Glaucoma Associated with Sinusitis: A Case Report

Nawzad Jacksi, DO[1], Jennifer Chapman, MD, MBA[1], Martin Wegman, MD, PhD[1]

[1]HCA Florida Orange Park Hospital, Orange Park, FL

HCA Florida Orange Park Hospital

Introduction

Acute rhinosinusitis is a generally benign illness frequently diagnosed in emergency departments and primary care settings across the United States. Patients commonly present with nasal and sinus congestion, including facial pressure and pain, as well as with rhinorrhea, and constitutional symptoms. They may also have co-occurring pharyngitis, conjunctivitis or middle ear fullness, pain or infection. Risk factors for acute sinusitis include septal deviation, smoking, viral infection, and middle nasal turbinate hypertrophy [1]. Allergy is the most frequent cause of rhinosinusitis, although cases tend to take a more chronic course and have fewer constitutional symptoms. Infectious rhinosinusitis is predominantly caused by viral pathogens with some of the common culprits including rhinovirus, influenza, and parainfluenza [2]. Cases of viral rhinosinusitis are frequently self-limited.It is thought that half to two percent of acute viral sinusitis develop a superimposed bacterial infection [3]. Fungal causes are rare in those without significant immunocompromise.

Most cases of viral sinusitis resolve by day ten of illness with no complications [4]. When the illness persists past ten days, or a patient has some improvement with a subsequent worsening in condition, one must consider a bacterial superinfection [4]. Eighty percent of bacterial sinusitis cases are said to be caused by an initial viral infection [5]. Development of chronic rhinosinusitis is another common complication. Serious complications resulting from acute sinusitis are one in 1000 cases [5]. Bacterial sinusitis has the potential to spread from the sinuses to adjacent structures including the orbits and into the cranium [6]. Some of the notable complications include, but not limited to, orbital cellulitis, orbital abscess, cavernous sinus thrombophlebitis, subdural emphysema, and meningitis [6]. Pradhan and colleagues described a case of acute sinusitis that was complicated by a subperiosteal abscess and a subdural empyema [7]. There have been no published cases of rhinosinusitis associated with acute glaucoma, the subject of this report.

Case Description

A 42-year-old female presented to the emergency department with the chief complaint of a left sided headache and blurry vision in her left eye that began earlier that morning. She reported a frequent history of headaches that were often associated with bilateral blurry vision. Her current symptoms felt similar to prior headaches except that her headache and blurry vision were unilateral. She also complained of a sensation of fullness in her left ear.

She reported feeling unwell the preceding 1-2 days with symptoms of fatigue and malaise. She had not experienced trauma to her head or eye, and did not wear contact lenses. She had no fever, difficulties with coordination, numbness or weakness. Her medical history only included chronic headaches. She denied past surgical history and had no allergies. Social history was negative for tobacco, alcohol, and illicit drug use. Family history was significant for glaucoma.

Of note, the patient had presented to the same emergency department 2 weeks earlier for a similar headache that improved with standard analgesia provided during that visit. The headache was diagnosed as a non-emergent migraine versus tension headache by the treating clinician and she was discharged home. Her headache had fully resolved in the interim.

Vital signs in the emergency department included: pulse oximetry of 98% oxygen saturation on room air, blood pressure of 131/88, temperature of 36.5 degree Celsius, heart rate of 90, and respiratory rate of 16. Pertinent physical examination included a well-appearing patient in no acute distress, alert, and oriented. Left eye examination was significant for conjunctival injection. Bilateral pupils were equal, round, and reactive to light. She had normal extraocular movement. Visual acuity in the left eye was 20/15 and 20/15 in the right eye. The patient also had left maxillary sinus tenderness and serous otitis media on the left.

Case Description

Given the atypical nature of her symptoms, the decision was made to further investigate the patient's' condition with laboratory studies and imaging. A complete metabolic panel and complete blood count were both unremarkable. The patient underwent non-contrast Computed Tomography brain and maxillofacial imaging which demonstrated **thickening in the left maxillary sinus, bilateral ethmoid air cells and left sphenoid sinus** (figure 1,2). Owing to her visual symptoms and conjunctival injection, the patient's iIntraocular pressure (IOP) was also measured. IOP was found to be 56 mmHg in the left eye and 17 mmHg in the right eye.

The patient's symptoms, physical exam findings, and increased left IOP were consistent with a diagnosis of AACG in the setting of acute sinusitis. Ophthalmology was emergently consulted, and latanoprost, brimonidine, acetazolamide, and timolol were administered with subsequent reduction of the left IOP to 30 mmHg. The patient's blurry vision also improved. She was instructed to continue latanoprost, brimonidine, acetazolamide, and timolol medications and follow-up with ophthalmology within 48 hours. A 10 day course of oral amoxicillin was also prescribed for presumed bacterial sinusitis given the duration of illness and possible double worsening.

Images

Figure 1: Mucosal Thickening in the Left Maxillary Sinus on Coronal Cross-section

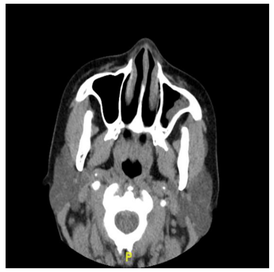

Figure 2: Mucosal Thickening in the Left Maxillary Sinus on Transverse Cross-section

Discussion

This report describes a case of co-occurring sinusitis and AACG. Whether our patient's AACG was triggered by her sinusitis, as a side effect of an unreported medication used for symptomatic control, or whether it was coincidental, remains unknown in this case.

AACG is an ocular emergency requiring prompt recognition and treatment. It is an important cause of blindness worldwide, affecting ~0.6% of the population [8]. AACG causes a rapid decline in visual acuity through an increase in intraocular pressure [9]. This increase in pressure is caused by an acute blockage of the aqueous drainage system through the trabecular meshwork by the iris [9]. The decreased visual acuity is secondary to destruction of the retinal ganglion cells [10]. The increased pressure can also lead to corneal cell death which causes corneal destruction [9]. Another feared complication of AACG is precipitation of chronic glaucoma through blockage of aqueous flow by the development of adhesions [9]. David and colleagues Found that patients treated within 24 hours of disease onset developed chronic increases in IOP at a lower rate than patients with a delayed presentation [11].

The causes of AACG are often multifactorial and may include environmental factors, medication side effects, and genetic components. Several risk factors include a shallow anterior chamber, asian descent, large lens, and older age [9]. Some AACG precipitants include dim lighting, anticholinergic medication use, and reading excessively [10].

Discussion

We have not identified any previous report of AACG in patients with rhinosinusitis. While the causal relationship between AACG and sinusitis in our case is not clear. The patient in this report had a family history of glaucoma, which may indicate a genetic and anatomical predisposition to AACG. Furthermore she had sinus thickening on the same side that she developed glaucoma. This may reflect a pathophysiologic mechanism.I theorize the surrounding inflammation triggered by the sinusitis applies direct pressure on the globe and iris with subsequent blockage of the aqueous outflow tract.

Interestingly, open angle glaucoma (OAG), which is different in acuity and pathophysiologic process, has been associated, particularly with chronic rhinosinusitis [12]. Of note, open angle glaucoma (OAG) causes a more gradual and progressive decline in visual acuity that is not caused by an acute obstruction. Several possible pathophysiological processes have been described. For example, sinusitis associated with nasal polyps and nasal obstruction may lead to hypoxia [13]. This relative hypoxia may lead to retinal ischemia and lead to hypoxia-induced mediators which will worsen the inflammatory process [13]. Another theory is that sinusitis may spread to involve adjacent structures such as the soft tissue surrounding the globe [13]. With significant surrounding inflammation, cerebral venous thrombosis and orbital apex syndrome may develop [13]. This may lead to decreased orbital venous drainage and subsequent increased IOP [13]. The surrounding inflammation will also apply direct pressure to the globe, increasing its pressure [13].

One notable limitation of this case was the lack of information of whether the patient had taken any OTC medications for symptomatic relief of rhinosinusitis. Some over-the-counter medications used to treat sinusitis have been linked to acute flares of AACG. It is thought that patients with anatomic risk factors for glaucoma can experience an acute flare after taking medications that induce mydriasis such as pseudoephedrine or phenylephrine [14]. For example, a patient developed bilateral AACG after taking a single dose of pseudoephedrine [15]. Although intranasal steroids are theorized to cause an increase in IOP, studies have found no significant increase in IOP [16] or development of glaucoma at 12 months [17].

The overlapping nature of symptoms between AACG and sinusitis complicated the diagnosis in this case and may have led to delay in diagnosis given the preceding emergency department visit. Even more, many OTC medications have anticholinergic effects that can cause blurry vision which may mimic AACG, further complicating the diagnostic picture. This case report suggests that clinicians should continue to consider AACG in a patient with symptoms of sinusitis presenting with complaints including eye pain, injection and/or blurry vision. Measuring intraocular pressure and visual acuity should be routinely performed in this patient group.

Conclusion

Sinusitis and AACG have overlapping symptoms and can co-occur. Thus, AACG must be considered in a patient that presents with symptoms suggestive of sinusitis with an associated eye complaint. Further study should seek to investigate the relationship seen in this case and will need to be performed to understand the relationship between these two diseases.

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