

Surgical management of paralytic strabismus

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Objectives

- To Present Some surgical procedures for Paralytic Squint
- To present 3 case studies with IIN, IV, VI palsies
- Generate interest In Strabismus Surgery

PARALYTIC STRABISMUS

- Paralytic strabismus is an incomitant strabismus due to motor deficiency of one or a group of extra ocular muscles

Typical CLINICAL PRESENTATION

- Binocular DIPLOPIA,
vertical, horizontal, Oblique
- CHP
- Usually large angle deviation
(Secondary Deviation)
- Others

Surgical Aim

- Aim
- Abolish/ reduce CHP
- To get largest area of useful binocular vision
that is straight ahead, down/reading
- Cosmesis

SURGICAL PRINCIPLES IN PARALYTIC SQUINT

- Complete muscle palsy where there is no residual muscle function do not respond to the usual strengthening procedures
- Transposition of available functioning muscles is the main option

SURGICAL PRINCIPLES IN PARALYTIC SQUINT

Improve ocular movement in Paretic eye

- increase the action of the involved muscle through a resection or tucktype procedure
- Use alternate force vector (often necessary in complete paralysis) by an extraocular muscle transposition procedure.

principles

- Weaken the **yoke** muscles of the other eye. The “normal” eye needs to be matched to whatever resulting function can be achieved in the involved eye. (Herring’s Law of equal innervation)

principles

The direction of greatest deviation determines *which* muscles are operated

The quality of the remaining duction (good, fair, poor) helps select *what* operation to perform.

principles

- Other options include permanent fixation of the eye in primary position with autogenic material or nonabsorbable sutures.

III Nerve PALSY

Typical clinical presentation

- Complete/partial
- Divergent
- Depressed
- Intorted
- ptosis
- Pupil spared or involved
- No AHP if complete ptosis
- Face turn, if little ptosis

BEWARE OF MG



3Nerve paralysis

- Wait for at least 6-12 before surgery
- **Squint corrected before ptosis**
- Distinguish partial from complete/complete

Do Force Generation Test

- Partial: Maximum Recess/resect
- Faden Operation (Posterior fixation on LR)

IIIN Paralysis with no adduction

- OPTIONS
 - Recess/resect with traction sutures(Non Absorbable)
- Superior Oblique transposition
- Nasal transposition of vertical recti with resection
- Periosteal fixation suture, usually with LR weakening
- Lateral Rectus split and transposition to MR border

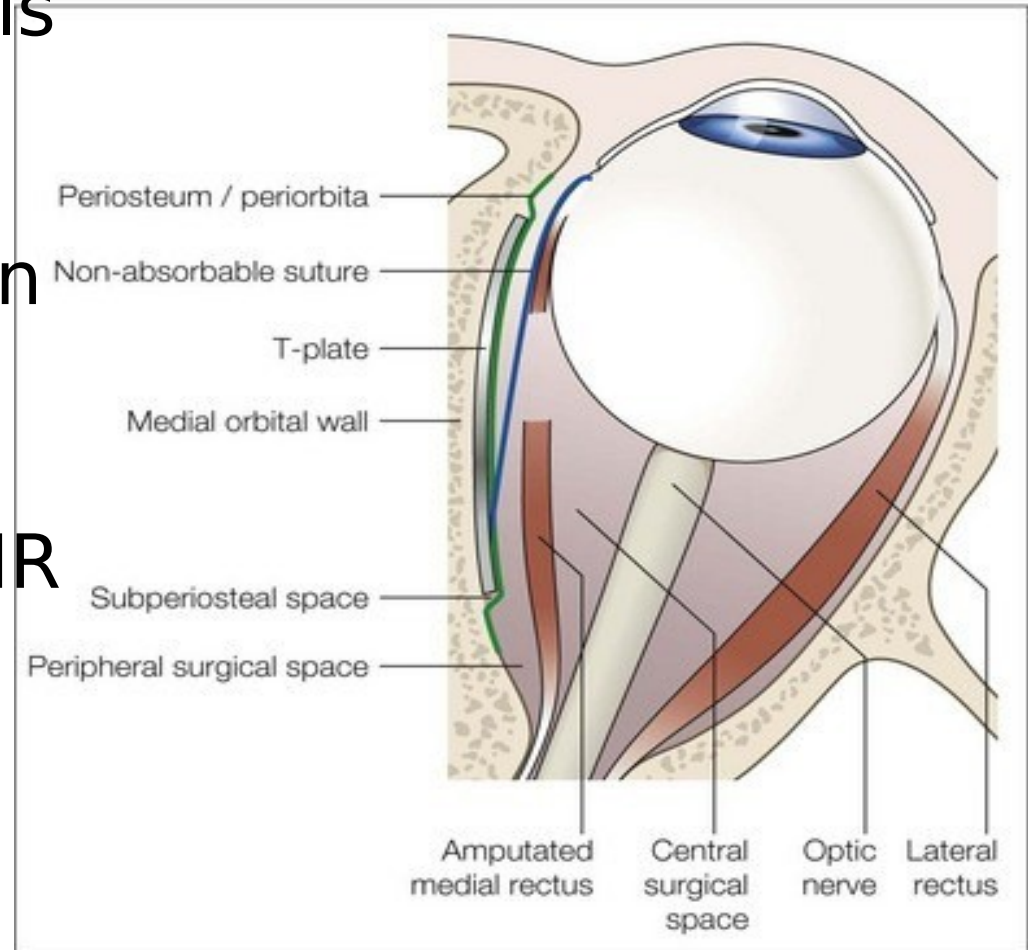
Superior oblique transposition



Figure 1: Surgeon's view, right eye. The superior oblique tendon is cut at the medial border of the superior rectus muscle (dotted line) (A). The superior oblique tendon is then secured 1-3.5 mm anterior to the medial insertion of the superior rectus muscle (B).

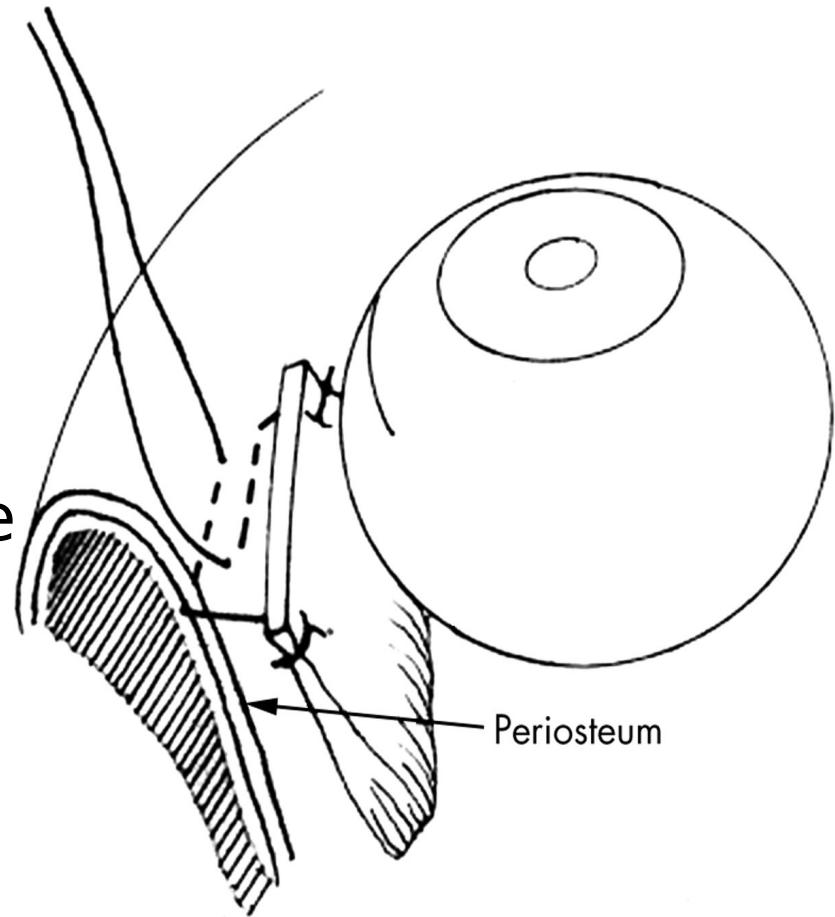
Periosteal fixation of MR

- Mechanically pulls the globe from abduction and anchors the eye in desired primary position.
- The amputated MR is fixed to the periosteum anterior lacrimal crest



Periosteal fixation of LR

- Identify LR
- Blunt adjacent periosteum about 5 mm from orbital margin
- Apply 5.0 nonabsorbable suture about 2mm from insertion to LR
- Disinsert LR
- Fix to orbital wall



III Nerve case study

- A 65 year old man farmer with two year history of CVA, resented to my office with complaints of inability to open right eye since he suffered a stroke 2 years.





- Main Complaint : “Doctor I cant open my right eye”
- POHx :Nil
- PMHx :Hypertensive, Rt sided midbrain CVA has been diagnosed

Examination

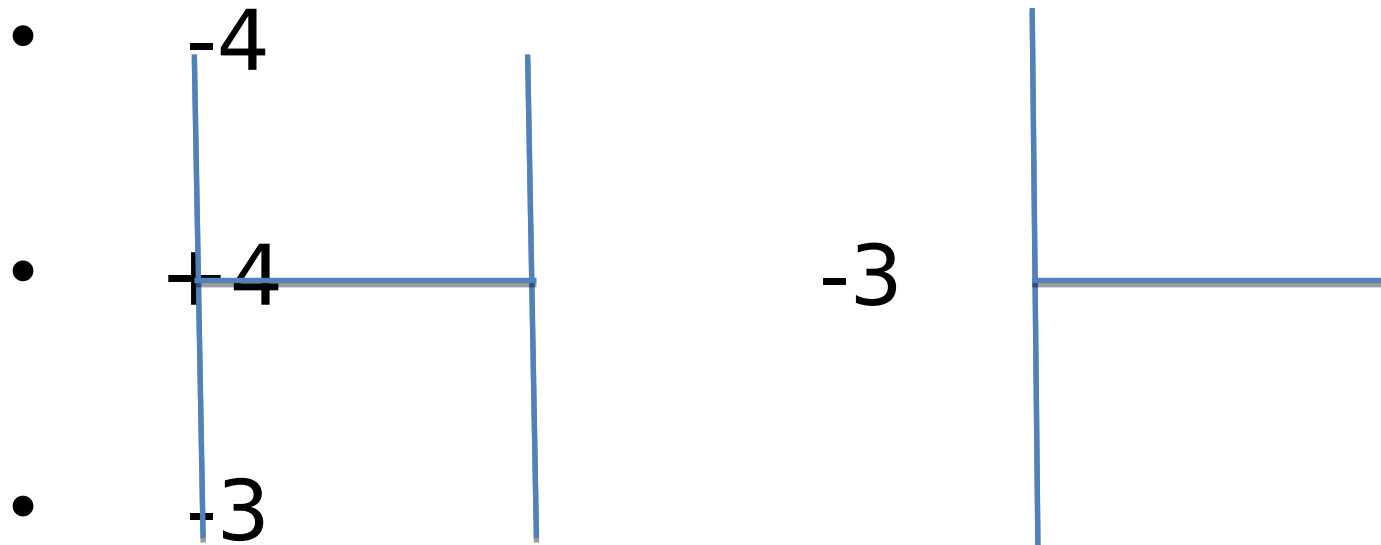
Observation

Left Hemiparesis

- No CHP
- Complete blepharoptosis

Examination

- VR 6/18, VL 6/12
- Ocular motility



- Motility in LE Normal

Measurement

- Large angle Exotropia RE about 100[^]
- 15[^] hypotropia RE

surgery

- Threestage surgery was planned
- Horizontal realignment
- Vertical realignment
- Ptosis correction

- During Surgery
- FDT to assess extent Tightness (contacture) lateral rectus .

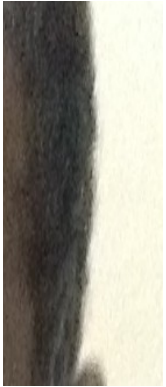
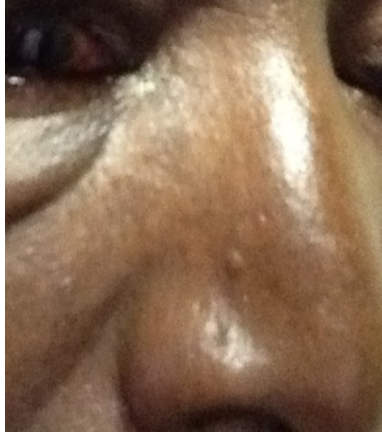
- Stage 1
- Supra maximum LLR recession 14 mm (LR found to be tight)
- Supra maximum Resection of LMR 12 mm

Vertical alignment 3 months after stage !

- 5 mm inferior rectus recession with adjustable suture. (1mm corrects 3[^])
- Ptosis Surgery
- Frontalis suspension with Silicon Rods

Results

- 20 ^ XT
- Palpebral fissure height improved
- Improved Bells phenomenon
- No corneal staining
- No Diplopia in primary
- Little diplopia on down gaze



4TH NERVE PALSY

CLINICAL PRESENTATION

Poor depression with the eye in adduction

Chin depressed

Head tilt to opposite uninvolvement side

Oblique diplopia/diagonal

Overaction of antagonist IO causes the paretic to be Hypertropic in primary position

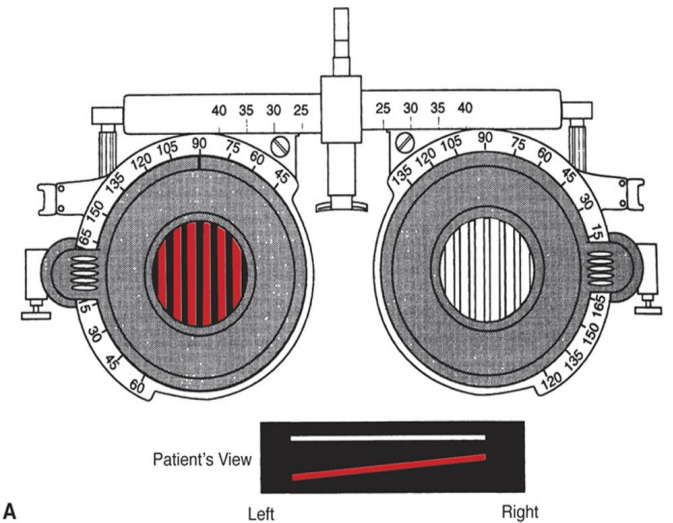
4 n

- If acquired wait 6-12 months before surgery
- IO weakening- 1st option RECESSSION/
MYECTOMY if $I^0 < 15^\wedge$
- $>15^\wedge$ IO recession + contralateral IR recession
- Ipsilateral IR resection

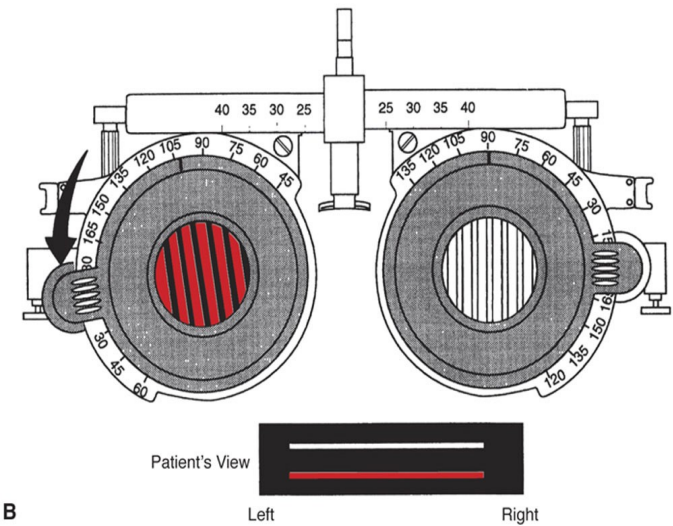
Assess ocular torsion

- Patients with torsion have diplopia on down gaze /going down stairs and reading
- Measure with double Maddox ROD
- 14° or more indicates bilateral 4N palsy
- Congenital SO do not have or have little torsion 2-5 degrees
- Treat with Harado-Ito procedure

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A



B

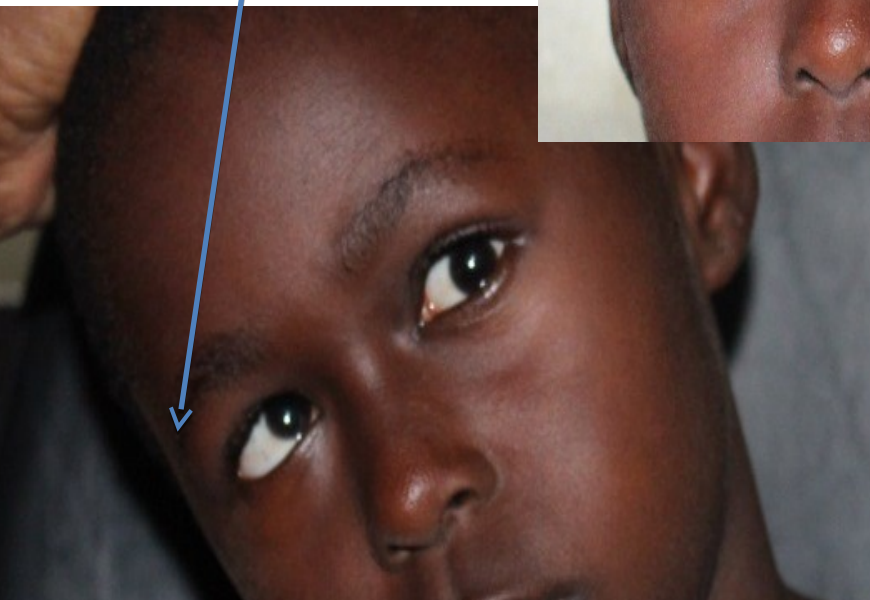
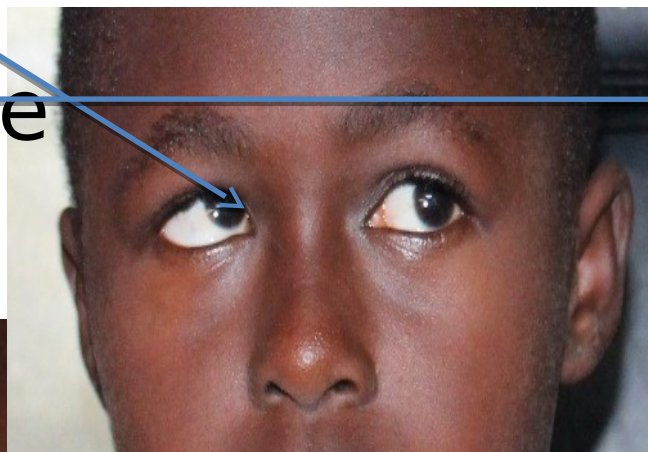
IV Nerve case study

- 9 year old girl .
- Short history of febrile illness followed by diplopia 2 weeks before presentation.
- Exam
- VR 6/9 VL 6/6
- Cycloplegic refraction
- RE +2.00/-1.00X100
- LE +2.00/1.00X80



SOS

Same
Opposite
Same

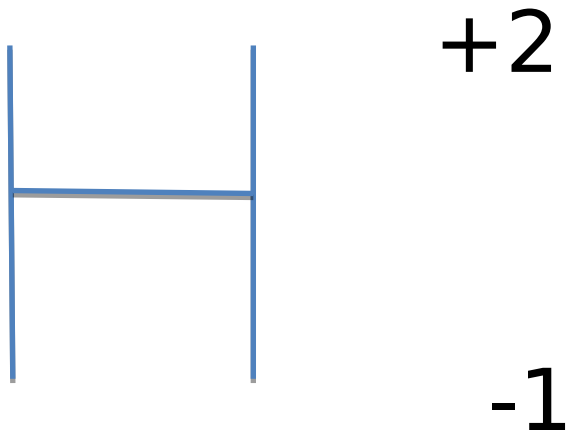


BEFORE

- Head tilt to the left

	10	
15 Hyper	30	
	40	

- +2 IO overaction
- Positive head tilt test



LE Normal

- Superior oblique palsy
- A pattern Esotropia

What was done

- Rt Inferior oblique recession 4mm, 2mm
- Rt MR Recession with $\frac{1}{2}$ tendon width
Up shift



AFTER

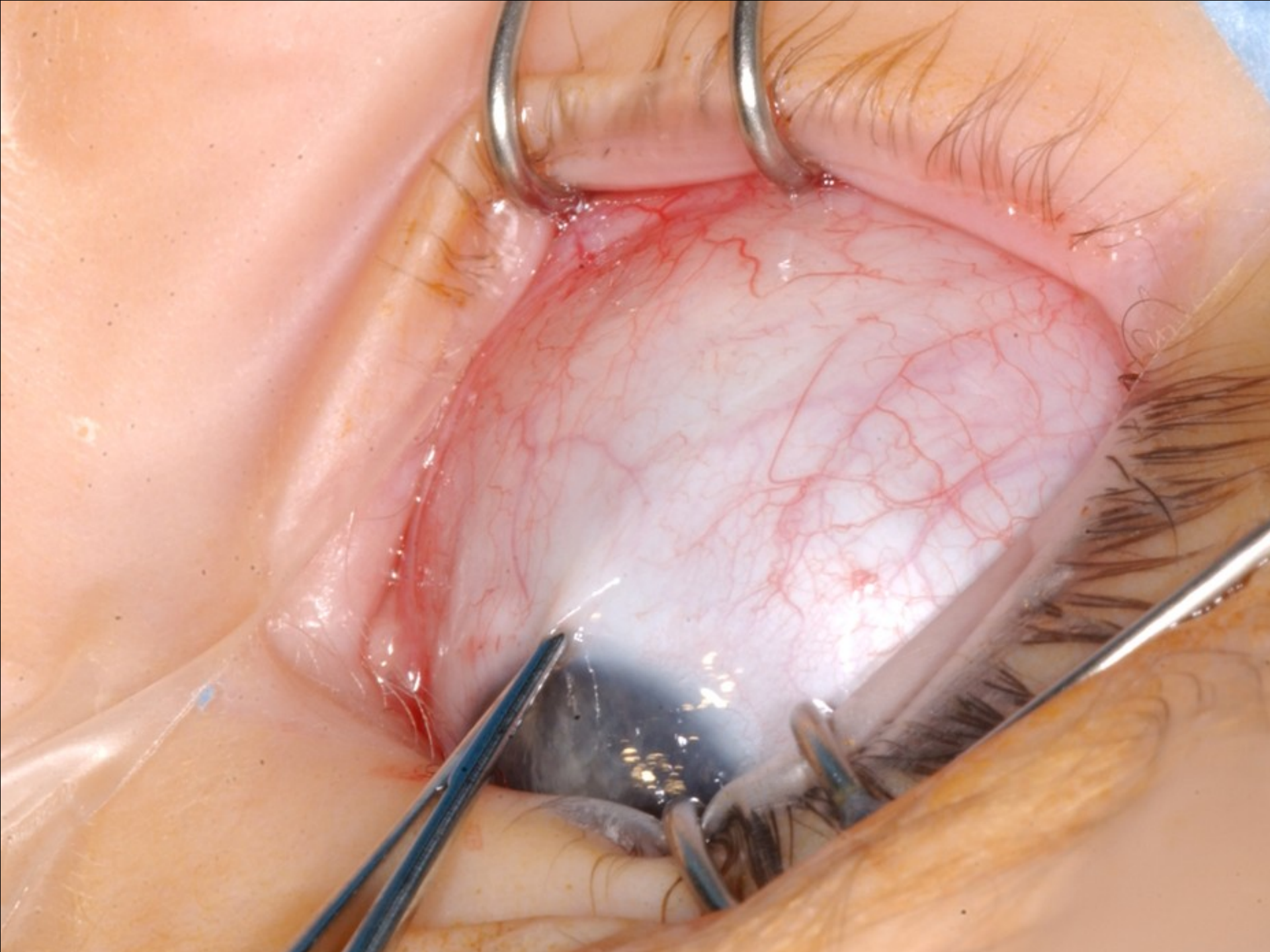
outcome

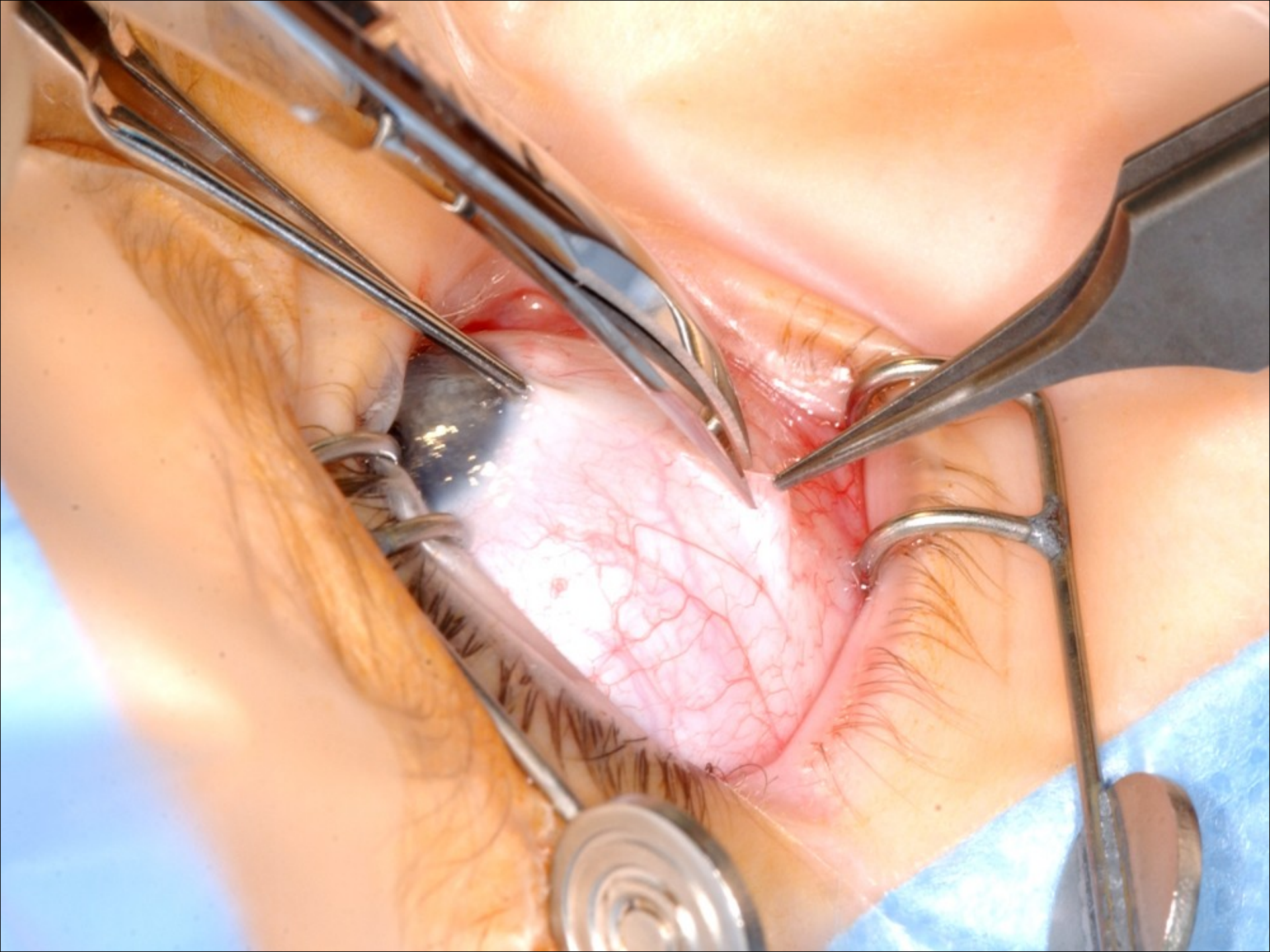


outcome

- Good alignment in primary position No Head tilt 8[^] residual ET
- No CHP
- No diplopia

Inferior oblique recession



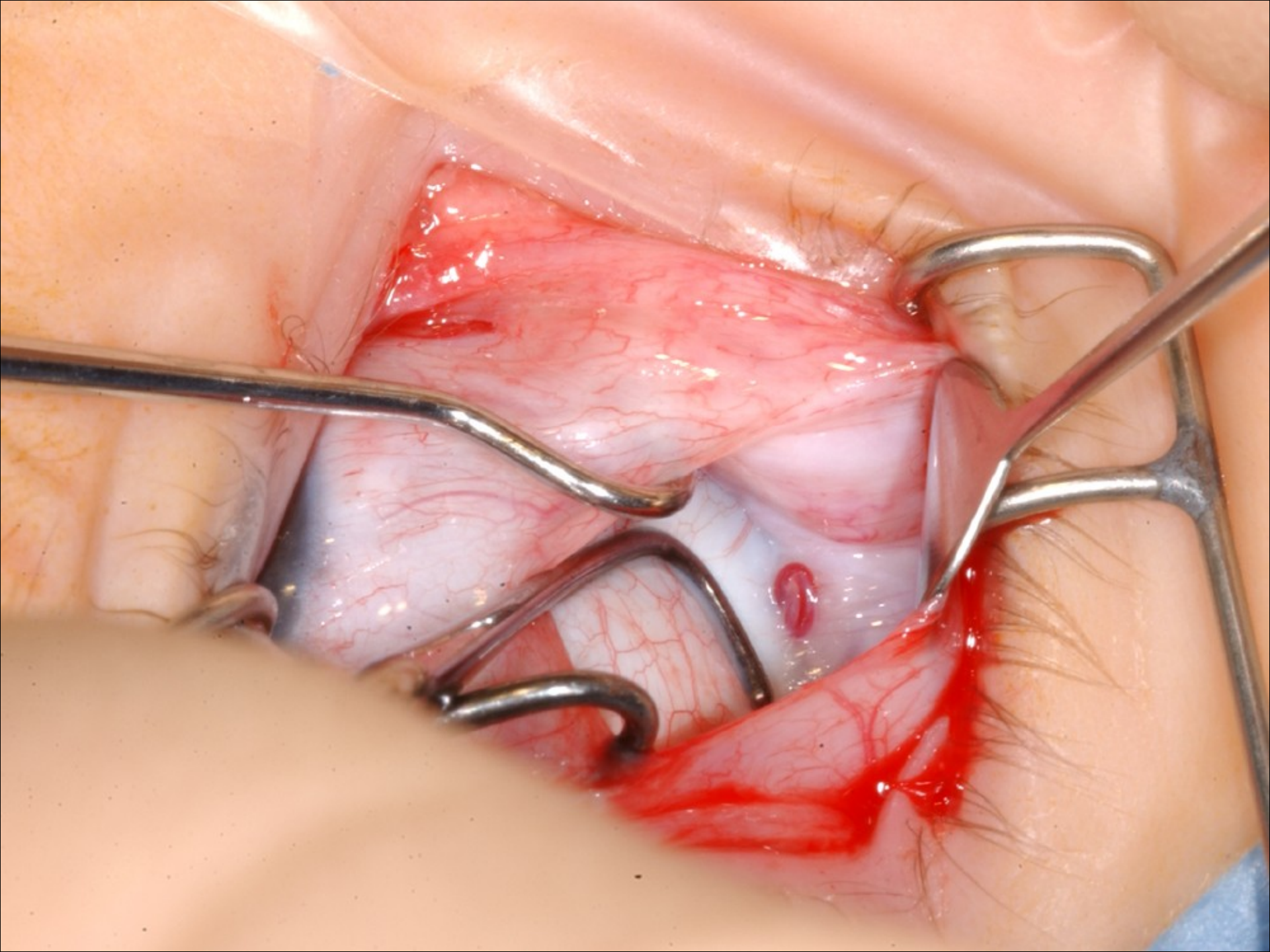


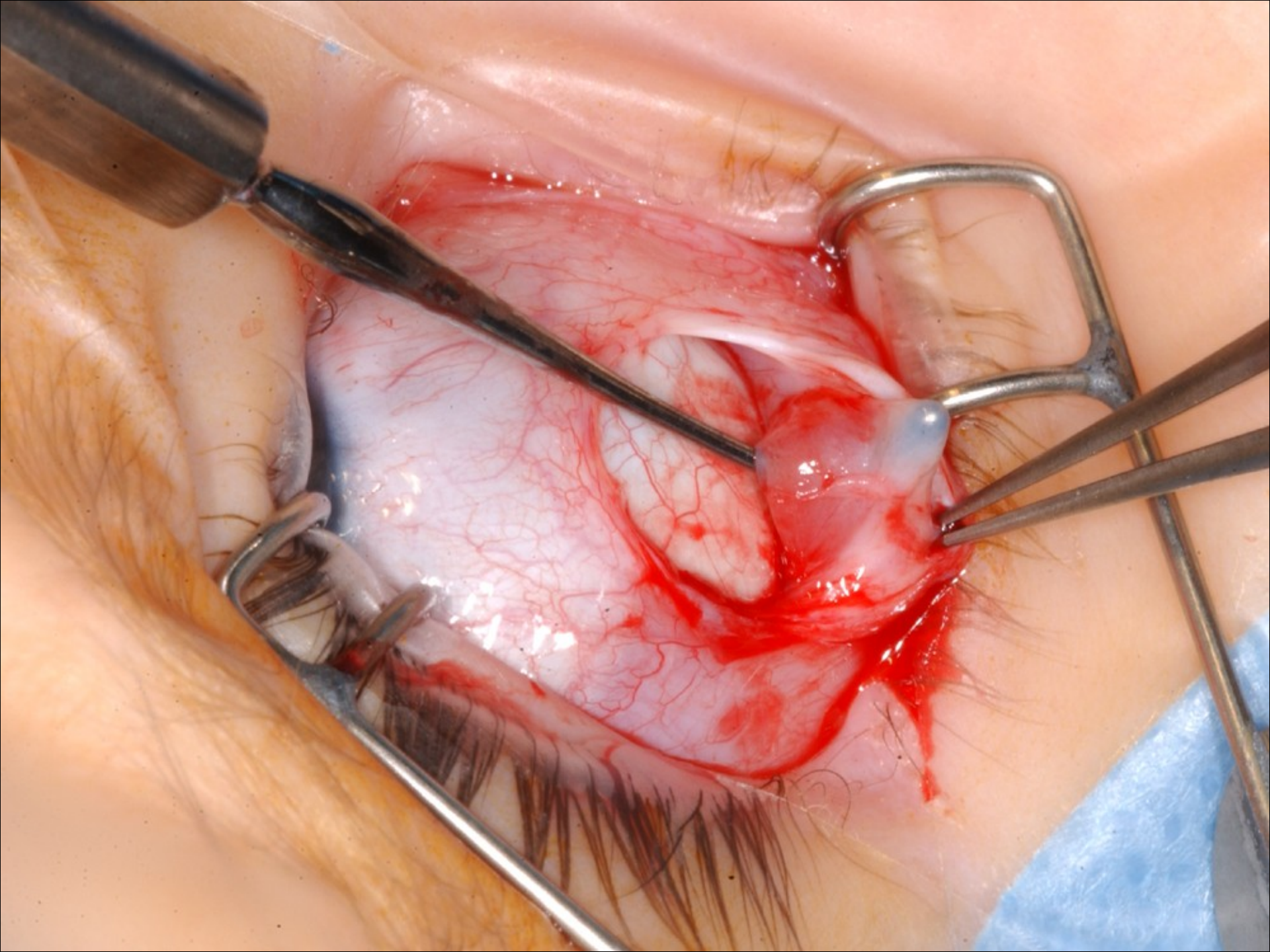
Isolate inferior and lateral rectus

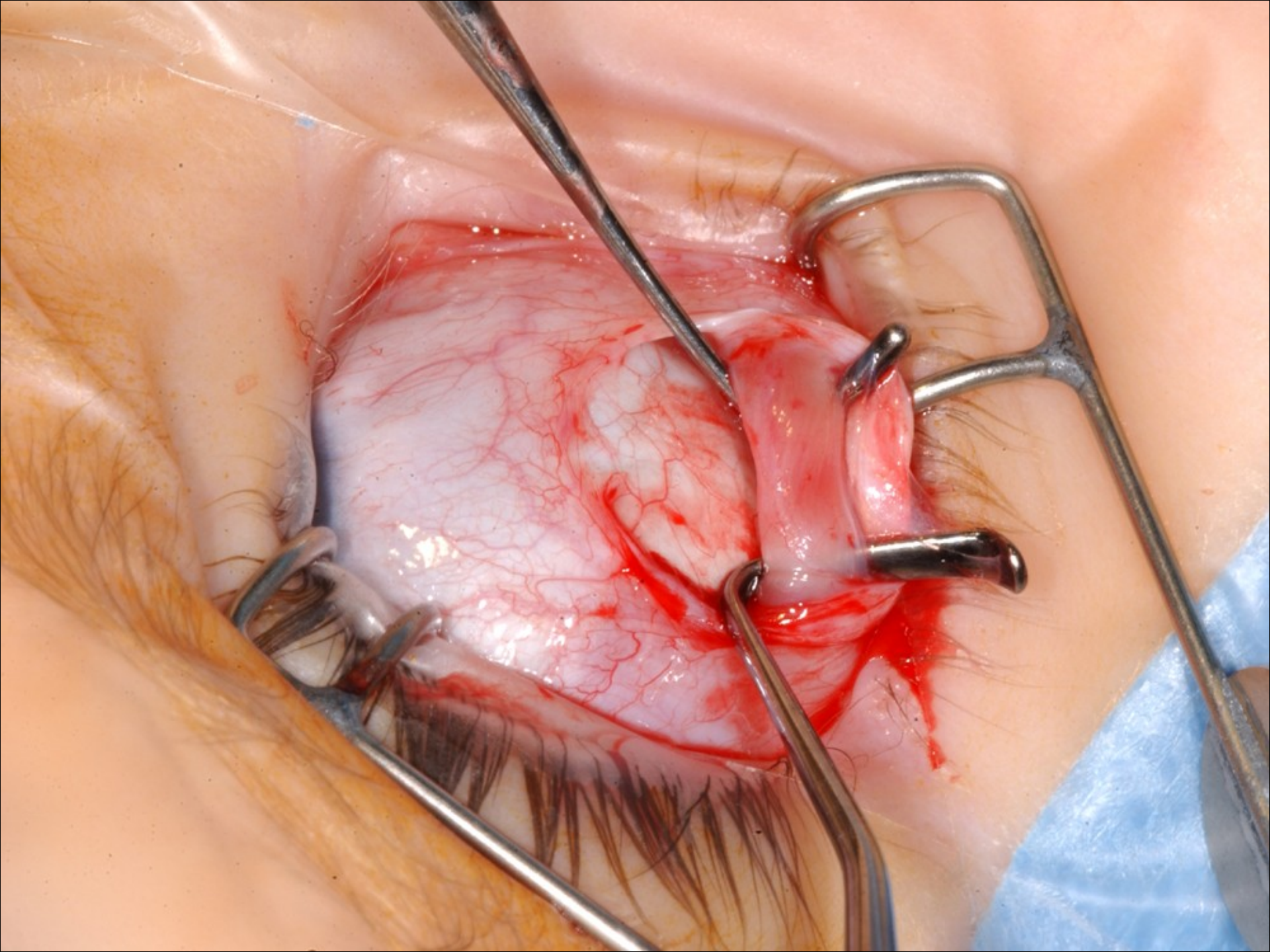
- Jameson hooks
- Elevate and adduct globe
- Elevate posterior aspect of wound with Desmarres

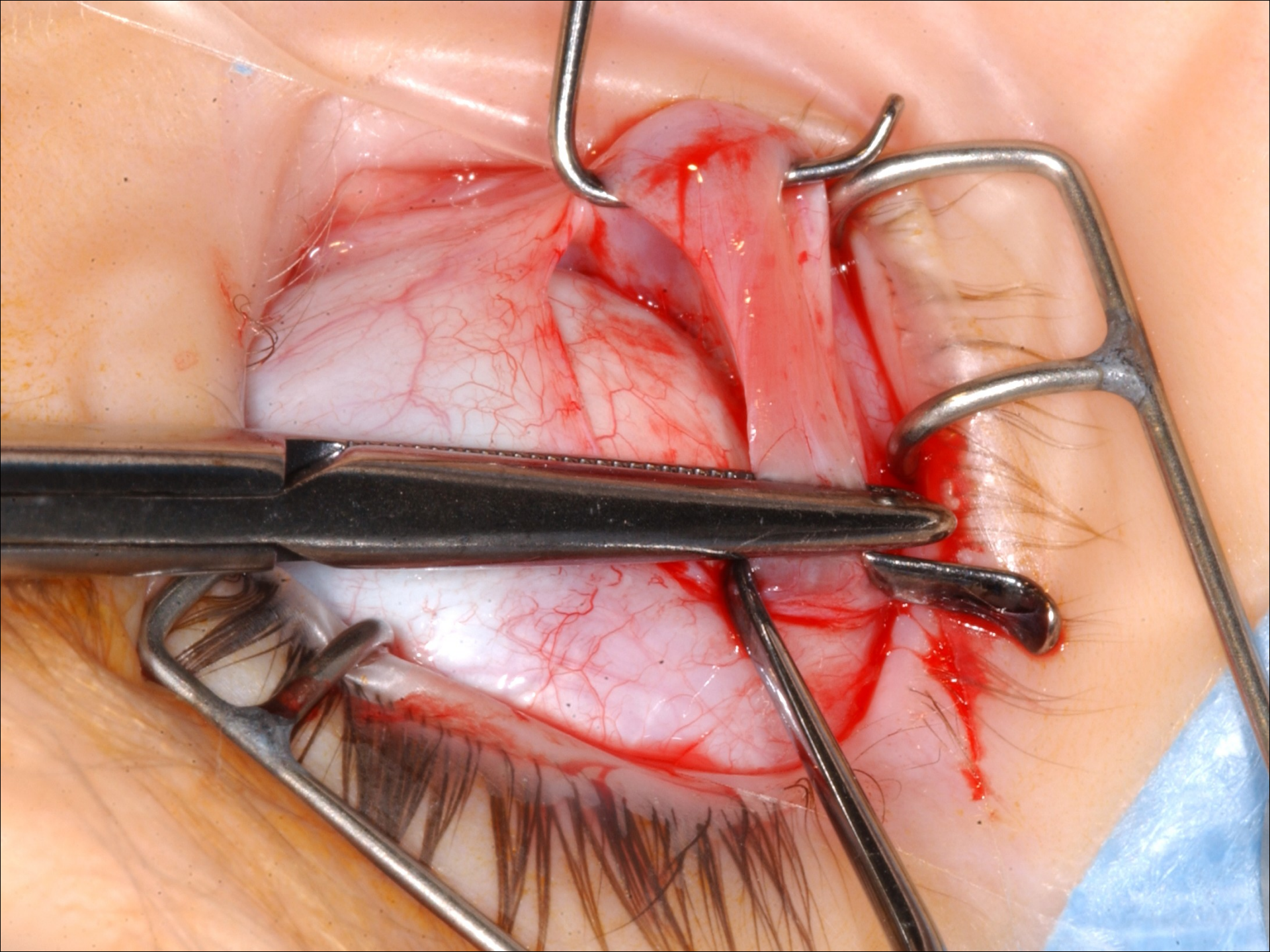
Isolate inferior oblique

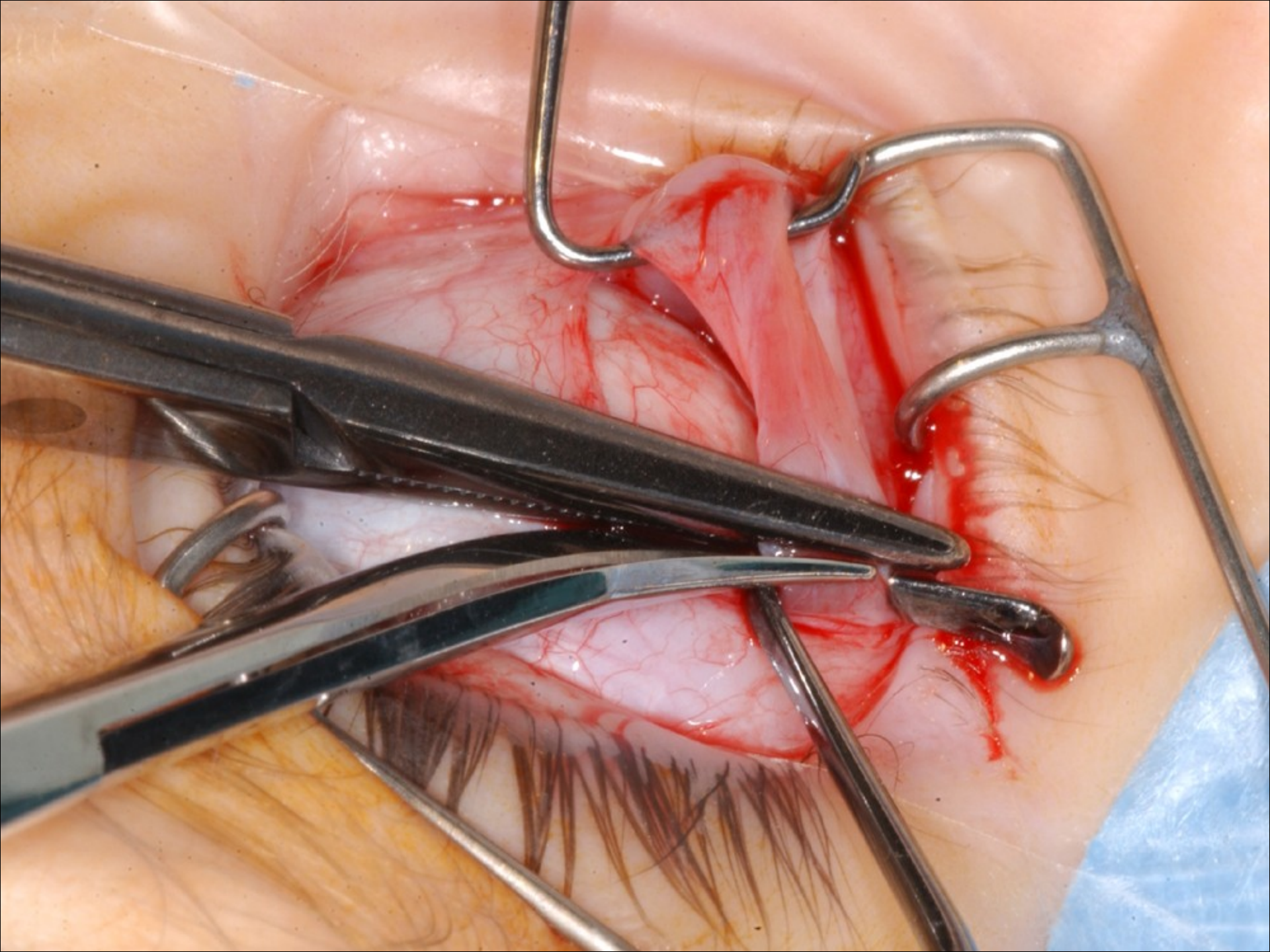
- Look lateral to infero-temporal vortex vein
- Stevens hook
- Avoid placing anything but muscle on hook
- Make small opening over tip of hook in posterior tenon's layer

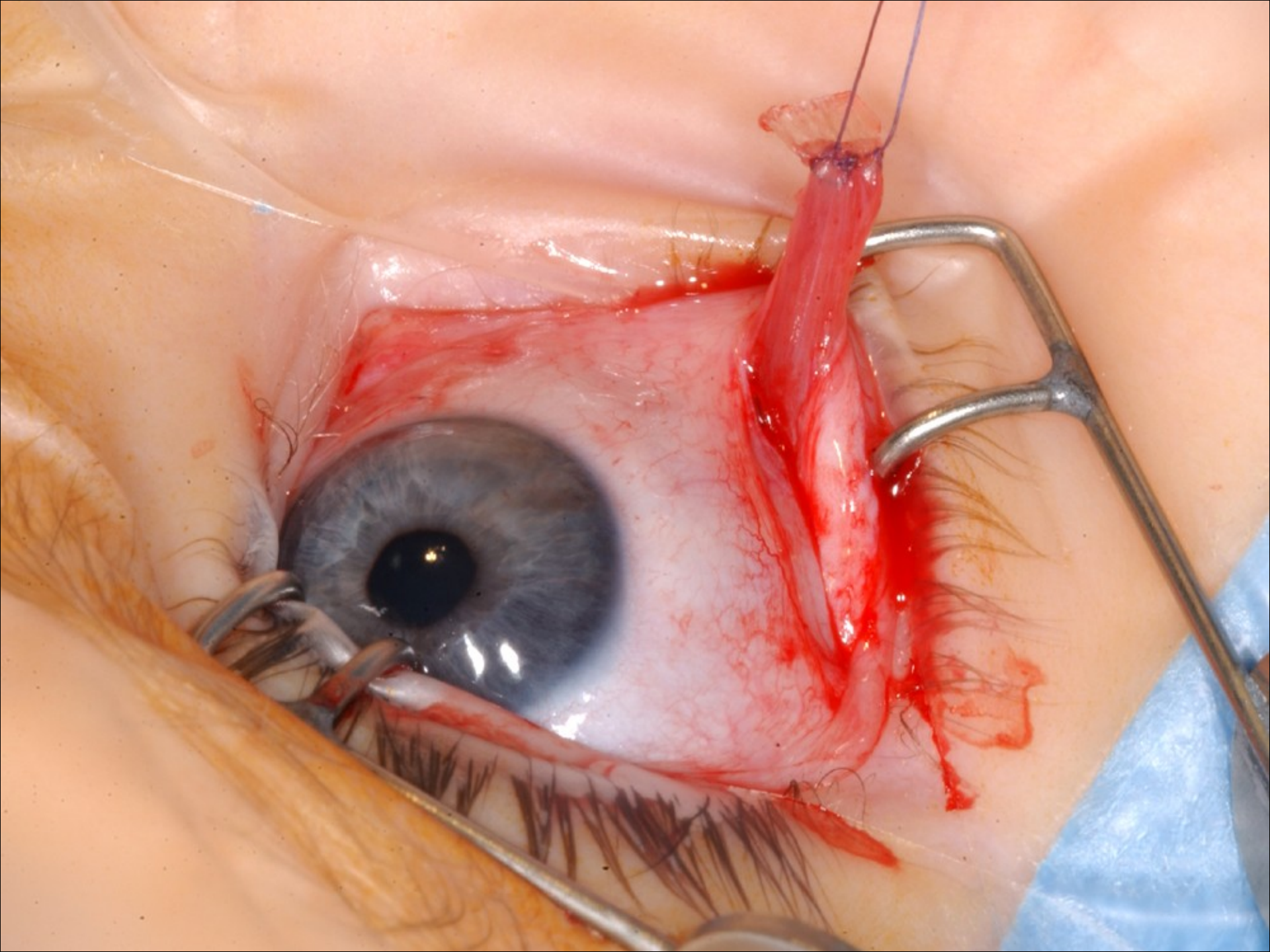


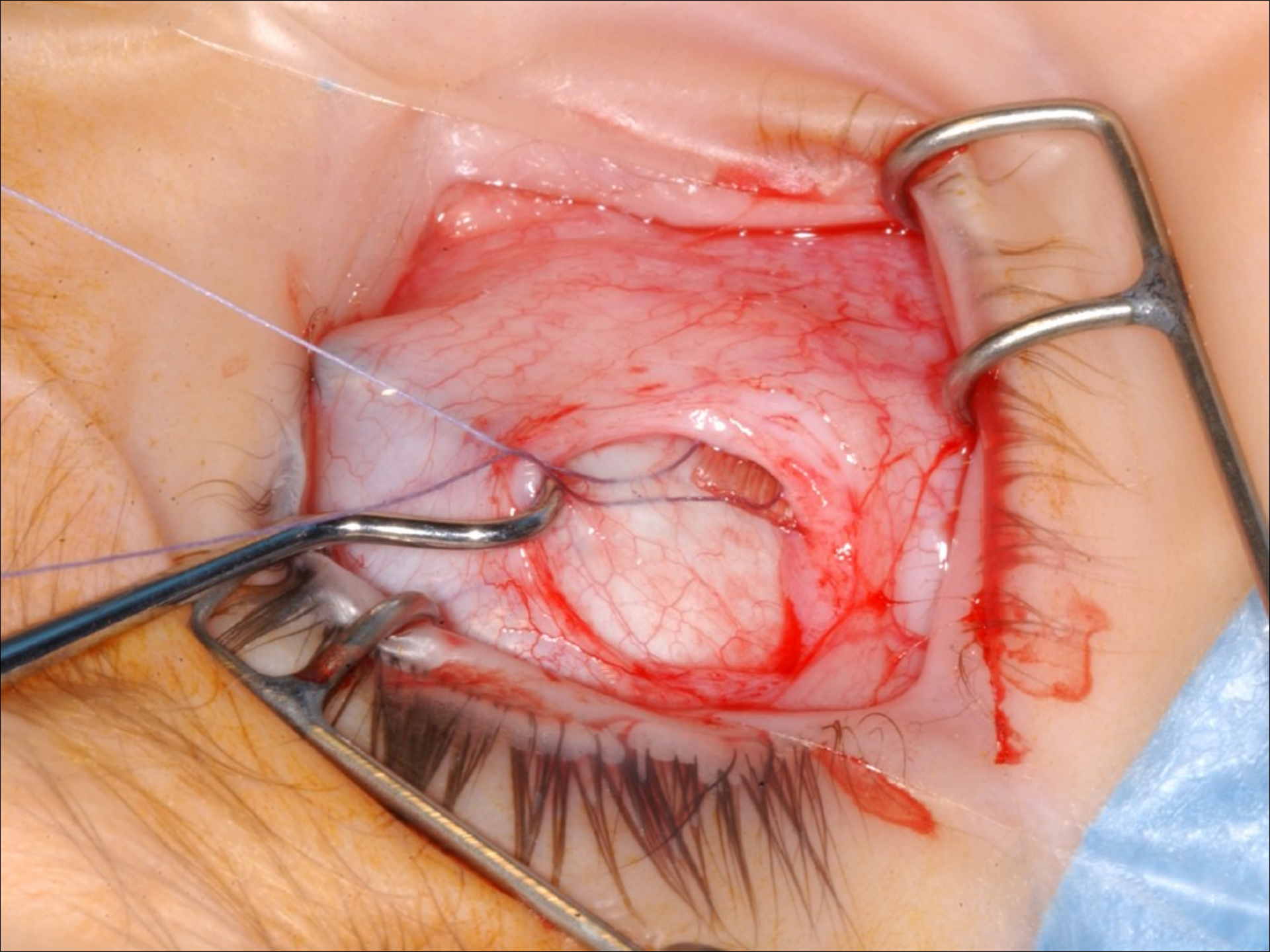


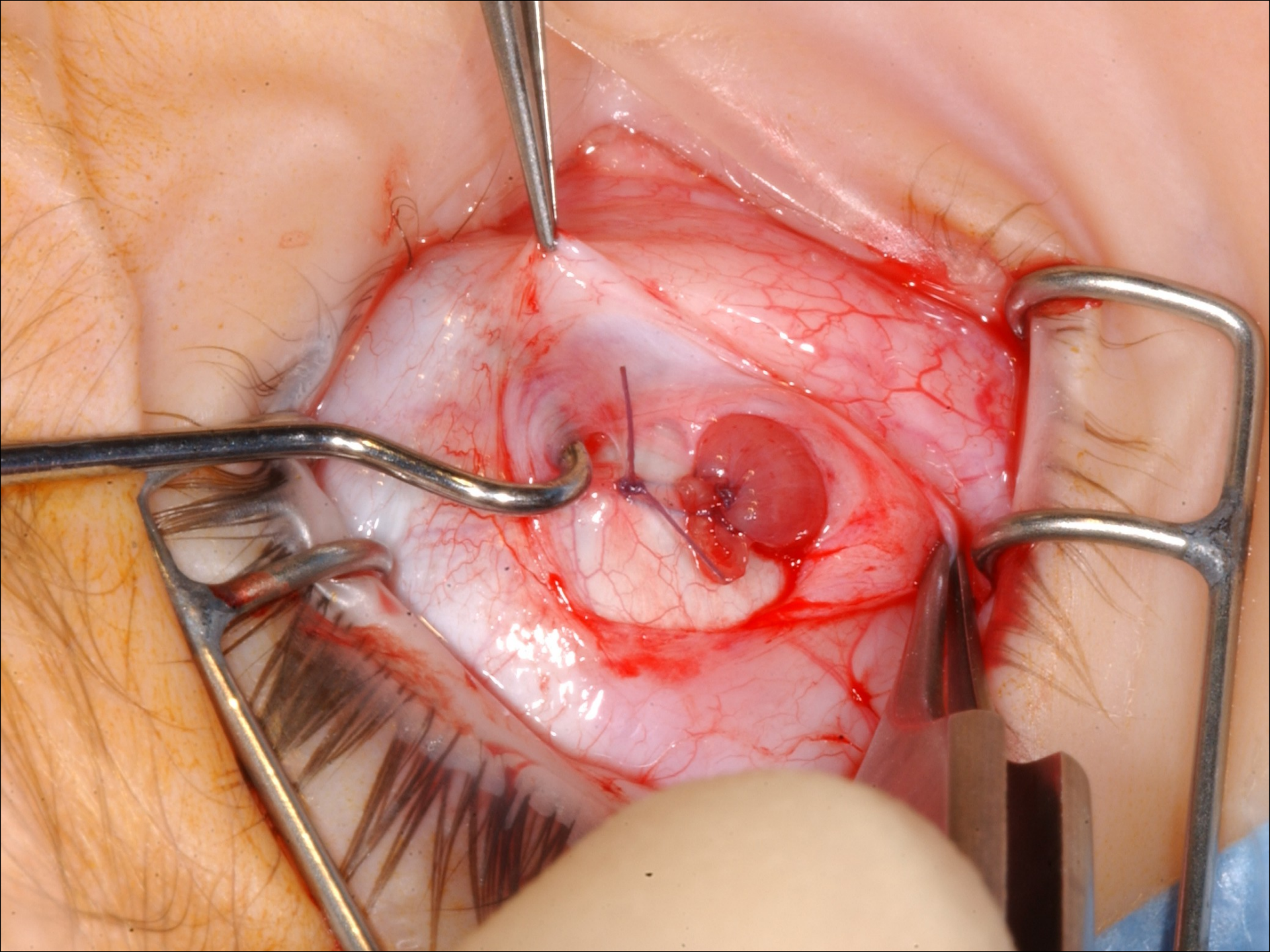












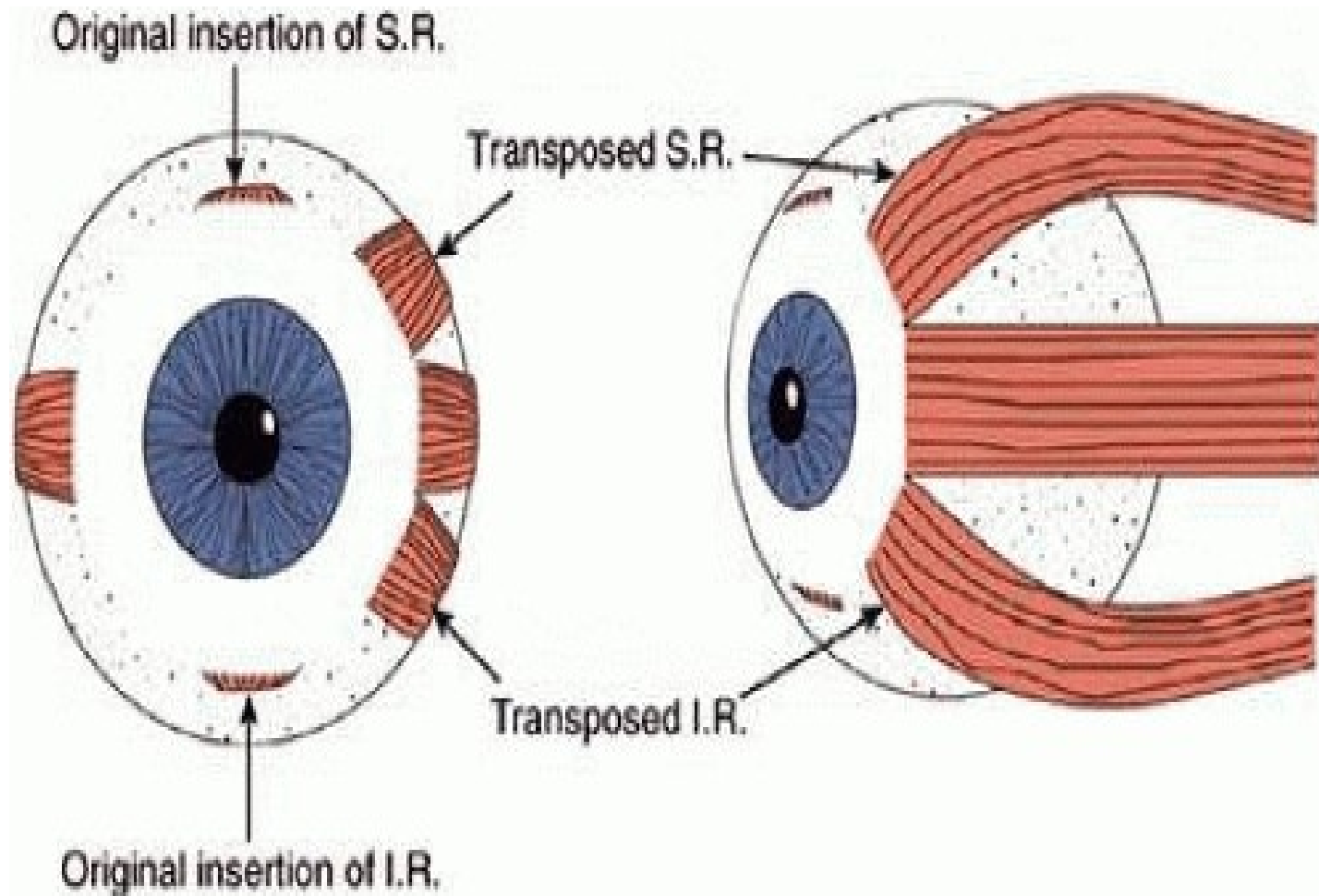
6N

- ET worse for distant
- face turn to affected side
- may be congenital
- Acquired :Wait b/ 6-12 months fr acquired
- Partial/total
- Force generation test to assess strength in LR
- PARTIAL= EYE ABDUCT BEYOND MIDLINE RECESS/RESEC +ADJUSTABLE SUTURE
- Vertical Recti Transposition for complete
- Risk of anterior segment Ischemia

TRANS

- FULL TEDON OR HALF TENDON OF SR IR TO LR BORDERS
- +
- MR Supra maxRECESSION /FADDEN
(posterior fixation Suture)

VRT



Case 6

- 14 year old boy presented in 2014 with complaints of diplopia face turn to the right.

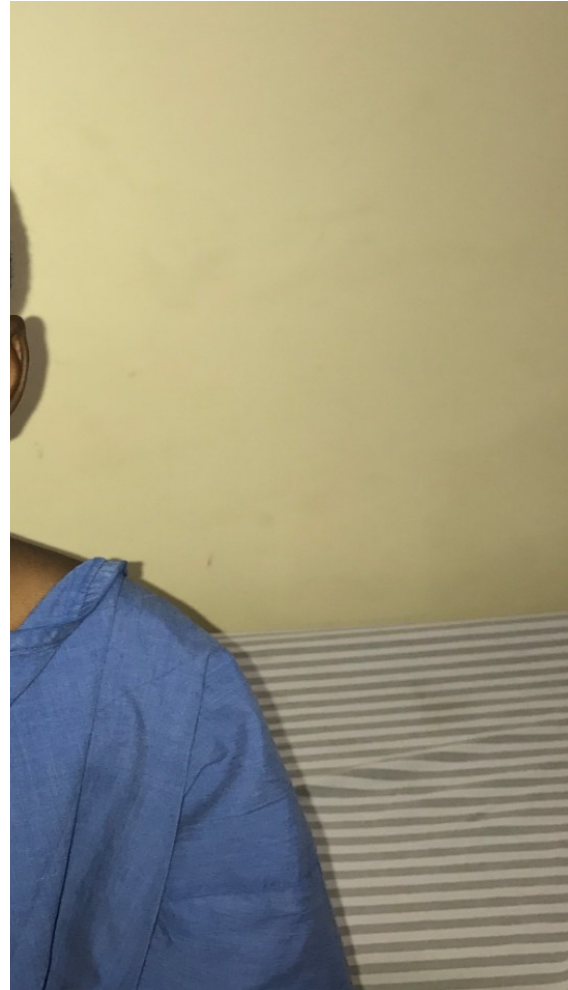
PMHx

- He was knocked down by a moving vehicle when he was two years (about 9 years before his visit) and sustained a head injury and has since had a face turn.
- **POHx**
- In 2016 VRT (Vertical Recti Transposition) to the insertion of LR were done)

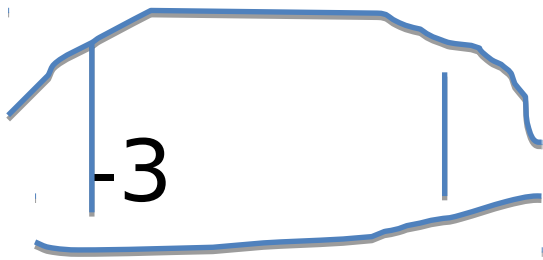
- Diplopia in primary gaze, worse on right gaze. No diplopia in left gaze.
- Child still maintained large face turn to the right
- LE -3 abduction deficit

One month ago

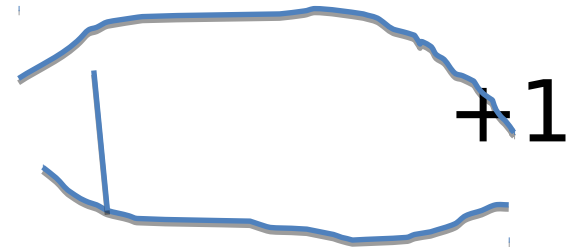
- Diplopia in primary gaze, worse on right gaze. No diplopia in left gaze.
- Child still maintained large face turn to the right about 40°
- Good alignment with face turn
- LE -3 abduction deficit
- **Large angle deviation on Right lateral gaze $>90^\circ$**

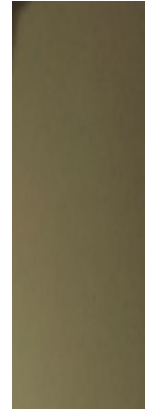


Motility



+1



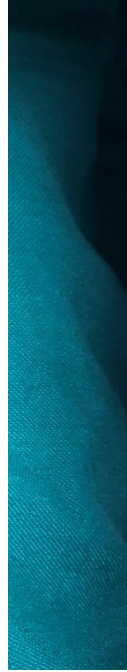
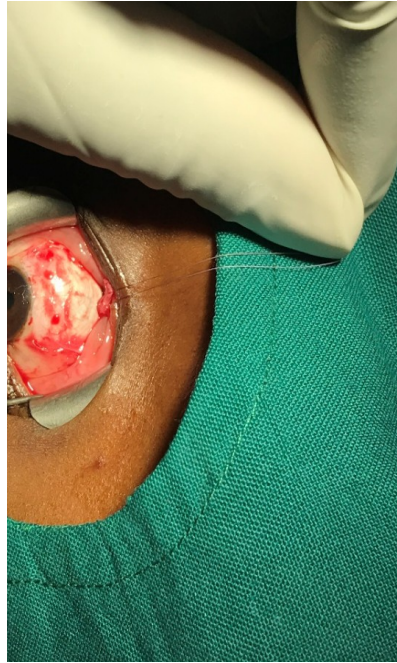
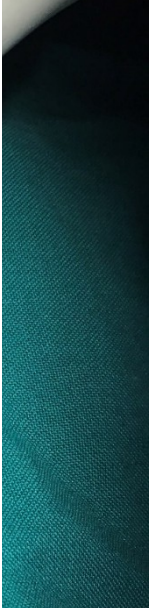


Surgical plan

- EUA, assess MR by FDT.
- Right MR Supra maximum recession from limbus 12- 14 mm. post equatorial fixation

Surgical Technique

- Conj peritomy
- Good exposure
- MR freed of tenons and attachments far beyond equator.
- Disinserted MR fixed to sclera 14 mm from limbus with 5/ 0 non absorbable suture

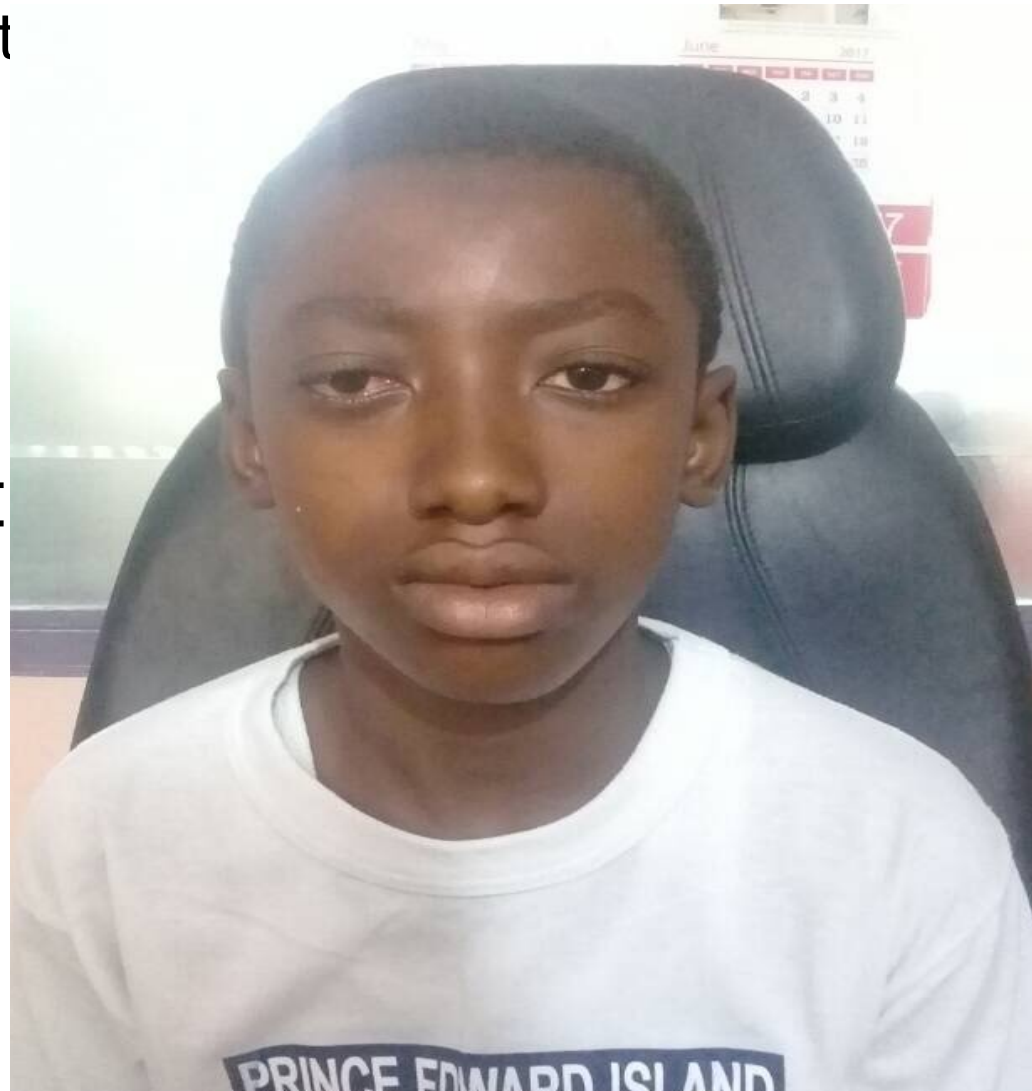


Post Op



OUTCOME

- Dramatic Improvement in HEAD POSTURE
- Child maintains Fairly normal head posture first time in 12 years
- No face turn
- Residual 15^ XT



Discussion

- Main aim of surgery was to achieve good alignment in primary with the CHP abolished
- The immediate post op findings for these cases are exciting and obviously all the patients are happy with the outcome.

- Third nerve palsy present a huge challenge as 4 of the EOM are dysfunctional and also the levator.
- Defective elevation (poor Bell's phenomenon), poses a great challenge to ptosis surgery.
- My patient had poor elevation and hypotropia which improved with IR recession
- Many surgeons have treated 3N with transposition of the SO with or without Tracheotomy with varying results.
- We have done this in the past on a child with congenital 3N but with unimpressive outcome.

6N discussion

- Main purpose of VRT is to allow rotation into the palsied muscle field by creating tone through the transposed muscle in primary position (Guntton K.B)
- They also increase the field of binocular vision by shifting the field to the palsied side (Miller JM)
- Our patient who had VRT surgery done by an experienced visiting faculty did not improve much with VRT, maybe because contracture from long standing Esotropia
- Supramax Recession yielded exiting results. VRT allows antagonist weakening (MR recession) have a better effect (MILLER. JM)

Thank you