

Title: An Abscess Causing a Delayed Optic Neuropathy After Decompression for Thyroid Eye Disease

Running Title: Delayed optic neuropathy after thyroid decompression

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Abstract: A 63-year-old female with Graves' disease and chronic sinusitis presented with acute left orbital pain and proptosis five years after bilateral orbital decompression and sinus surgery. Imaging revealed bilateral frontal sinus opacification, frontoethmoidal mucoceles and left subperiosteal mass. Presence of an optic neuropathy drove emergent management with intravenous antibiotics and orbitotomy with exploration. Intra-operatively, a left orbital abscess and left frontal sinus purulence were drained. The patient regained her vision with relief of proptosis and pain.

Thyroid orbitopathy is the most common cause of proptosis in adults. It often requires surgical decompression to relieve proptosis, keratopathy, and/or optic neuropathy (1). Complications including diplopia, sinusitis, infraorbital hypesthesia, and cerebrospinal fluid leak have been reported (2-4). Mucocele formation or orbital abscess after decompression surgery are rare (5-9). To our knowledge, there are no reports of an orbital abscess causing a compressive optic neuropathy after decompression. We describe such a patient with both orbital abscess and mucoceles that was treated with intravenous antibiotics, steroids, and surgery.

Case Report:

A 63 year old female with Graves' disease and chronic sinusitis presented to her physician with left eye pain, sneezing, and rhinorrhea. She was prescribed azithromycin. Four days later, the patient developed retrobulbar pain, periorbital swelling, and limited extraocular movements. Magnetic resonance imaging (MRI) revealed a left orbital mass suspicious for infected hematoma or abscess and bilateral frontoethmoidal mucoceles. She was transferred to our facility for specialized care. Of note, five years prior, the patient had bilateral maxillary antrostomies, anterior ethmoidectomies, and middle turbinectomies for chronic sinusitis and bilateral three wall orbital decompression through a swinging eyelid approach for thyroid ophthalmopathy.

On presentation, the vision was 20/30 OD and 20/100 OS with Ishihara color plates 11/11 OD and 0/11 OS. Left eye chemosis, injection, lid erythema, and afferent pupillary

defect were noted. There was significant restriction of motility in all fields of gaze.

Hertel exophthalmometry was 17mm OD and 23mm OS at base 95. Intraocular pressure was 8mmHg OD and 12mmHg OS. Fundoscopic exam revealed trace edema of the left optic nerve. The patient was afebrile and without leukocytosis.

A computed tomography (CT) scan demonstrated left superior orbital mass with bilateral frontoethmoidal mucoceles and opacification of frontal sinuses. Additionally, dehiscence of the left orbital roof was noted. Bedside endoscopy revealed bilateral anterior ethmoid and frontal recess obstruction with herniated orbital fat.

The patient underwent a left anterior orbitotomy. A subbrow incision was made with dissection down to the superior orbital rim. A subperiosteal dissection was initiated and followed into the superior orbit until purulent fluid was encountered, which was drained and sent for culture. Purulence draining from the frontal sinus into the orbit was visualized.

A frontal sinus trephination was performed concurrently. Incision and dissection medial to the supraorbital nerve was performed until frontal bone periosteum was encountered. Periosteum was removed and the frontal sinus was identified with transillumination. The sinus was entered with a 2mm cutting burr with expression of frank purulence and irrigated with vancomycin solution. A drain was placed in the orbit and sinus, and the incisions were closed. The drains were removed the following day.

Cultures showed rare coagulase-negative staphylococcus, a presumed skin contaminant. The patient was treated with antibiotics and steroids. On two weeks follow-up, vision improved to 20/20 OU, 11/11 Ishihara plates OU, along with resolution of her afferent pupillary defect, disc edema, and pain. Hertel exophthalmometry improved to 17mm OU at base 95. Her motility returned to baseline.

Follow-up imaging revealed persistent frontal sinus opacification and bilateral frontoethmoidal mucoceles. Two months after initial orbitotomy, the patient underwent image-guided bilateral endoscopies. Herniated orbital fat in the ethmoid and maxillary sinus was again noted. Frontal sinusotomies with placement of silastic stents in the frontal recess and drainage of right orbital mucocele was performed. Five months later, the patient remains asymptomatic without recurrence.

Comment:

Numerous techniques and complications have been described for orbital decompression (2-4). There are only a few reports of mucoceles or orbital abscess after decompression (5-9). We report a patient with optic neuropathy secondary to orbital abscess formation five years after bilateral three-wall decompression through a swinging eyelid approach combined with bilateral maxillary antrostomies, anterior ethmoidectomies, and middle turbinectomies. To our knowledge, this is the first report of an orbital abscess causing an optic neuropathy after decompression for thyroid ophthalmopathy.

As Rumella et al hypothesized, we believe our patient's mucocele and abscess developed from frontal sinus outflow tract obstruction due to scarring or herniated orbital contents. In our patient, herniated orbital fat was confirmed by nasal endoscopy to be the source of this anatomic obstruction. She developed mucoceles and sinusitis as a result, however did not present with symptoms until the development of an optic neuropathy due to an abscess causing stretch of the optic nerve. Fortunately, aggressive treatment led to full recovery.

As Kwan et al claimed, recurrent proptosis after decompression is rare. The physician must have a high index of suspicion in evaluating these patients. Aside from recurrent thyroid orbitopathy, neoplasms, and inflammatory disorders, a thorough differential diagnosis should include frontal sinus outflow tract pathologies, such as mucocele or infection. Imaging and prompt nasal endoscopy are key tools in management. Mucoceles may require surgical drainage while sinus and orbital infection may be treated with intravenous antibiotics (10). If an orbital abscess is present, drainage may be necessary. Finally, the frontal sinus outflow tract must be definitively recanalized. If a concurrent optic neuropathy is present, treatment should be instituted on an emergent basis.