Graves’ Ophthalmopathy in a monocular patient

**Abstract:** A monocular patient presents to the emergency room with a red eye and was diagnosed with conjunctivitis. With no improvement on antibiotic treatment, a CT scan and lab work confirm Graves’ disease.

**I. Case History**
- Demographics: 74-year-old Asian male
- Chief Complaint: Red, itchy, watery, irritated left eye that has been going on for about 2 months
- Medical History: Hyperkalemia, Hyperlipidemia
- Medications: Atorvastatin calcium, Calcium, Cholecalciferol (Vit D3), Ibuprofen
- Other information: Patient was seen in the emergency room about 6 weeks before and was diagnosed with conjunctivitis. Antibiotic drops were prescribed, 1 gtt bid OS. Patient used drops for 6 weeks and reported no improvement in signs/symptoms.

**II. Pertinent findings**
- Clinical
  - Visual acuity: OD HM @ 1 ft, OS 20/25
  - Pupils: OD difficult to assess secondary to tarsorrhaphy, appears round and reactive, 3+ APD OD; OS round and reactive to light
  - EOMS: OD grossly full, difficult to assess secondary to tarsorrhaphy, OS: full + smooth with no restrictions
  - SLEx: 1+ PEE with 2-3+ conjunctival injection OS
  - IOP: OD 12mmHg (nasal gaze), OS 18mmHg (primary gaze)
  - Dilated examination: C/D: OD 0.35R with diffuse pallor, OS 0.40R, pink, healthy, distinct margins
- Physical: Unilateral Proptosis OS and tarsorrhaphy OD
- Laboratory studies:
  - TSH = < 0.02 Low (normal = 0.49 – 4.67)
  - T4 = 13.4 High (normal = 4.8 – 10.4)
  - T3 = 171 Normal (normal =60 – 181)
- Imaging: CT scan - Diffuse enlargement of the extraocular muscles, slightly more pronounced on the left. No convincing evidence of carotid cavernous fistula.

**III. Differential diagnosis**
- Graves’ Ophthalmopathy, Carotid Cavernous Fistula, Idiopathic orbital inflammation, Orbital neoplasm

**IV. Diagnosis and Discussion**
Graves’ disease is the most common cause of hyperthyroidism today. It is an autoimmune disease characterized by hyperthyroidism, dermopathy, or most commonly ophthalmopathy. The pathophysiology of hyperthyroidism secondary to Graves’ disease includes thyroid stimulating immunoglobulins that bind to the TSH receptor on the thyroid gland and activate it. This causes an increase in the release of thyroid hormones (T4/T3). Lab work (TSH, T4, and T3) will display a low TSH and an elevated T4. Signs and symptoms of hyperthyroidism include nervousness, irritability, increased perspiration, anxiety, difficulty sleeping, weakness of the muscles, and weight loss.

Graves’ ophthalmopathy usually occurs more frequently in females between the ages of 30-50 with a more severe presentation in males and in patients over the age of 50. Additionally, the disease is six times more likely to occur in European rather than Asian populations. The ophthalmic findings usually present bilaterally, although some can be unilateral or asymmetric. Signs and symptoms range from dryness, stinging, photophobia, and epiphora secondary to eyelid retraction and soft tissue involvement, diplopia secondary to restrictive myopathy, pressure behind the eyes secondary to proptosis, and in rare cases optic neuropathy. The pathophysiology for Graves’ ophthalmopathy is not completely understood but it is believed that autoimmunity develops against antigens common to the thyroid gland and the orbit. This causes an increase in the production of cytokines that stimulate fibroblasts to produce glycosaminoglycans (GAGs). The water attracting properties of GAGs leads to proptosis, swelling of the EOMs, and periorbital edema. A MRI/CT scan will show
enlargement of the EOM bodies sparing the tendons. Risk factors that can exacerbate Graves’ ophthalmopathy include cigarette smoking and uncontrolled thyroid hormone levels.

The severity of Graves’ ophthalmopathy can be graded using a clinical activity score (CAS). The CAS is calculated by a point given to each of the following ophthalmic findings: pain or pressure behind the globe, pain on up/down/side gazes, redness of the eyelids, diffuse redness of the conjunctiva, swelling of the eyelids, chemosis, and swollen caruncle. If the patient has been evaluated within the past 3 months, an additional point may be added for an increase in proptosis of 2 mm, a decrease in VA of 1 line, and decrease in eye movements in any direction by 5 degrees. A score of 3/7 or 4/10 indicates the patient is in the active stage of Graves’ ophthalmopathy and will positively respond to anti-inflammatory therapy and/or orbital radiotherapy.

Diagnosis of Graves’ ophthalmopathy and overall treatment/management of the patient described above has been challenging due to prior injury, leaving the patient monocular with a tarsorrhaphy and an APD OD. In addition, the patient, a 74-year-old Asian male does not fit the common demographics of Graves’ ophthalmopathy. One of the most common symptoms of Graves’ ophthalmopathy includes diplopia, which requires binocular vision. The signs of unilateral proptosis warranted a CT scan, which displayed enlargement of the EOM’s. This combined with the low TSH levels and elevated T4 levels aided in the diagnosis of Graves’ ophthalmopathy and hyperthyroidism.

V. Treatment and Management

The treatment and management of Graves’ ophthalmopathy ranges depending on the stage of the disease. In the mild form of the disease, treatment is initiated for relief of the ocular surface symptoms with lubricants and eyelid taping. In the non-sight threatening, moderate to advance stages of the condition oral steroid therapy has been the mainstay of treatment. Patients are started on oral prednisolone 60-100mg/day and then tapered over few weeks to months, depending on the response to treatment. Recent studies have shown more promising results in terms of efficacy and favorable side effect profiles, with the use of IV steroid treatment. Orbital radiotherapy has been shown to be beneficial treatment in patients with diplopia and restrictive myopathy. In the sight threatening, severe cases of Graves’ ophthalmopathy secondary to optic neuropathy, IV steroids for 3 days is initially started. If non-responsive, orbital decompression surgery accompanied with IV steroids and orbital radiotherapy has been demonstrated to be most effective. In sight-threatening, severe cases of Graves’ ophthalmopathy secondary to severe corneal involvement, IV steroids, lubrication, and tarsorrhaphy are most effective. It is also crucial to restore the thyroid levels as well as to urge the patient to quit smoking.

For the patient described above, the treatment plan has not been finalized yet, and we are currently working with the patient’s primary care physician and endocrinologist. The patient has been prescribed artificial tears and lubricating ointment to aid the ocular surface discomfort and will be re-evaluated in 2 weeks for further treatment and management.

VI. Conclusion

In cases of a non-resolving red eye, Graves’ ophthalmopathy should not be a diagnosis overlooked. It is crucial to diagnose the condition as early as possible in order to prevent any further progression and to try and manage the underlying etiology. The characteristics that our patient presented with, a monocular 74-year-old, Asian male with a non-resolving red eye and unilateral proptosis did make the diagnosis, treatment, and management of Graves’ ophthalmopathy very challenging.

VII. Bibliography


