



TED

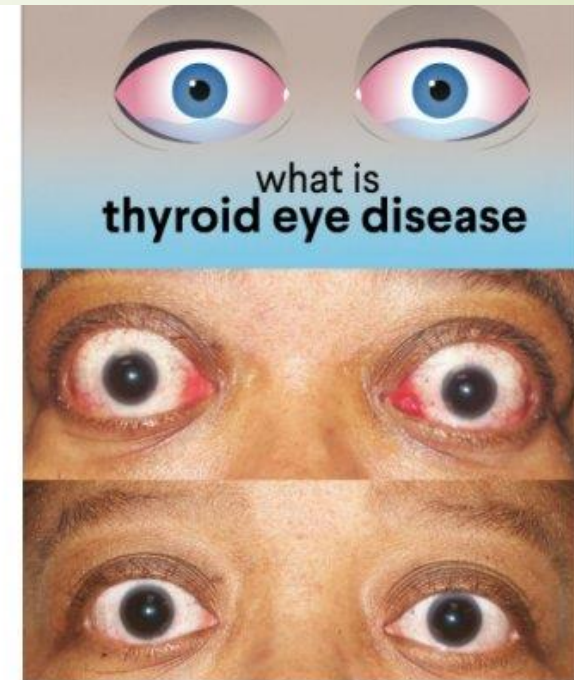
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Oculoplastic & orbital surgeon

MAZUMS

What is thyroid related ophthalmopathy?

- chronic inflammatory disease of the orbits
- patients with systemic thyroid imbalance
- scarring and dysfunction of the orbit
- course and severity are variable



Top: A patient with active TED. Bottom: Patient shown again after receiving teprotumumab infusions (TEPEZZA, Horizon Therapeutics).

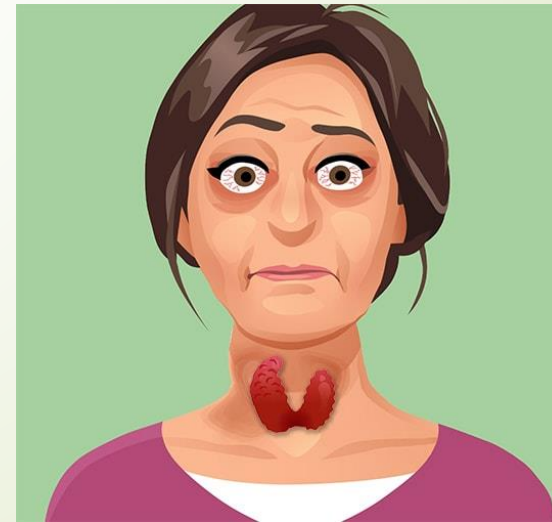
Who develops TRO? wide range of ages

- ▶ 8-88 years of age
- ▶ average age in the 40s
- ▶ Females are affected 3-6 times more often than males
- ▶ Children are rarely affected



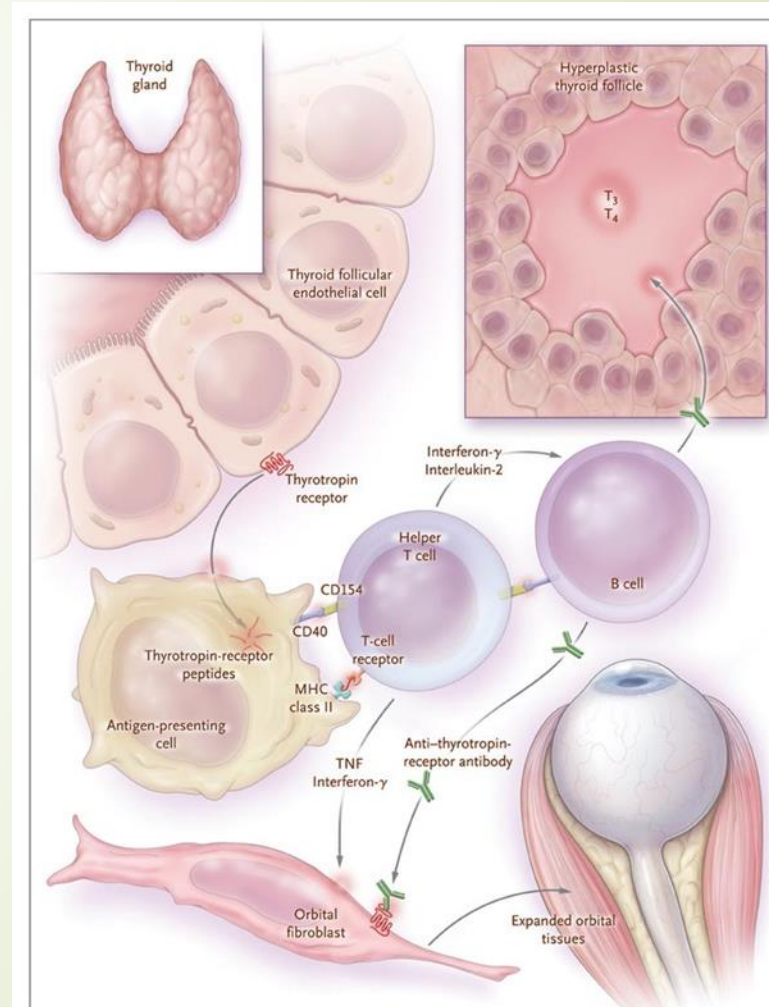
Is everyone with TRO hyperthyroid?

- 80% develop TRO while they are hyperthyroid
- 10% hypothyroid
- 10% may not develop a clinically detectable thyroid abnormality
- 25% of euthyroid TED develop hyperthyroidism in 1 year and **50%** in 5 year.
- 20% diagnosis of TED & hyperthyroidism is the same time
- 60% TED occur during 1 year of hyperthyroidism
- **Only 30%** of autoimmune hyperthyroidism develop TED.



What causes TRO? We do not know immunologically mediated process

- EOMs end organs
- theories link the orbit and thyroid gland by shared antigens, with some defect in immune surveillance initiating the process



factors affect TRO severity

- ▶ THYROID **DERMOPATHY** {pretibial mixedema 4%, acropachy 1%}
- ▶ **radioactive iodine** THERAPY FOR TREATMENT OF SEVERE GRAVES:

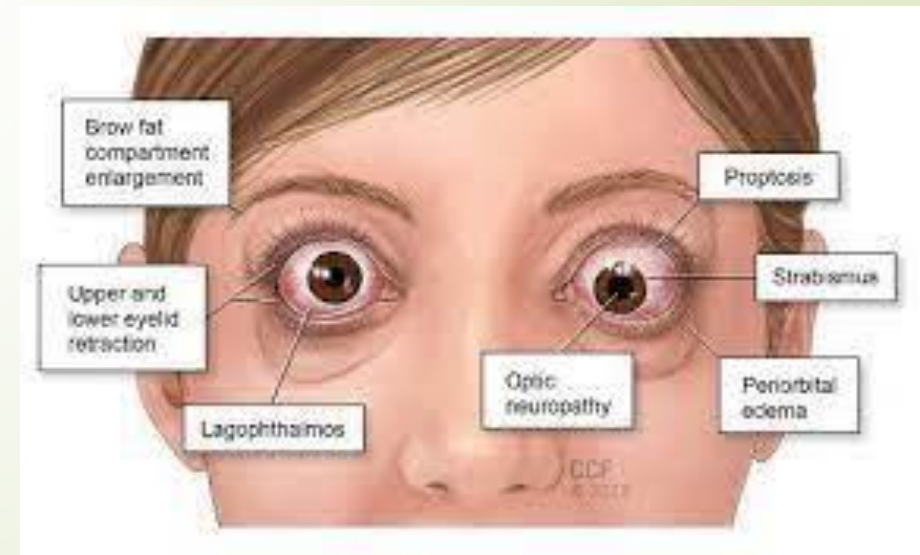
Because of TSHR release during & TSHR stimulation after hypothyroidism.

- ▶ Evidence also suggests that **smokers** with TRO have more severe disease than nonsmokers. (7 times) The effects of second-hand smoke can only be speculated.
- ▶ More severe in **older** and **male** patients.
- ▶ Elevated T3



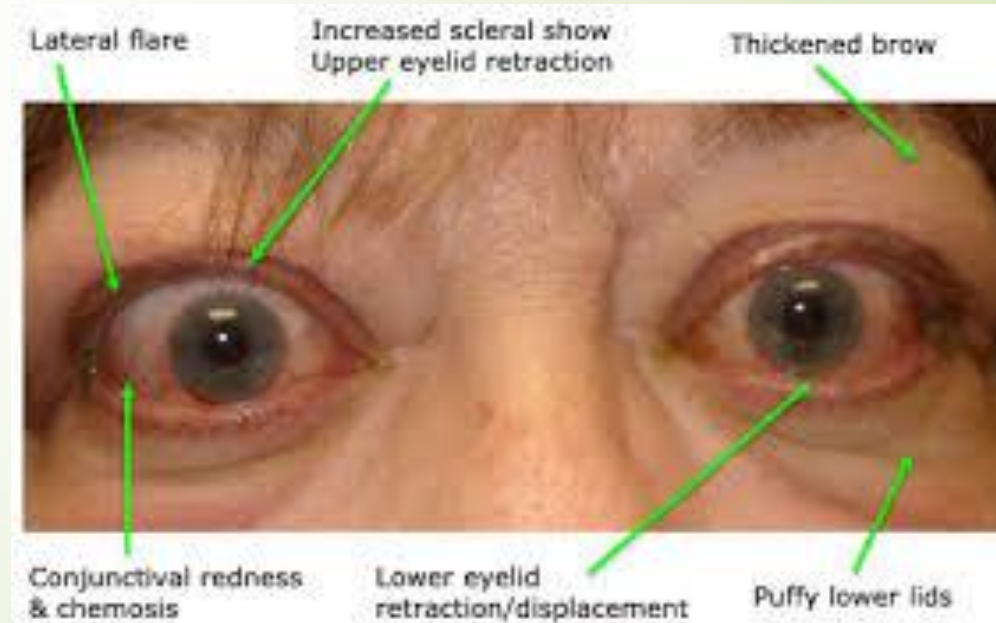
What are the early signs of TRO?

- initially present with intermittent lid swelling along with nonspecific ocular irritation, redness, and swelling
- so nonspecific that early onset is usually missed
- not recognized until the appearance of more obvious clinical signs such as
- lid retraction, lid lag, early proptosis



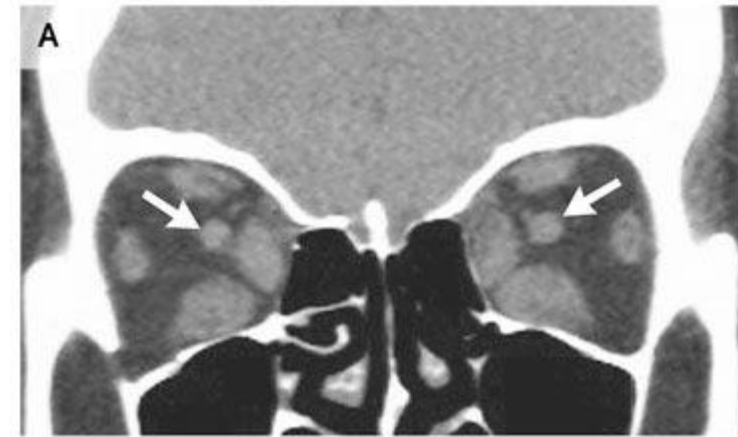
What studies need to be done in the work-up for TRO?

- ▶ most effective screening tool is level of **TSH**
- ▶ internist or **endocrinologist**
- ▶ special attention to visual function, including acuity, pupils, color vision, and visual fields, if indicated. Ocular motility with note of any diplopia needs evaluation, along with corneal exposure, proptosis, and eyelid position



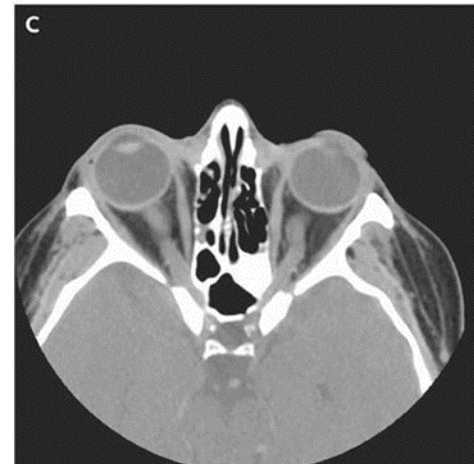
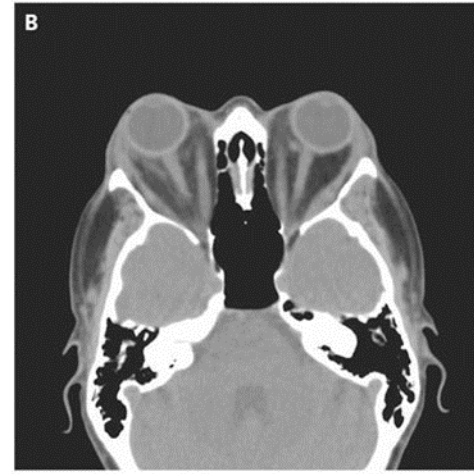
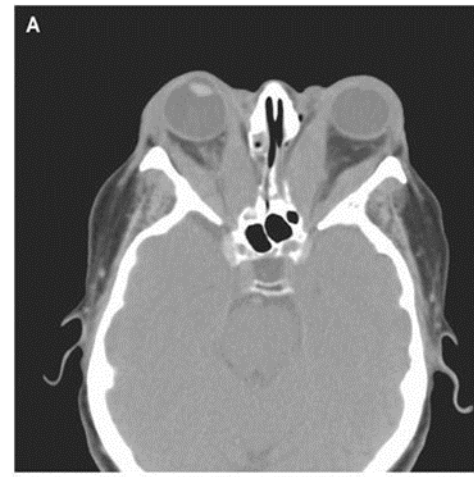
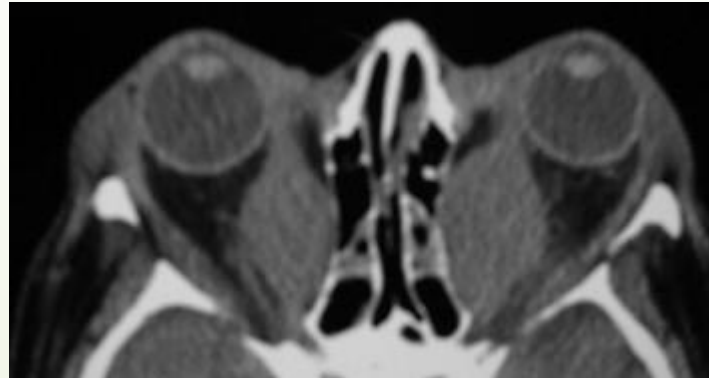
Which patients require orbital imaging? (CT SCAN)

- suspicion of optic nerve compression
- evaluation for orbital decompression surgery
- unclear diagnosis
- need to rule out other orbital processes
- **inferior rectus is the most commonly involved muscle** medial rectus and the superior rectus
- The lateral rectus is least likely to be involved



What findings are present on orbital imaging?

- ▶ Fatty hypertrophy in younger than 40 years
- ▶ EOM hypertrophy in older than 40 years
- ▶ Enlargement of the rectus muscle belly with sparing of the tendon



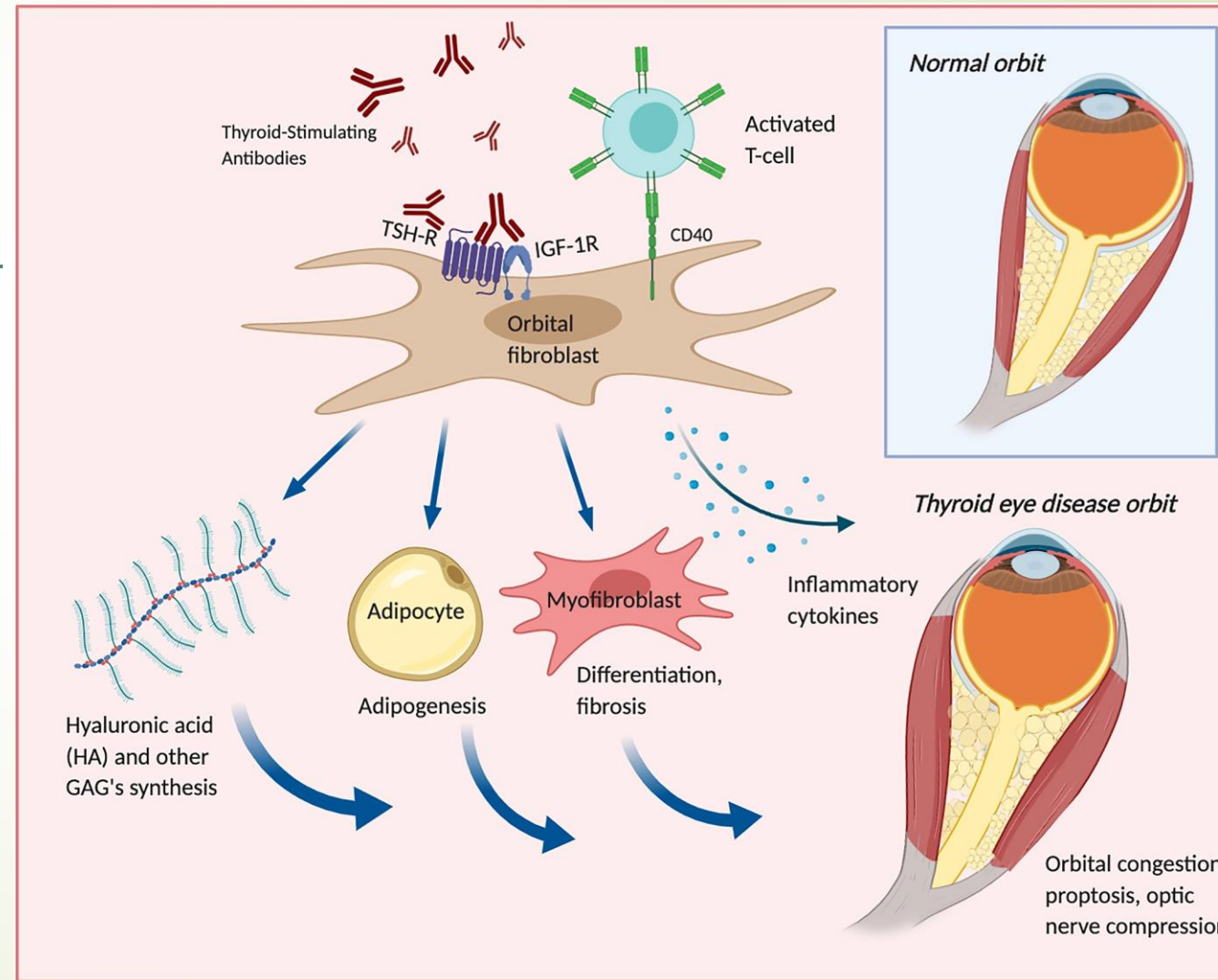
Does everyone with proptosis have TRO?

- No
- most common cause of unilateral and bilateral proptosis in adults
- Patients with systemic thyroid disease may develop orbital tumors and non-thyroid orbital inflammation
- TRO bilateral disease, whereas most orbital tumors are unilateral
- may present asymmetrically



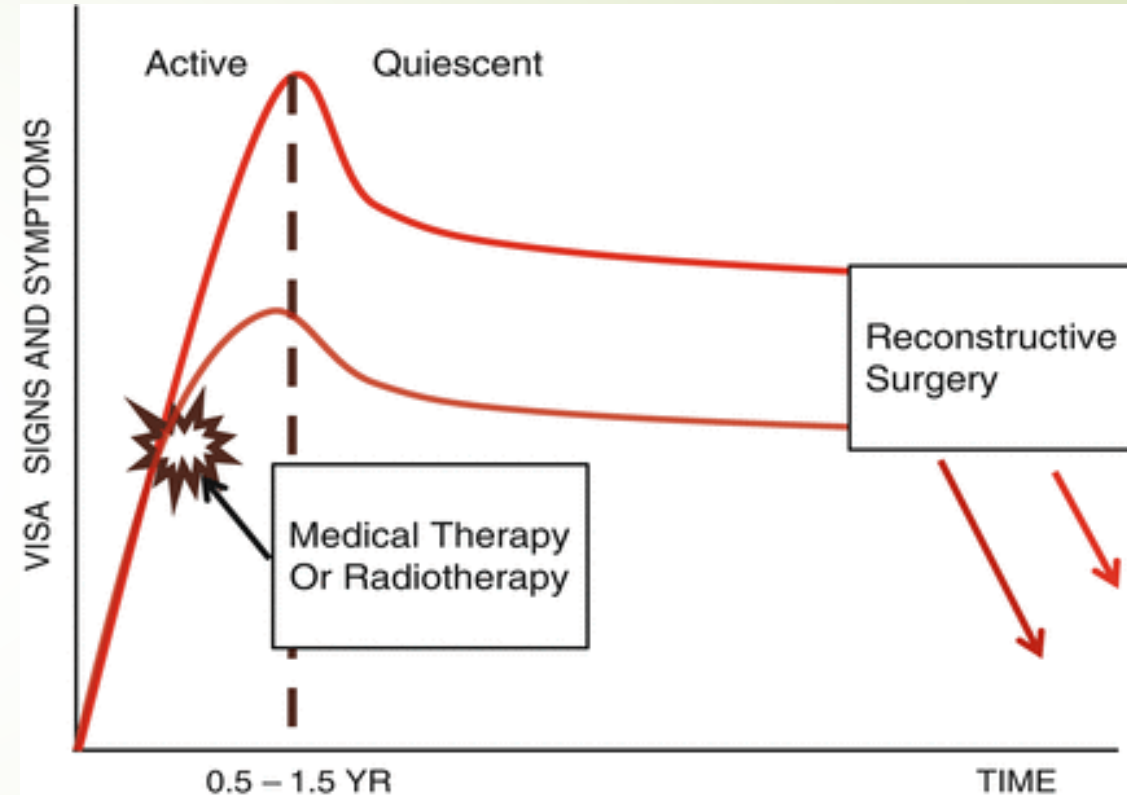
How do the tissues of the orbit change in TRO?

- ▶ EOM infiltration by inflammatory cells
- ▶ fibroblasts that produce **(MPS) mucopolysaccharides & GAG** (100TIMES) early collagen later
- ▶ Orbital and eyelid swelling is common early
- ▶ Late inflammation resolves and the enlarged muscles become fibrotic and scarred



How long does the disease last?

- ▶ period of active inflammation
- ▶ 6 months to more than 2 years(average 1y)
- ▶ some slow, mild changes
- ▶ others more acute
- ▶ activity has quieted and the eyes are stable
reactivation is rare(5-10%)



Clinical activity assessment

ACTIVE

STABLE

Considering categories:

- ✓ Vision
- ✓ Inflammation
- ✓ Strabismus
- ✓ Appearance

Considering categories:

- ✓ Proptosis
- ✓ Strabismus
- ✓ Eyelid

Management

Management

Medical

**Surgical
(urgent)**

**Surgical
(elective)**

Observe

Active Phase

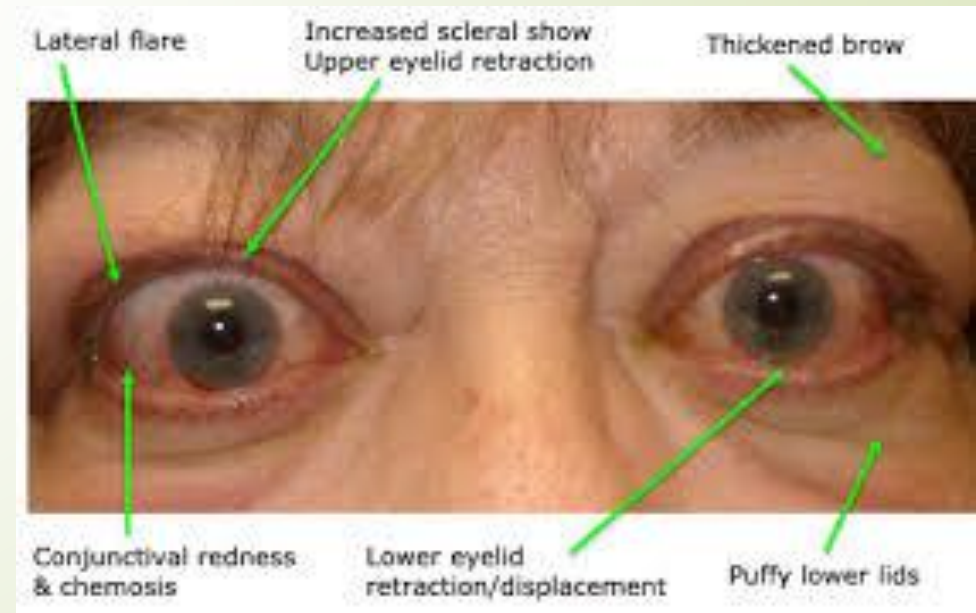
Stable Phase



Five Main Clinical Manifestations

- 1. Soft Tissue Involvement
- 2. Eyelid
- 3. Proptosis
- 4. Optic Neuropathy / Exposure Keratopathy
- 5. Fibrosed Muscles

Class	Description
0	No symptoms and findings.
1	No symptoms; there is only spasm in the upper eyelid, eye opening increased.
2	Swelling in the preorbital soft tissue.
3	Proptosis (exophthalmos)
4	Involvement in extraocular eye muscles.
5	Corneal involvement
6	Optic nerve involvement, visual loss in various levels.



Clinical feature

Lid retraction initially 75% (more than 90% in clinical course)

exophthalmus 60%

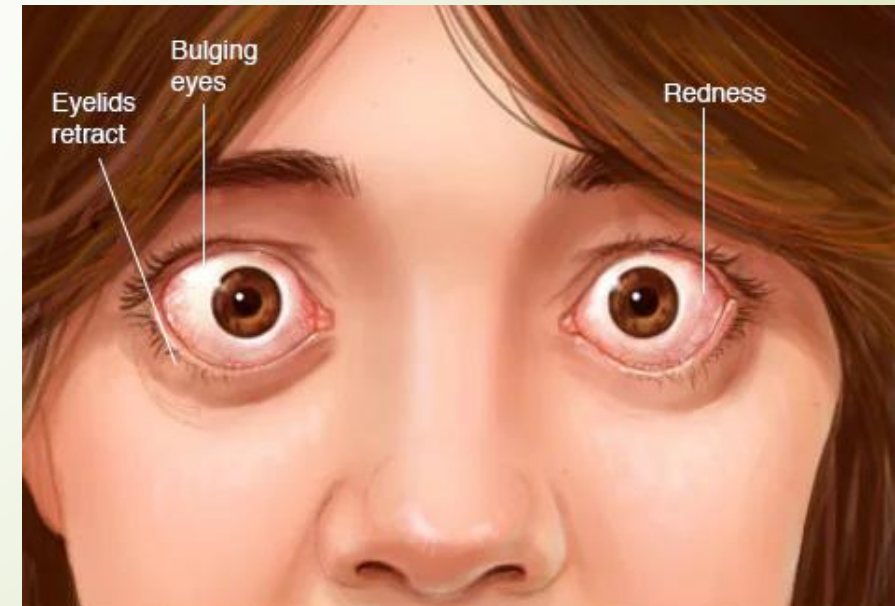
Lid lag 50%

Restrictive EOM myopathy 40%

Orbital pain or discomfort 30%

Diplopia 17%

Optic nerve dysfunction 5%



What can be done to treat TRO?

- Many do not require any treatment
- monitoring during the active phase
- Supportive care (lubricant, topical cyclosporine, wraparound sunglasses)
- Low salt diet , head & bed elevation

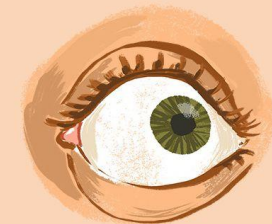
Active Phase Symptoms of Thyroid Eye Disease



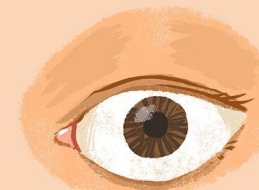
Dry eyes



Double vision



Protruding eyes





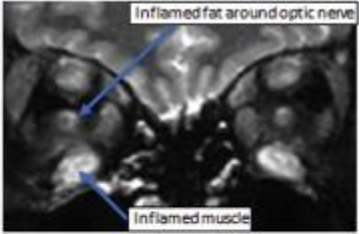
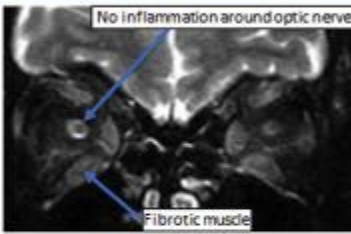
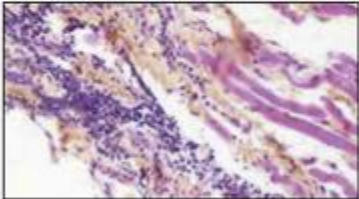
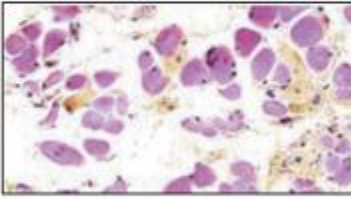
Retracted eyelids



Loss of vision

What can be done to treat TRO?

- Systemic steroids
- temporizing measure because of their side effects
- Cessation generally results in return of orbital inflammation
- Orbital irradiation
- Surgical treatment is also used

	Active	Inactive
Clinical characteristics		
Presence of inflammation		
Histopathology		
Treatment	No FDA-approved therapy	Surgery (if indicated)



When are systemic steroids used?

- ▶ decrease orbital inflammation acutely
- ▶ temporary basis
- ▶ most common indication is visual loss from optic nerve compression
- ▶ Severe proptosis with resultant corneal exposure is a second indication
- ▶ short-term and long-term side effects of steroids limit their usefulness

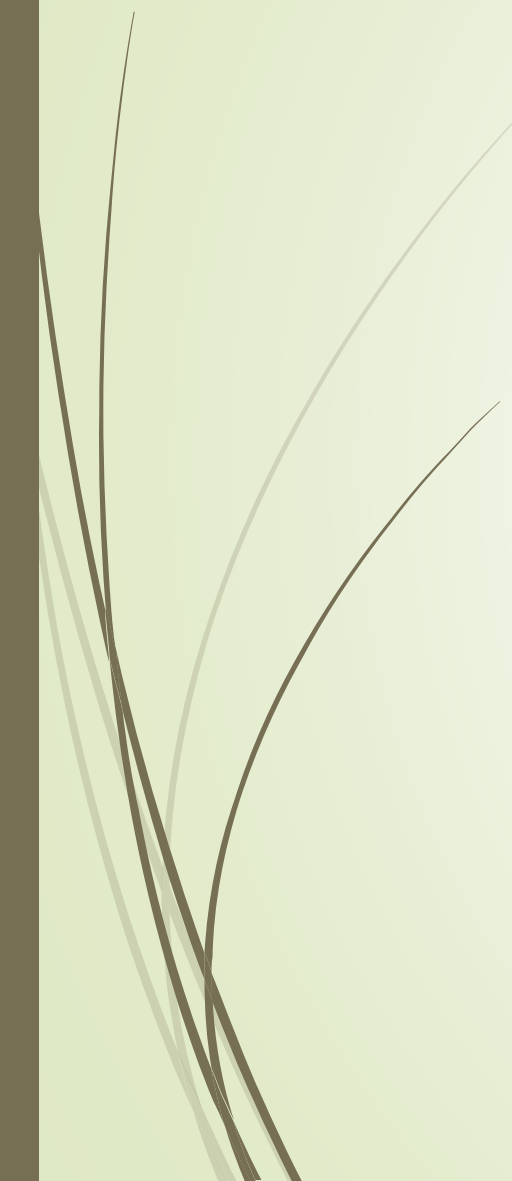
How does orbital irradiation affect TRO?

- ▶ exact mechanism of action unclear (2000cGy)
- ▶ localized immunosuppression with lymphocyte sterilization in the orbit postulated
- ▶ patients have a definite decrease in orbital inflammation and edema after orbital irradiation
- ▶ Avoided in **diabetic** and **vasculitic** disease.





Which patients require surgery? (20%)

- ▶ **emergent basis**
 - ▶ optic nerve compression
 - ▶ corneal exposure
 - ▶ **Nonemergent** (after 6-9 months stability)
 - ▶ severe disfiguring proptosis
 - ▶ double vision from restrictive myopathy
 - ▶ eyelid retraction
- 

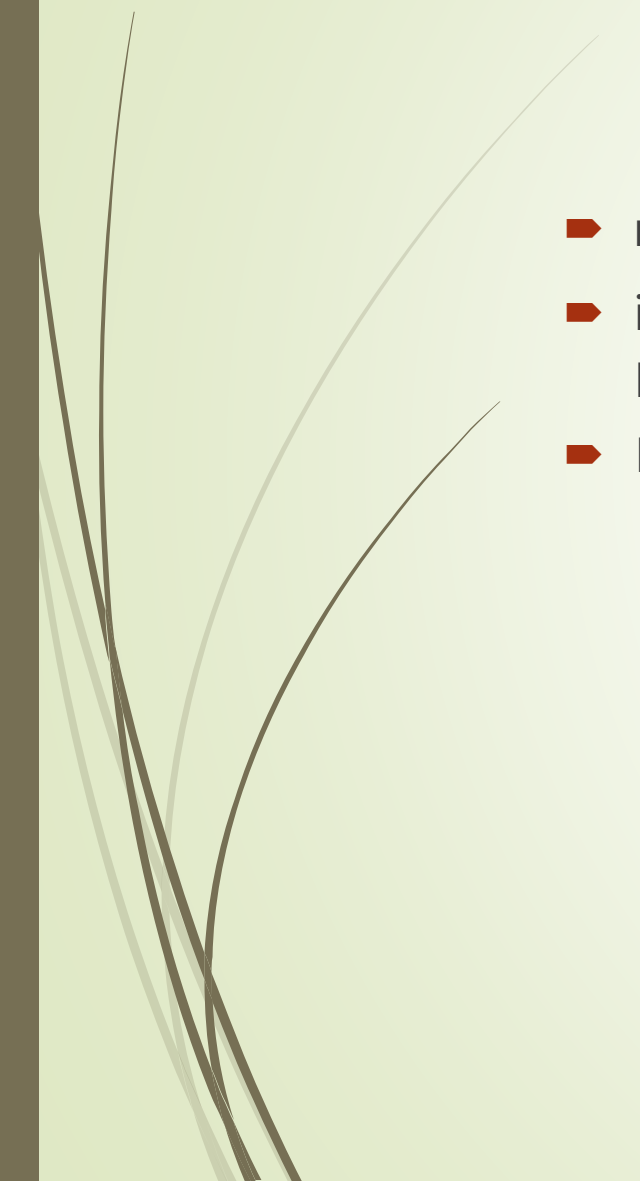
What kinds of surgery are done in patients with TRO?

- **First:** orbital decompression (7%)
- **Second:** eye muscle surgery (9%)
- **Third:** eyelid surgery (13%)
- needs to be done in this **order**
- Decompression affects ocular motility and may alter muscle surgery
- muscle surgery should be completed before eyelid surgery





What is orbital decompression?

- removal of bone and/or fat to allow the eye to settle back in the orbit
 - inferior and medial walls of the orbit to let the expanded orbital tissue move partially into the sinus space
 - Removal of orbital fat decompressive to a lesser degree
- 



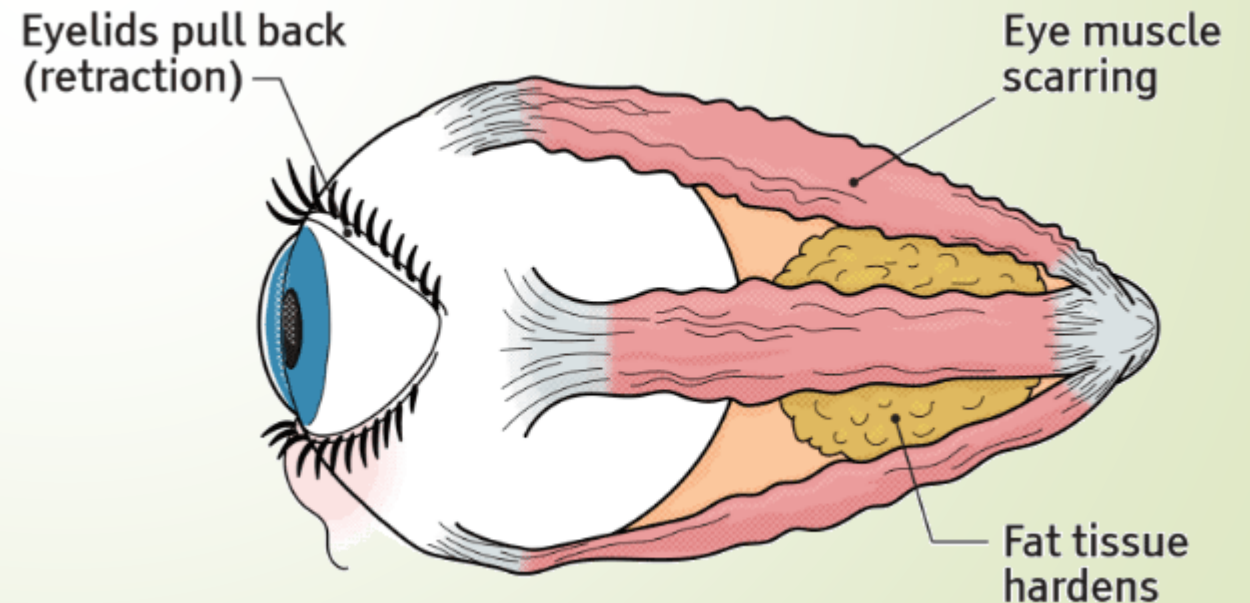


What are the complications of orbital decompression?

- ▶ most common worsening of existing diplopia or new double vision
- ▶ preexisting motility problems have a much higher risk of postoperative diplopia
- ▶ infraorbital hypesthesia postop., usually improves with time.
- ▶ Risk of visual loss is small
- ▶ Bleeding and infection

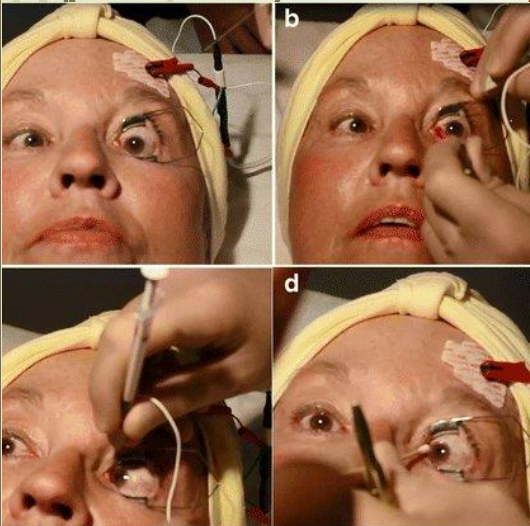
When do patients require muscle surgery?

- ▶ double vision in functional field
- ▶ ensure that the inflammation is quiet and the patient's motility pattern stable
- ▶ Repeated stable measurements over 6+ months help to ensure that motility is stable



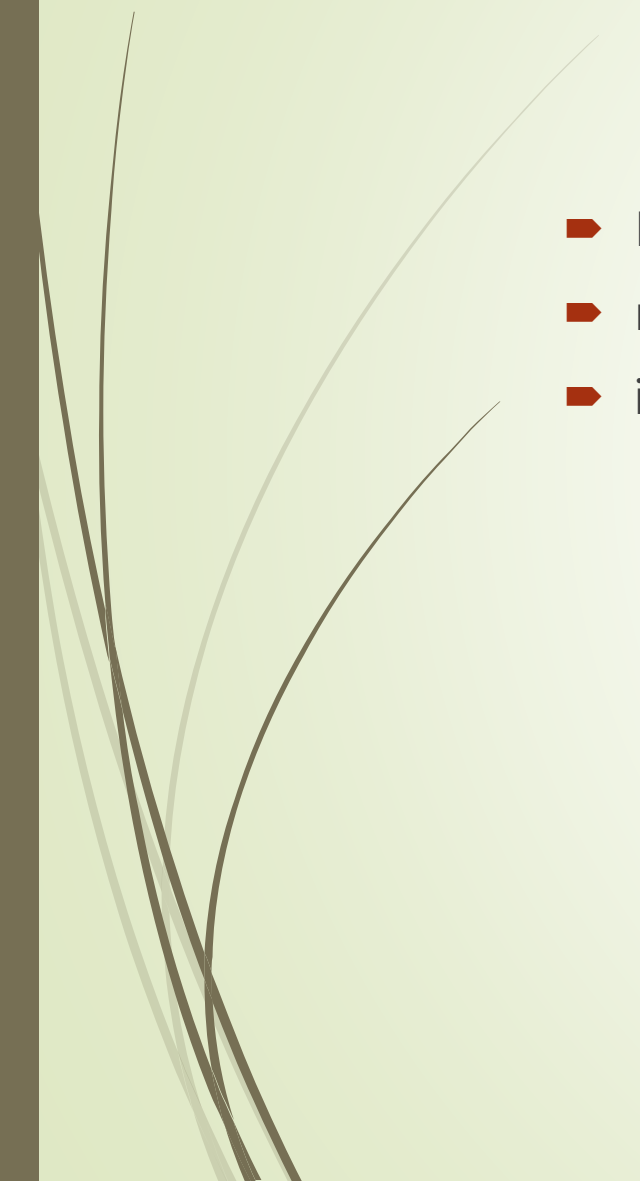
What are the alternatives to muscle surgery?

- ▶ prisms in glasses works for patients with double vision and relatively small deviations
- ▶ also important that the motility is stable before prisms are prescribed
- ▶ Temporary Fresnel prisms may be helpful during periods of instability
- ▶ Botox injection in active phase in IR or MR or levator
- ▶ Technical limitation (poor titration & localization)





What type of muscle surgery is required?

- ▶ Recession of muscles, usually on an adjustable suture
 - ▶ muscles are tight and scarred, resection is not done
 - ▶ inferior and medial rectus muscles most common targets
- 





What kind of eyelid surgery is done?

- ▶ Eyelid retraction
- ▶ orbital decompression lowers eye, improving the lower lid retraction
- ▶ mild lid retraction, recession of the eyelid retractors (upper or lower) is adequate
- ▶ severe retraction, spacers are needed, such as hard palate in the lower lids and fascia in the upper lids
- ▶ blepharoplasty and/or brow lift
- ▶ excessive skin from chronic swelling
- ▶ same or at later date



قبل از عمل



بعد از عمل



➔ **THANK YOU**

