

Clinical Records

Neuralgia-like symptoms in a patient with an airgun pellet in the ethmoid sinus: a case report

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Abstract

An unusual case of a retained airgun pellet in the ethmoid sinus is presented. The patient's only complaint was a severe neuralgic headache. Anatomical basis for this symptom, imaging and successful endoscopic removal of the foreign body are discussed. The philosophy for removal of innocuous foreign bodies, potential pitfalls in surgical management, and a review of the literature are included in the discussion.

Key words: Foreign body; Paranasal sinuses; Neuralgia

Introduction

Foreign bodies in the paranasal sinuses are most often traumatic in origin and are usually seen in adults (Grevers and Reiterer, 1990). They are often asymptomatic but when complaints arise that can conceivably be related to the foreign material, removal is advisable. Foreign bodies in the maxillary and frontal sinuses are relatively easy to remove. However, those in the posterior ethmoid or sphenoid sinuses pose a surgical challenge.

The availability of endoscopic sinus surgery facilitates foreign body removal not only with safety, but also with minimal morbidity. However, if trauma has distorted anatomical landmarks, the surgeon must be prepared to use more conventional external approaches.

Here we report a case where an airgun pellet entered the right orbit and lodged in the right posterior ethmoid air cell. The patient's only symptom was an unremitting severe headache. The foreign body was removed endoscopically a year later without sequelae, and the headaches disappeared.

Case report

In October 1994, a 19-year-old female patient was referred to the Otolaryngology Clinic of the U.C. Davis Medical Center with a history of intractable, intermittent, severe headaches of one year's duration. They began in the right temporal region, spread to involve the right side of the head and were also retro-orbital. The headaches would awaken her from sleep. There were no aggravating factors and only salutary relief was achieved with acetaminophen and codeine.

The headaches began in November 1993, soon after she had been accidentally shot in the medial canthal area of the right eye by a nine-year-old with an airgun (Crossman American Classic Air gun, Model 1377 which uses a Crossman Fielduse 0.177 calibre pellet). At that time the patient suffered epistaxis which was managed conservatively at another institution. There was no retro-orbital haematoma or decrease in vision. Orbital ecchymosis and

transient blurring of vision at that time resolved completely. X-rays of the paranasal sinuses were performed (Figure 1a, b and c). An air fluid level was noted in the right maxillary sinus and the ethmoid sinuses were hazy. A CT scan revealed a metallic foreign body lodged in a right posterior ethmoid air cell near the orbital apex and just anterior to the sphenoid sinus. A defect was noted in the lamina papyracea, and the tract formed by the trajectory of the missile was clearly seen medial to the globe (Figure 2). Another tiny metallic fragment was noted at the point where the tract contacted the lamina papyracea.

Examination revealed an anxious patient with an almost indiscernible scar in the right brow which marked the point of entry of the pellet. Nasal examination with the endoscope revealed a high deviation of the nasal septum to the right with minimal mucoid discharge in the middle meatus and inflamed, and enlarged middle and inferior turbinates on both sides. On palpation there was some questionable tenderness over the right medial canthus but tenderness was not elicited over the maxillary or frontal sinuses. There was no epiphora, diplopia, or decreased vision at the time of examination. The remainder of the ear, nose and throat examination was unremarkable.

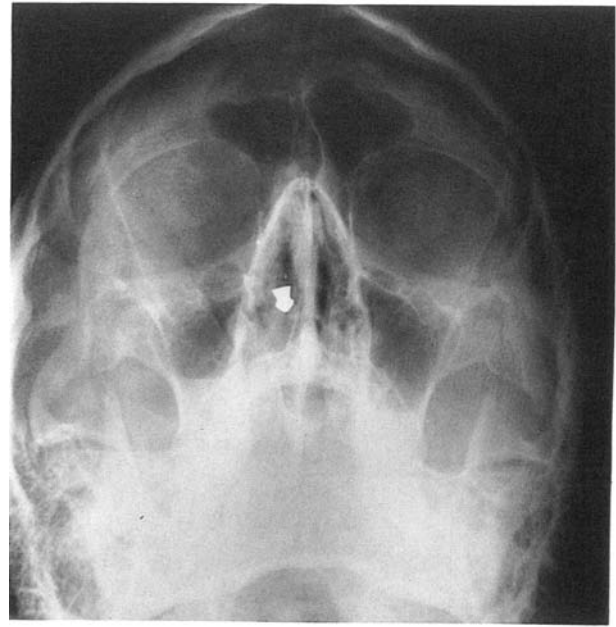
Repeat CT scans one year later revealed the pellet to be lodged in the same location as in her initial scan but the sinus mucosa now appeared normal. No increased fluid levels or haziness were seen (Figure 3).

Foreign body removal was accomplished with the patient under general anaesthesia. The face was prepared and draped for possible external ethmoidectomy. The nose was cocanized and a medialization of the septum was performed in order to improve endoscopic visualization. An initial attempt at foreign body removal was made using the endoscopic ethmoidectomy approach. The lateral aspect of the middle turbinate was excised in order to afford more working room. The cells of the ethmoid bulla were opened and an anterior ethmoidectomy done. The grand lamina was removed to gain access to the posterior

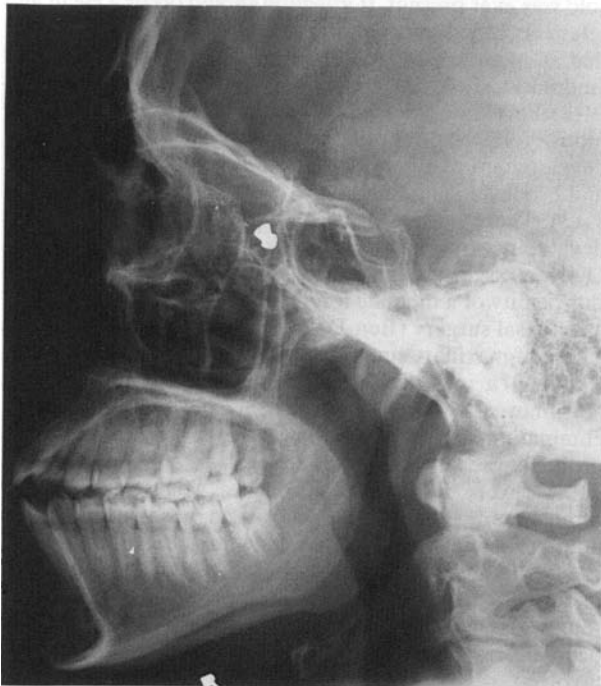
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(a)



(b)



(c)

FIG. 1(a)

Caldwell's view of the paranasal sinuses. Blood around the globe resolved spontaneously. (b) Water's view of the paranasal sinuses. Note fluid level in right maxillary sinus. (c) Lateral view of the paranasal sinuses.

ethmoid air cells. The pellet was found lying free in a posterior ethmoid cell near the anterior wall of the sphenoid sinus and removed (Figure 4). The globe was monitored for movement at all times during the operation. Once haemostasis was achieved silastic sheeting was placed between the middle turbinate and septum and in the middle meatus to prevent adhesion formation. The patient's post-operative course was uneventful. Post-operatively her severe headaches immediately disappeared. She has remained pain-free.

Discussion

Foreign bodies in the paranasal sinuses are relatively rare. The frontal (Gadre *et al.*, 1963; Rohatgi *et al.*, 1964; McAuley, 1970; ViswambaraNath, 1971), maxillary (Thornell and Williams, 1944; Sinha, 1968), sphenoid

(Ferris, 1964), and ethmoid (Cantoni, 1947; Gunewardene, 1949; Shukla *et al.*, 1975; Freifield and Burke, 1978; Halm, 1981; Mladina, 1992; Udwardia *et al.*, 1994) sinuses have all been reported to be involved. Most have a traumatic aetiology.

Most cases of foreign bodies in the ethmoid sinuses are infected and have associated purulent nasal discharge or on occasion discharging cutaneous sinuses (Thornell and Williams, 1944; Cantoni, 1947; Gunewardene, 1949; Gadre *et al.*, 1963; Rohatgi *et al.*, 1964; Sinha, 1968). When infection supervenes, the otolaryngologist is left with no option other than to remove the offending agent and treat the infection with an appropriate antibiotic.

Because of the proximity of the globe, foreign bodies in the ethmoid from projectiles are also often associated with loss of vision (Mladina, 1992). However, Udwardia *et al.* (1994), reported a toothbrush in the ethmoid sinus and

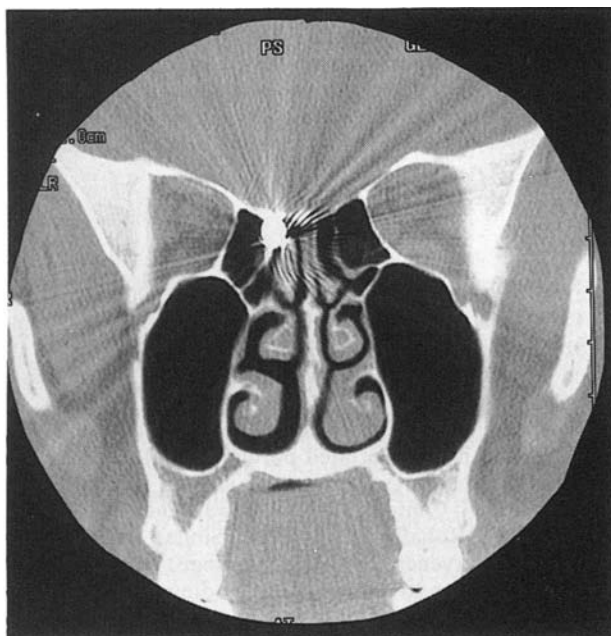


FIG. 2

Axial CT scan of the ethmoid sinuses. Note the defect in the lamina papyracea of the ethmoid bone (between arrowheads) and the site of the foreign body. The path taken by the pellet is clearly seen.

orbit without visual disturbance. Our patient was equally fortunate and had 20/20 vision using a Snellen's chart one year after her injury. A fortuitous combination of the low power of the firearm along with the trajectory of the projectile, prevented the pellet from entering the brain, or irreversibly damaging the globe. Additionally, there was neither clinical nor radiological evidence of sinusitis.

Our patient did pose two problems: firstly the decision of whether to operate or not and secondly whether to use the endoscopic approach or the external route.

Uninfected metallic foreign bodies from gunshot wounds can remain in soft tissues for long periods of

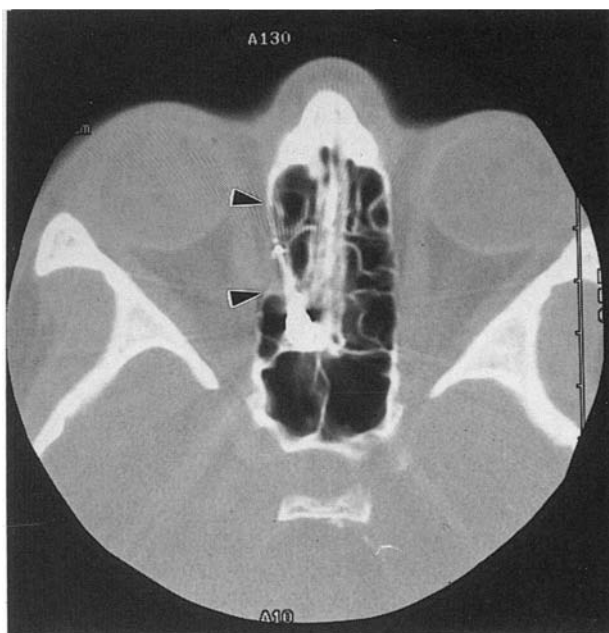


FIG. 3

Coronal CT scan showing the position of the pellet relative to the skull base. Note that the sinuses are clear.

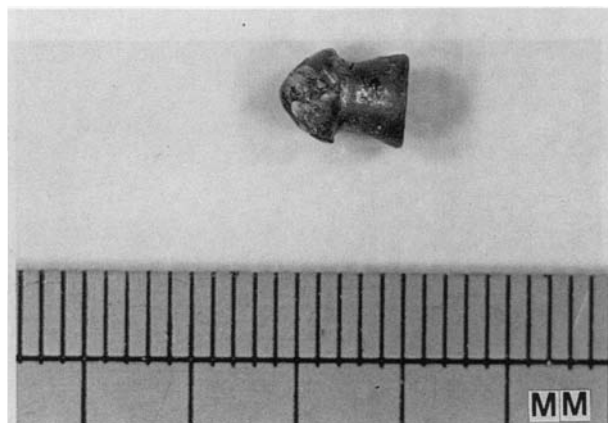


FIG. 4

The pellet after removal.

time without causing problems. However, in the sinuses they appear to behave differently. Consequently, we elected to remove the pellet for the following reasons:

(1) The potential for developing a severe ethmoid sinusitis and intracranial complications after even a trivial cold was ever present. If infection should occur a clean and relatively bloodless operation could be converted into one that is bloody with poor visualization of the anatomical landmarks.

(2) Foreign bodies lying free in the sinus may form a nidus for the deposition of calcium salts and the development of rhinoliths. These in turn can get infected and erode surrounding bone.

(3) There are at least two reports of malignancies developing around foreign bodies in the sinusal tract. One was of a patient who developed a plasmacytoma in the vicinity of a metallic foreign body retained for 50 years after nasal surgery (Ben-David *et al.*, 1981). The other was a case of maxillary sinus carcinoma developing in a patient who had a metallic foreign body retained for 48 years (Birmeyer, 1963). While this occurrence is decidedly rare, eliminating the potential hazard in a young patient is probably the best course of action.

(4) Severe intractable headaches which resolve after foreign body removal are known to be associated with uninfected metallic foreign bodies in the sinuses (Ferris, 1964; Mladina, 1922). Headaches were the only symptom in our patient. These resolved promptly after the pellet was removed. Curiously, similar neuralgic headaches have not been described where non-metallic foreign bodies were involved.

The ethmoid sinuses are supplied by afferent branches of the ophthalmic and maxillary divisions of the trigeminal nerve. While the nasociliary nerve which is a branch of the ophthalmic division, supplies the anterior cells by way of the anterior ethmoidal nerve, the posterior ethmoid cells receive input via the posterior lateral nerve branches of the sphenopalatine nerve. Additionally the posterior ethmoid cells also receive a contribution from the ophthalmic division of the Vth cranial nerve via the posterior ethmoidal nerve (Friedman and Rosenblum, 1989). It is also known that acute inflammation of the posterior ethmoid air cells can cause inflammation of the maxillary nerve and cause trigeminal neuralgia-like symptoms (Friedman and Rosenblum, 1989). Inflammation of the posterior ethmoidal cells causes referred pain over the parietal area and can spread over the entire head. This could affect the pterygopalatine ganglion, producing pain after resolution of the inflammation, a condition described by Sluder in 1908 and 1909 (Lang, 1989). Severe headaches

in our patient could represent a neuralgia-like pain as a result of irritation or galvanic stimulation of the nerve endings within the sinuses.

The choice of surgical approach depends entirely on the comfort level and experience of the surgeon. Along with optimal CT scan imaging to determine the exact location of the metallic foreign body, the endoscopic approach combines excellent visualization, low perioperative morbidity, with a minimally invasive technique. Also, additional facial scars are avoided. However, should difficulty be encountered in defining landmarks due to bleeding or from distorted anatomy, the surgeon must be prepared to employ the more conventional external approaches.

References

- Birmeyer, G. (1963) Über spatfolgen metallischer fremdkörper der nasennebenhohlen. *Zeitschrift für Laryngologie, Rhinologie und Otologie* **42**: 778–785.
- Ben-David, J., Podoshin, L., Bartal, A. H. (1981) Plasmacytoma arising in the vicinity of a foreign body in the nasal cavity. *Laryngoscope* **91**: 1150–1154.
- Cantoni, A. J. (1947) Wooden foreign body in the ethmoid capsule. *Annals of Otology, Rhinology and Laryngology* **56**: 953–956.
- Ferris, K. P. (1964) Foreign body in sphenoid sinus. *Journal of Laryngology and Otology* **78**: 697–701.
- Freifield, S., Burke, J. (1978) Chronic ethmoid sinus foreign body. *Journal of the Medical Society of New Jersey* **75**: 248–249.
- Friedman, W. H., Rosenblum, B. N. (1989) Paranasal sinus etiology of headaches and facial pain. *Otolaryngologic Clinics of North America* **22**: 1217–1228.
- Gadre, K. C., Lodaya, J. D., Deshpande, C. K. (1963) Foreign body (stone) in the frontal sinus. *Journal of Laryngology and Otology* **77**: 146–149.
- Grevers, G., Reiterer, A. (1990) Traumatisch bedingte Fremdkörper der Nasennebenhohlen. *Laryngo-Rhino-Otologie* **69**: 155–157.
- Gunewardene, H. C. P. (1949) A case of non-metallic foreign body in the ethmoidal sinus. *Journal of Laryngology and Otology* **63**: 34–35.
- Halm, D. (1981) Chronic ethmoid sinusitis due to foreign body. *Nebraska Medical Journal* **66**: 264–266.
- Lang, J. (1989) *Clinical Anatomy of the Nose, Nasal Cavity and Paranasal Sinuses*, Thieme Medical Publishers, Inc., New York, pp 112–116.
- McAuley, G. (1970) Foreign body in the frontal sinus. *Journal of Laryngology and Otology* **82**: 217–219.
- Mladina, R. (1992) Endoscopic sinus surgery: a metallic foreign body at the sphenothmoidal junction. *Journal of Laryngology and Otology* **106**: 998–999.
- Rohatgi, J. N., Imam, S. N., Sinha, A., Das, D. (1964) Foreign body in the frontal sinus. *Journal of Laryngology and Otology* **78**: 1125–1127.
- Shukla, G. K., Srivastava, D. K., Sharma, B. (1975) Foreign body: frontal and ethmoidal sinus. *Indian Pediatrics* **12**: 267–268.
- Sinha, S. N. (1968) Foreign body (lead pencil) in the maxillary sinus. *Journal of Laryngology and Otology* **82**: 473–476.
- Thornell, W. C., Williams, H. L. (1944) Foreign body involving the floor of the orbit and the antrum. *Archives of Otolaryngology* **39**: 83–84.
- Udwadia, R.A., Maniar, D., Acharya, M. (1994) A transethmoid transorbital foreign body. *Journal of Laryngology and Otology* **108**: 441–442.
- ViswambaraNath, P. (1971) A case of foreign body in the frontal sinuses. *Journal of Laryngology and Otology* **85**: 511–514.

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