Graves Ophthalmopathy
Overview

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Graves’ Disease

- Robert Graves
- Triad
  - Hyperthyroidism
  - Eye findings
  - Pretibial Myxedema
  - (phalangeal acropachy-1%)
- Most common auto-immune disorder (1% prevalence)
- More common in woman
  - 16/100,000/yr females
  - 3/100,000/yr males
- Smokers
  - 7x incidence
  - Longer duration (2-3 yrs)

Relationship hyperthyroidism and ophthalmopathy

- Two separate problems, but interact
  - 12-40% Graves hyperthyroid get ophthalmopathy
  - ? Influence of treatment
    - RAI- 33%
    - PTU-10%
    - Thyroidectomy-16%
- Systemic steroids may decrease onset p RAI
- Avoid RAI
  - Smokers, elevated TSH, severe inflammation, myxedema, T3 hyperthyroidism,
- Most recent study in North America- no relation RAI and exacerbation G.O. J of Nuc Med 2008

Graves Disease

- Hyperthyroidism – TSIs (anti-TSH-Receptor-Abs)
- Ophthalmopathy- postulated cross-reaction to TSH-R or IGF-1 antigens expressed on orbital fibroblasts
  - Orbital fibroblasts uniquely inflammatory
  - TSH-R and IGF-1 receptors adjacent on orbital fibroblasts
  - Both are upregulated on orbital fibroblasts
  - Increased expression of IGF-1 on circulating T cells in Graves patients vs controls- ? Increased release inflammatory cytokines, stimulate infiltration of activated T-cells
TSH-R Abs (Ig G) react with orbital fibroblasts

- Release pro-inflammatory cytokines
- Elaboration of GAGs, fluid imbibition, swelling EOMs
- Activation pre-adipocyte fibroblasts, increased orbital fat

Explains inflammation, proptosis, myopathy, optic neuropathy

Does not explain eyelid retraction or Von Graefes

Eye Symptoms
Bartley AJO 1996

- Discomfort 30%
- Diplopia 17%
- Tearing 20%
- Photophobia 15%
- Blurred vision 7%
  - (2% optic neuropathy)
- Periocular swelling

Spectrum of Thyroid Eye Disease

- Mild in most, severe in some
- Visual loss in worst cases
- Frustrating disease
- Eventually acute inflammation resolves on its own
- Steroids, irradiation may alter course, but associated risks
Diagnosis

- Clinical signs-
  - Eyelid retraction, Von Graefe sign, proptosis, lid lag, injection over EOMs, periocular swelling, restrictive EOMs

- Laboratory
  - T4, TSH,
  - TSIg, TBII (TSHRAbs),
  - anti-thyroglobulin Abs
  - Urine GAGs

- Imaging
  - C.T.- EOMs, Orbital fat
  - STIR sequence MRI
    - “Short Tau Inversion Recovery”
    - Compare EOM brightness to temporalis muscle
    - Prolonged T2 recovery of EOMs

Proptosis, chemosis, lagophthalmos

EOM inflammation sparing tendon

Marked proptosis

Increased orbital fat / normal EOMs
Graves’ Disease
Active (wet) and Chronic (dry) Phases

Postulated Natural History:
Rundel’s Curve
• Early, active, “wet”- inflammatory
• Late, “burnt out”, dry- fibrosis
• Occurs in minority of cases of eyelid retraction
• May see “dry” phase precede “wet”

Typically active disease for 1 year, then quiescent

36 y.o.- c/o “drooping” R.U.L.
Recent weight loss
Wife describes “very nervous”
Tremor, tachycardia
TSH decreased, T4 increased
F/U 6 weeks later
Increased proptosis, chemosis
Limited depression

Progressive proptosis
Compressive optic neuropathy
s/p balanced R. orbital decompression
relief proptosis and optic neuropathy

11 yrs later acute swelling, erythema and chemosis O.S.

Treatment
• Medical
  – Lubricants
  – Elevate HOB
  – Steroids, cyclophosphamide
  – Topical cyclosporine
• Surgical (20%)
  – Orbital Decompression
  – Strabismus
  – Eyelid Surgery
• Irradiation
• Support

Try to wait for active disease to resolve

Ophthalmic surgery
• Indications for surgery
  – Exposure keratopathy
  – Compressive optic neuropathy
  – Globe luxation
  – Diplopia
  – Cosmesis
a/c proptosis and restricted EOMs
Tight levator diminishes upper eyelid excursion
Tight I.R. limits Bell’s

Compressive optic neuropathy - 6%

Men=women (vs 6:1)
Older (mean age 61 yrs vs 43 yrs)

Rarely “stretch” neuropathy
Globe luxation: Orbicularis closes behind equator

Surgical Treatment

- 20% undergo surgery
- Orbital decompression
- Strabismus surgery
- Eyelid surgery

Orbital Walls

“Do-it-yourself-decompression”
Traditional Decompression

Medial Wall and Floor Decompression

57% new onset diplopia after 3-wall decomp
No cases p “balanced” medial/lateral and fat

Unal et al OPRS 2003

Newer concepts in orbital decompression

“Balanced decompression”
- Medial & lateral walls, sparing floor
- Endoscopic medial decompression
- “Door stop” lateral valgus displacement
- Orbital fat decompression

“Balanced decompression”
- Medial & lateral walls, sparing floor
- Avoids globe ptosis, or exacerbation of lid retraction
4 mm proptosis O.S.

LU and LL retraction

Valgus out fracture lateral wall
Mini-screw “doorstop”

Unilateral decompression, globe same plain as contralateral side
Fat Decompression-augments increasing bony volume

s/p bilateral balanced decompression and fat removal
Endoscopic Assisted Decompression: Remove medial wall via nose

Retraction resolved with recession of I.R.s alone

Eyelid Surgery

• Euthyroid
• Decompressed
• Extra-ocular muscle surgery completed
• Stable for 6-9 months
Severe, retraction, Hertel 22 O.U., C.T.- mixed fat, EOM increase

Lower Eyelid Recession

• Aggravated by inferior rectus recession
• Variety of spacers
  – 1-2mm - extripation
  – 2-3mm - AlloDerm, hard palate
  – >3mm - ear cartilage or Medpor spacer
Review of Treatment Plan

- Empathy
- Review disease course
  - Acute and chronic stages
- Establish priorities for treatment
- Build confidence
- Purpose of future exams
- Medical treatments
- Surgical options