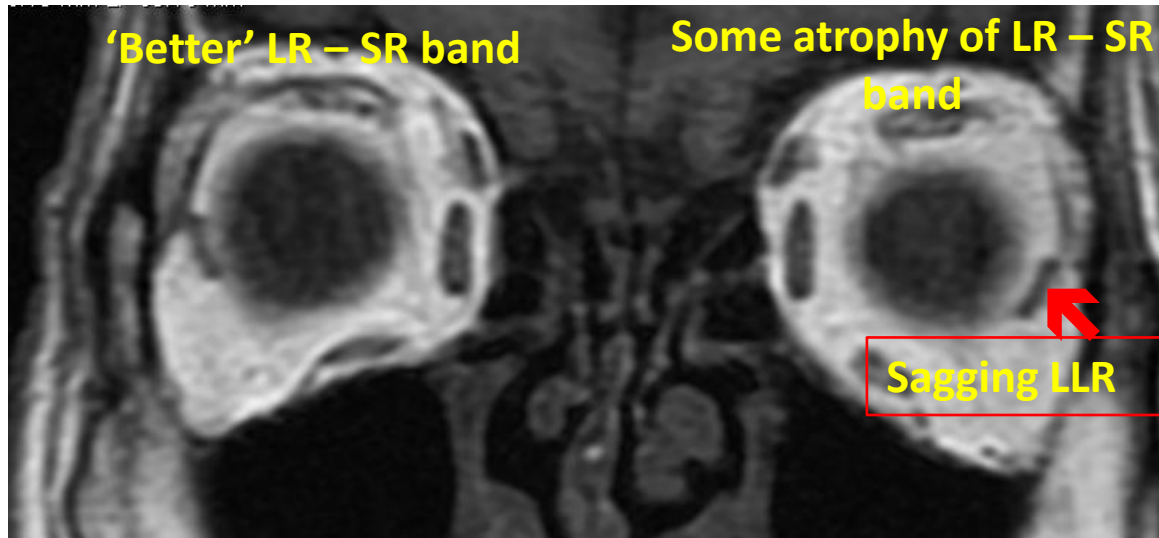
- Prisms fix most patients

Surgery

- ***Sup myopexy of LR*** [Clarke, Campos]
- BMR augmented [Demer]
- LR resect [Dai, Demer]
- LR-SR myopexy [Morad]

Superior myopexy of LR

- Raising the sagging LR restores the path & vector of the LR to normal: intellectually & mechanically elegant.
- 8-10Δ effect on ET
- Can add MR recess
- LK: total n > 20



J AAPOS. 2016 Oct;20(5):446.e1-446.e3. doi: 10.1016/j.jaapos.2016.05.020. Epub 2016 Sep 22.

Surgical correction of an inferiorly displaced lateral rectus with equatorial myopexy.

Clark TY¹, Clark RA².

Author information



**Clinical & Experimental
Ophthalmology**

Fresina et al., J Clin Exp Ophthalmol 2014, 5:3
<http://dx.doi.org/10.4172/2155-9570.1000337>

Case Report

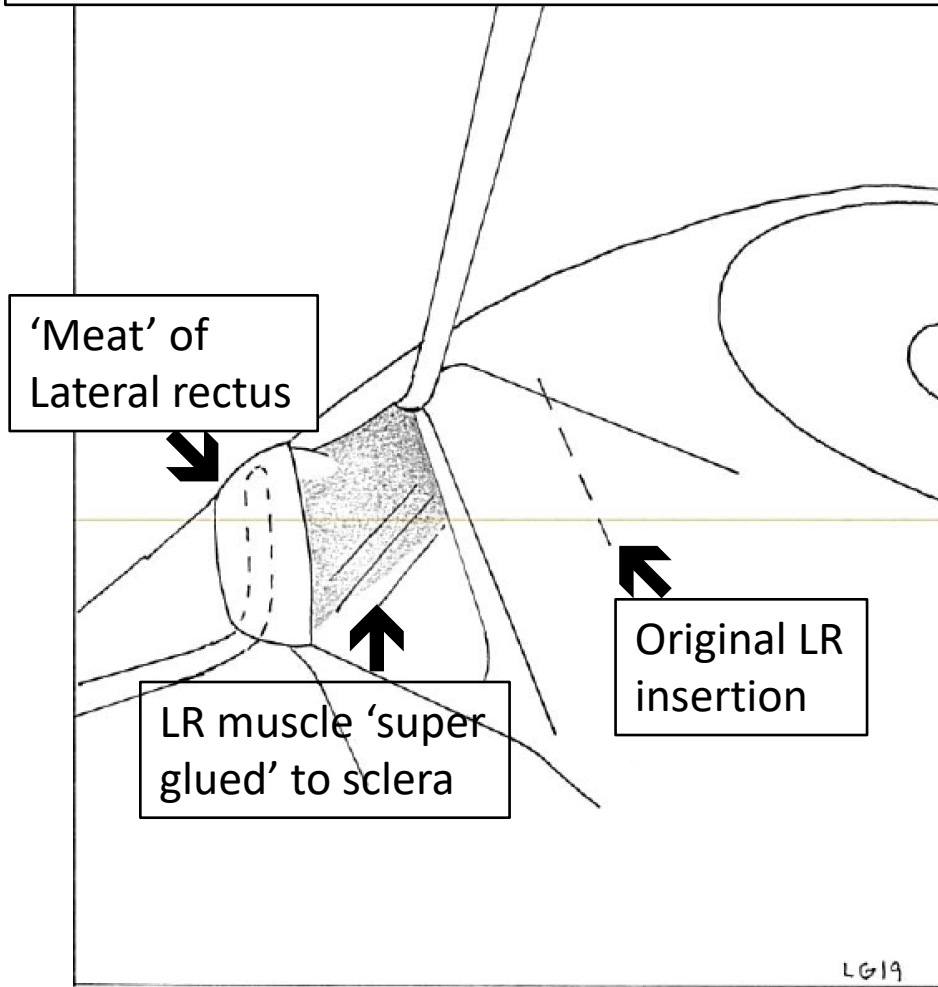
Open Access

BUT...

Equatorial Loop Myopexy in "Sagging Eye" Syndrome: A Case Report

Michela Fresina, Laura Sapigni, Cecilia Benedetti¹, Giuseppe Giannaccare and Emilio C. Campos

3 bad outcomes from sup myopexy LR : I have now abandoned this



3 cases. Initially good result. Early regression of ET: the LR anterior to the myopexy suture is 'superglued' to the sclera causing unplanned effective recession of the muscle to the point of the myopexy.

These problems with sup myopexy of LR have been previously recognised with scleral Faden

myoscleropexy is used widely in Europe but very little in the Americas. Proponents insist that it is reversible, but we do not agree. We have reoperated on some patients who had undergone this operation, and we found the muscle inserted on the sclera at the site of the sutures and adhered to the sclera from that point to the normal insertion site.

Muscular Structural Changes Following Fadenoperation

J.L. Alio, M.D., Ph.D.
M. Chacon, M.D.
A. Faci, M.D., Ph.D.
J. Uson, M.D., Ph.D.
I. Jimenez, M.D.

A. Vives, M.D., Ph.D.
G. Garcia-Julian, M.D., Ph.D.
M. Moros, M.D., Ph.D.
I. Gonzalez, M.D.
Salamanca, Spain

ABSTRACT

The authors describe the macroscopic, histological, and ultrastructural findings observed in an experimental animal model of the fadenoperation. Grossly, muscular fibrosis and musculo-scleral adhesions were well established after the second postoperative month. Histologic findings demonstrated the development of a granulomatous, foreign body reaction around the musculo-scleral fixation suture, collagenization of the muscle tissue from the first postoperative month and degenerative phenomena in the muscle fibers. Electron transmission microscopic study showed atrophy and angulation with distortion of the myofibrillar matrix, along with alteration of the Z bands of muscle fibers, mitochondrial alteration, and dilatation of the sarcotubular system. All these experimental findings suggest the relative irreversible effects of the fadenoperation after the early postoperative period and for the first time, demonstrated that this surgical technique alters the muscle structure.

1. Alio JL, Chacon M, Faci A, et al. Muscular structural changes following Fadenoperation. J POS 1984; 21(3): 102–109.

2. Prieto-Díaz J, Souza Dias C.

Strabismus. 4th ed: Butterworth-Heinemann; 2000: page 476

Surgical lessons learned....

BMR in childhood nystagmus with orthotropia

- IN & PAN /APAN often have a convergence null for near.
- $\geq 1/3$ of these pts also have a convergence null for distance = CND with 7Δ BO OU & -1 DS OU **They should have a trial of Δ glasses in real life**
- If CND is confirmed in real life &
- If CND is preferred to any eccentric null, ...
- **Then BMR is likely to also produce the same null = Artificial Divergence Surgery [Spielmann]**

7Δ BO OU & -1 DS OU over CLs

creates distance conv null & ***straightens both turn & tip***

Face turn to L 25+ °, tip up 20°



If home spectacle trial shows that CND is effective...



..there is a high positive predictive value that **BMR 3 ± Tenotomy / resuture LR OU** will also be effective

Medial rectus pulley sutures MRPS

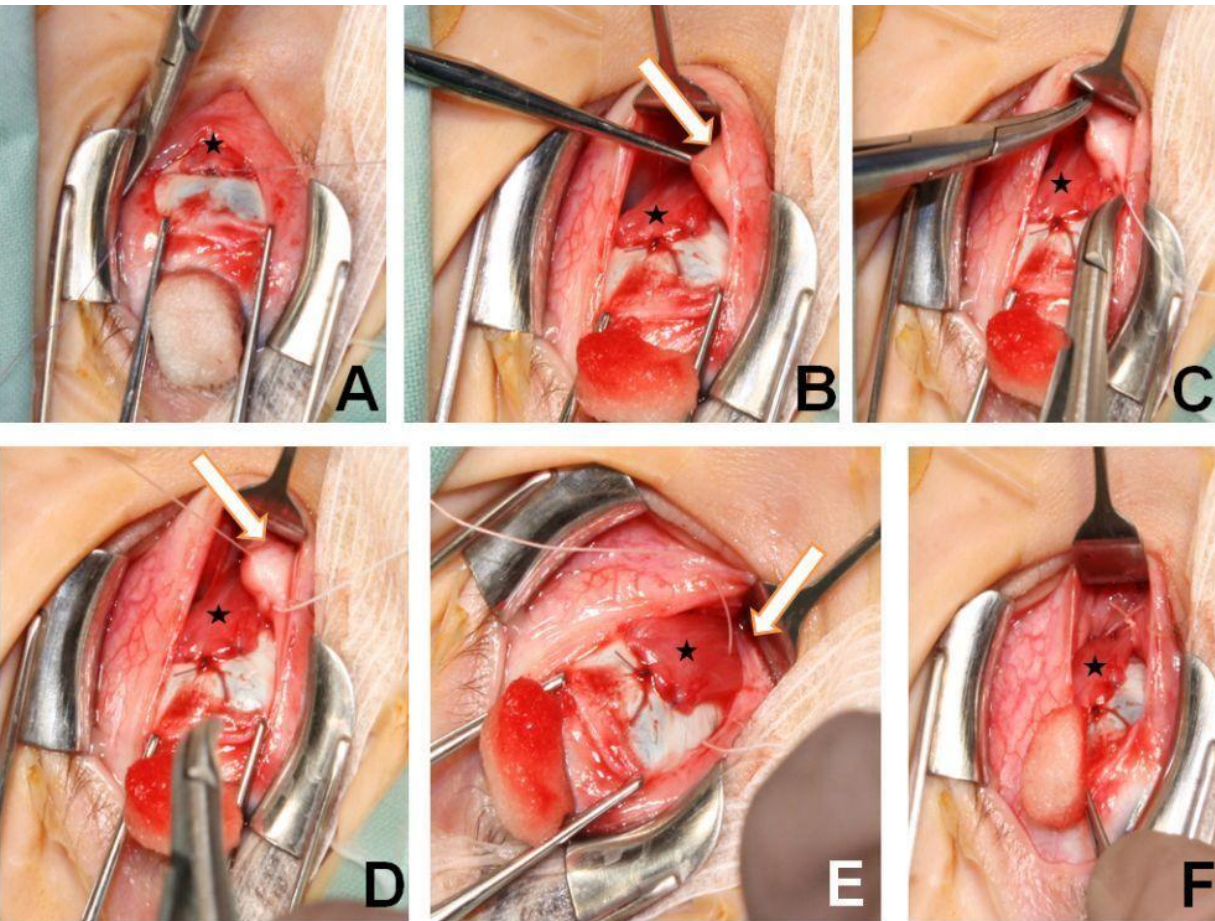
Thank You Joe Demer

- Same effect as Faden = posterior fixation suture PFS
- PFS: muscle sutured to sclera to create a restriction of movement through the adjacent orbital pulley
- MRPS: MR is sutured directly to its orbital pulley to create a restriction - marginally safer than PFS - no scleral bite

Useful for:

- **High grade convergence excess**
- **Near-only ET' of an amblyopic eye**

The orbital pulley of the MR:
white, dense, strong, resists anterior deformation



An orbital structure
~10 mm behind the MR
insertion.
Well defined @ the
superior & inferior
borders of the MR.
If the MR is sutured to
it, it creates an
adduction deficit of
the MR, similar
to posterior fixation
scleral suture

THANK YOU

- ..to my teachers @ Wills
- ..to international colleagues who have come to Australia to teach
- ..to colleagues who help me to help my patients
- ..to my students who keep me intellectually challenged and honest
- ..to the AAO for inviting me today