

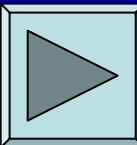


Institute of  
Ophthalmology



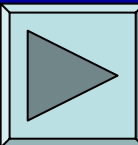
# Thyroid Eye Disease

aka Thyroid Associated  
Ophthalmopathy



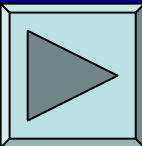
# Causes

- TED/TAO is an eye disease associated with disease of the thyroid gland
- Most commonly, it occurs with an overactive thyroid (Thyrotoxicosis), which itself can have different causes:
  - Grave's disease
  - Toxic nodular goitre
- It also occurs in hypothyroidism, for example with Hashimoto's disease

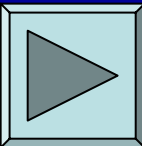


# Grave's disease

- Autoimmune (AI) origin
- Excess secretion of Thyroid Hormone by entire gland
- Majority occurs between 40s and 50s
- Female:Male = 8:1
- Affect 2% of females in UK, hence the commonest clinically significant AI disease in the community



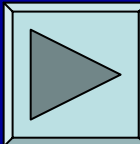
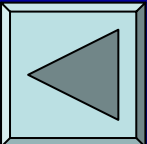
- In patients with Grave's disease, eye signs may precede, coincide with or follow the hyperthyroidism
- Sometimes similar eye signs are seen without a detectable thyroid abnormality



# Pathology

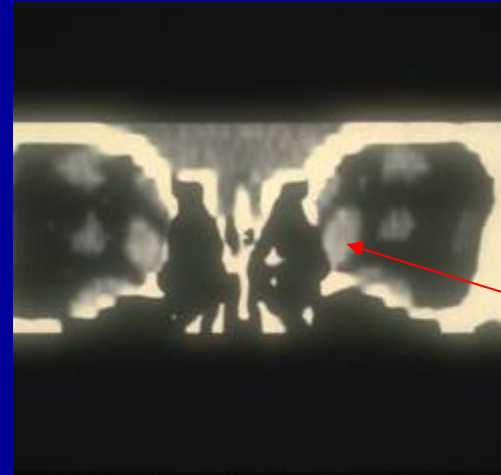
Activated T cells infiltrate orbital contents and stimulate fibroblasts, leading to:

1. Enlargement of extraocular muscles
2. Cellular infiltration of interstitial tissues
3. Proliferation of orbital fat and connective tissue

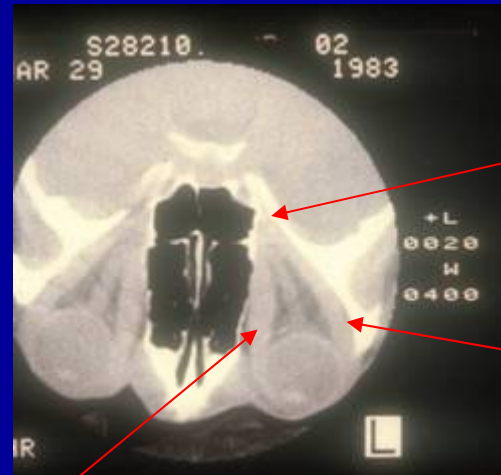


# Enlargement of extraocular muscles

- The stimulated fibroblasts produce glycosaminoglycans (GAGs) which cause the muscle to swell
- Muscle size may increase by up to 8 times
- The swollen muscles occupy orbital space and can compress the optic nerve
- These swollen muscles can cause a forward propulsion of the globe (proptosis) so that the eyelids do not cover well and eyes dry out, causing exposure keratopathy



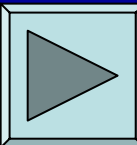
Swollen muscles



Compression of optic nerve at apex of orbit

Swollen muscle (lateral rectus)

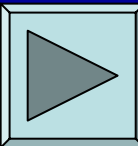
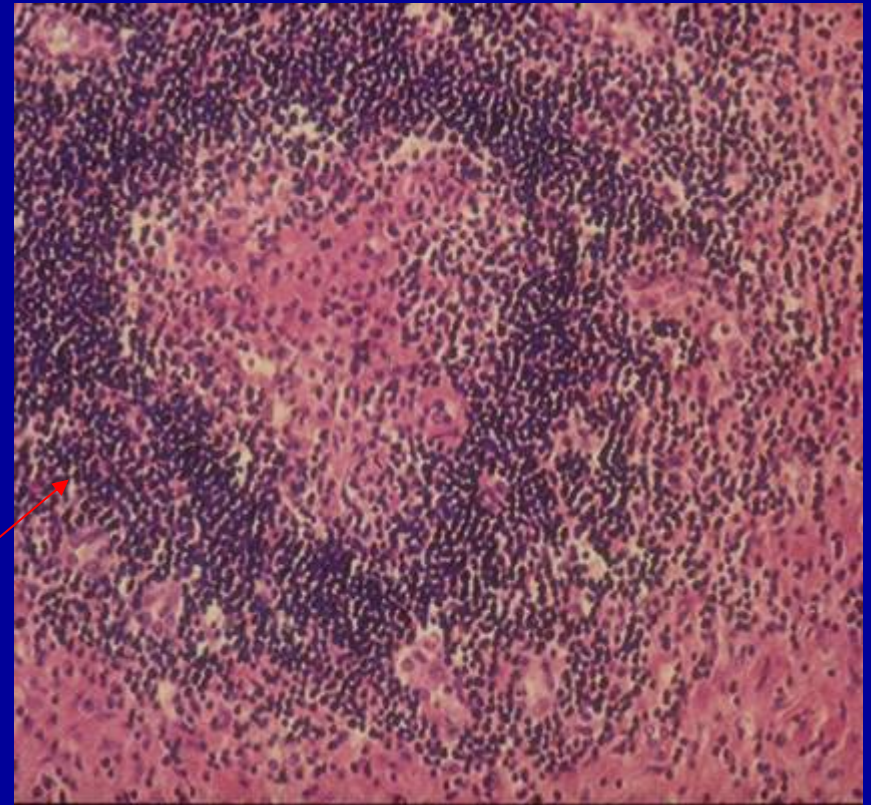
Swollen muscle (medial rectus)



# Cellular infiltration of interstitial tissues

- Lymphocytes, plasma cells, macrophages and mast cells infiltrate extraocular muscles, fat and connective tissue

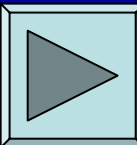
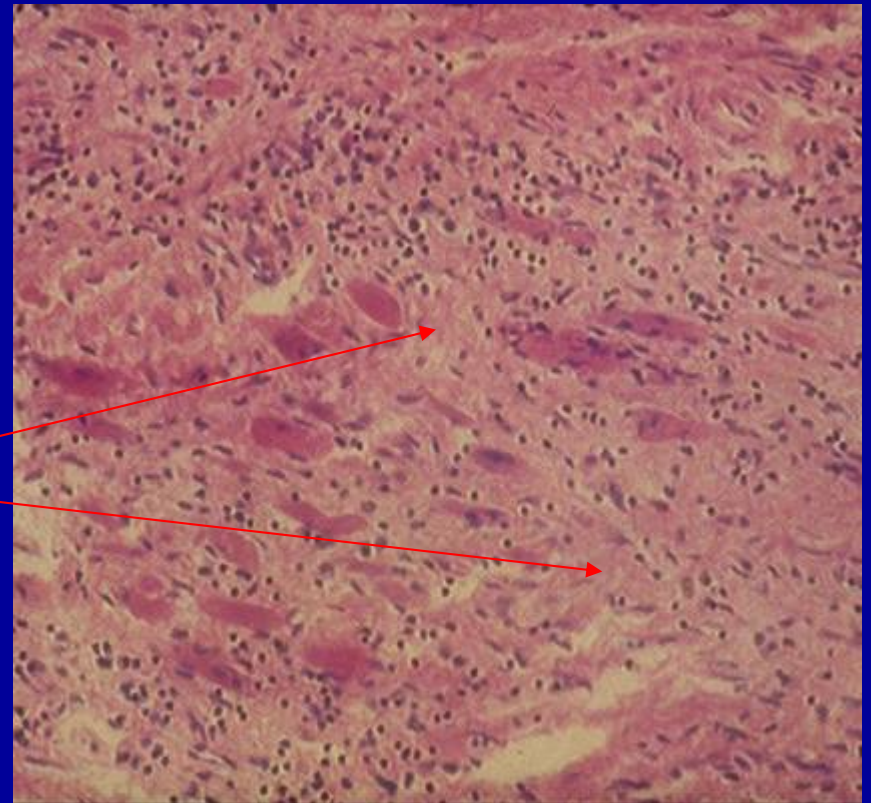
Lymphocyte cuff



# Pathology (cont'd)

- Causes degeneration of muscle fibres
- Leads to fibrosis of the involved muscle

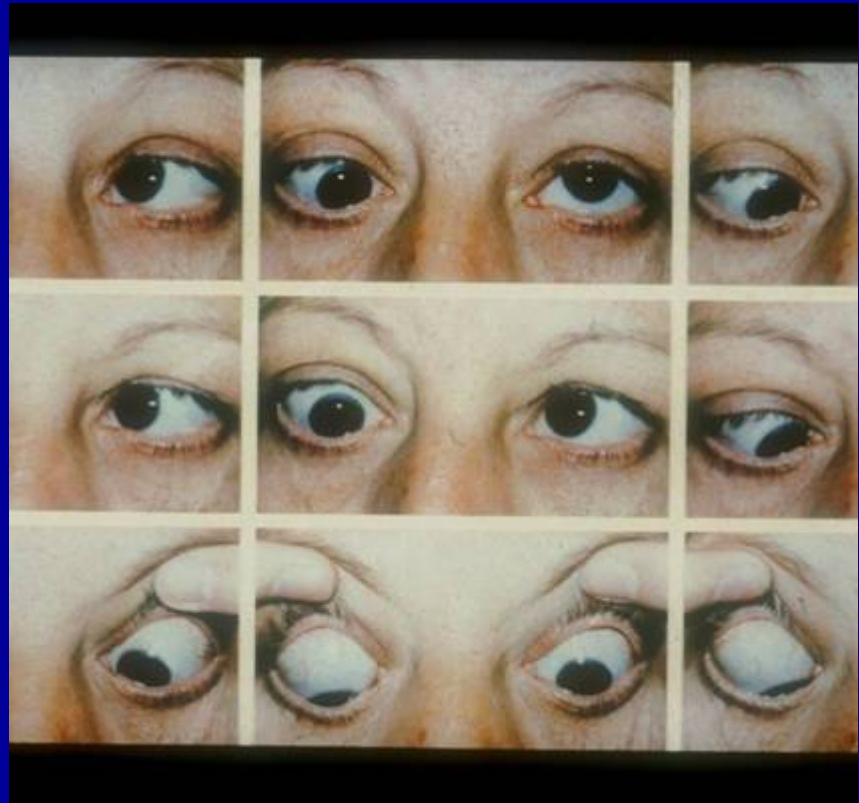
Build up of fibrous tissue





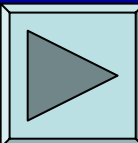
- This restricts its movement and causes diplopia (double vision) in the direction of gaze which is restricted

R



L

When looking up, the Right eye fails to elevate, due to muscle tethering



# Two Stages of Development

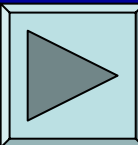
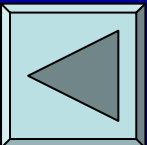
## 1. Active inflammation:

- Eyes red and sore years
- Cosmetic problem
- Remission within 3 years in most patients
- 10% patients develop serious long-term ocular complications



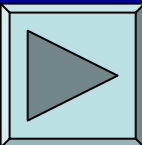
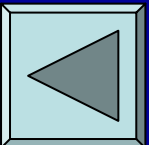
## 2. Quiescent stage:

- Eyes white
- Painless motility defect maybe present
- Severity may range from being nuisance to blindness (2° exposure keratopathy or optic neuropathy)



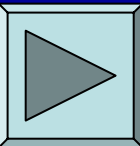
# Five Main Clinical Manifestations

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



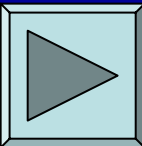
# Soft Tissue Involvement - Symptoms

- Variable grittiness
- Photophobia
- Lacrimation - watery eyes



# Soft Tissue Involvement - Signs

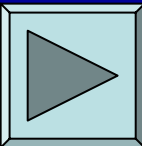
- Periorbital and lid swelling
- Conjunctival hyperaemia
  - Sensitive sign of disease activity
- Chemosis (oedema of the conjunctiva)
  - Severe cases: conjunctiva prolapses over lower eyelid



# Soft Tissue Involvement - R<sub>x</sub>

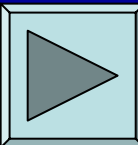
Frequently unsatisfactory, may be of some benefit

- Topical R<sub>x</sub> – lubricants (artificial tears & ointment) reduce irritation caused by conjunctival inflammation and mild corneal exposure
- Elevating the head end of bed during sleep may decrease periorbital oedema. Diuretics given at night may also reduce the morning accumulation
- Taping of eyelids at night may be useful for mild exposure keratopathy



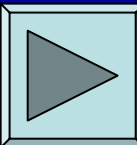
# Eyelid Retraction

- Retraction of both upper and lower eyelids occur in 50% of patients
- Normally, upper eyelid rests about 2mm below limbus, with lower eyelid resting at the inferior limbus
- When retraction occurs, the sclera (white) can be seen
- Causes cosmetic problems
- Pathogenesis not clear
- May be due to contraction of the levator muscle by fibrosis, or be chemically induced by high thyroid hormone levels
- If persists when disease is inactive, can be helped by eye lid surgery



# Eyelid Retraction – Clinical Features

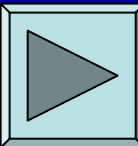
- Clinical signs:
  - Lid retraction in 1° (front) gaze
  - Lid lag i.e. delayed descent of upper lid in downgaze
  - Staring appearance of the eyes





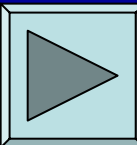
# Eyelid Retraction - $R_x$

- Mild eyelid retraction does not require  $R_x$ , in 50% of cases, there is spontaneous improvement
- $R_x$  of associated hyperthyroidism may also improve lid retraction
- Main indications are exposure keratopathy and poor cosmesis
- Treatment is surgical if required, when both the eyelid retraction and thyroid are stable



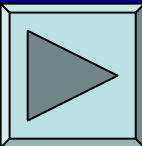
# Proptosis

- Proptosis is axial
- TED is the most common cause of both bilateral and unilateral proptosis in adults
- Proptosis is uninfluenced by  $R_x$  of hyperthyroidism and is permanent in 70% of cases
- Severe proptosis prevents adequate lid closure, and may lead to severe exposure keratopathy and corneal ulceration



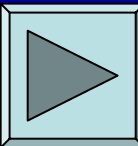
# Proptosis - R<sub>x</sub>

- Systemic steroids to reduce inflammation
- Low dose radiotherapy
- Surgical decompression: This is where one or more walls of the orbit are removed causing an increase in space and relief of the proptosis. In extreme cases, all four walls may be removed



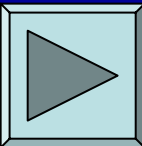
# Optic Neuropathy

- Serious complication affecting about 5% of patients
- Caused mainly through direct compression of the optic nerve or its blood supply by enlarged and congested rectus muscles at the orbital apex
- May occur in the absence of proptosis
- Can cause severe but preventable visual impairment



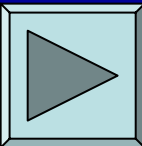
# Optic Neuropathy – Clinical Features

- An early sign is decreased colour vision
- Slow progressive impairment of visual acuity
- Visual defects, especially central scotomas
- Optic atrophy in chronic advanced cases



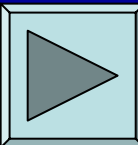
# Optic Neuropathy - R<sub>x</sub>

- Depends on severity
- Initial R<sub>x</sub> by systemic steroids and/or radiotherapy
- Orbital decompression is considered if above is ineffective or optic nerve severely involved



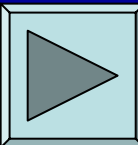
# Ocular Motility Problems

- Between 30% and 50% of dysthyroid patients develop eye movement problems
- The diplopia caused by this may be transient, but in many, it is permanent
- Ocular motility is restricted by oedema in the infiltrative stage and fibrosis during the fibrotic phase
- A defect in elevation is most common due to fibrosis of inferior rectus tethering eye



# R<sub>x</sub> of Ocular Motility Problems

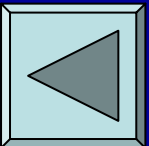
- Surgery is usually considered if there is diplopia in primary gaze or reading position
- Diplopia must have been stable for about 6 months
- R<sub>x</sub> is by muscle surgery, with the aim of producing binocular vision when looking forward, and good cosmetic result
- Botulinum toxin injection (Botox) to relax muscles may be useful in selected cases



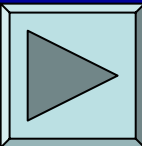


# The End

Some of the images  
used were taken from  
[eyetext.net](http://eyetext.net)



Go back?



Restart?