

## Glass in the frontal sinus: report of three cases

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### Abstract

Patients with paranasal sinus foreign body are not commonly seen in otolaryngological practice; glass in the frontal sinus as a complication of maxillofacial trauma should be very rare, and papers dealing with this issue appear to be rare in the English literature. To elucidate the diagnostic pitfalls and the treatment aspects we present three cases of glass in the frontal sinus which occurred as a result of road traffic accidents.

**Key words:** Foreign bodies; Glass; Frontal sinus

### Introduction

The occurrence of a foreign body in the paranasal sinuses is extremely rare. About 70 per cent of these foreign bodies are associated with some form of maxillofacial trauma, while the remainder occur in patients who have had surgical treatment for dental problems. The frontal sinus is even a rarer site of lodgment of foreign bodies (Garces and Norris, 1972). Foreign bodies in the paranasal sinuses cause vague symptoms. They are discovered either after occurrence of complications or after radiological workup for some other reason; so they may be missed if their presence is not suspected or looked for initially.

We present three patients with glass particles in the frontal sinus; one of these cases was discovered following an intracranial complication two years after a road traffic accident; the other two were diagnosed and treated immediately after the incident.

### Case 1

A 28-year-old male applied to our department with a history of meningitis following an upper respiratory tract infection. Two years ago he had had a road traffic accident with multiple lacerations to his face and the wounds had been sutured. A year ago the scars on his face were revised. A month before his admission to our department he was hospitalized with convulsions and meningitis after an upper respiratory tract infection; he had a painful swelling on his forehead; cranial magnetic resonance imaging (MRI) at that time was reported to be within normal limits. He did not mention any rhinorrhoea.

Except for the scars on his face ENT examination was within normal limits. X-rays revealed multiple opacities in the frontal sinus (Figure 1). Axial CT confirmed the findings and showed a possible posterior wall defect.

Suspecting a defect of the posterior wall of the frontal sinus exploration was performed in December 1994. Many pieces of glass were found in the right frontal sinus and a single one in the left. There were two bony defects (0.5 and 1 cm in diameter) in the posterior wall of the sinus; a slit

like opening was found in the dura. Some glass pieces were stuck onto the dura and some obliterated the sinus ostium. Frontal sinus mucosa had covered some of the glass pieces which were removed (Figure 2) and the sinus mucosa

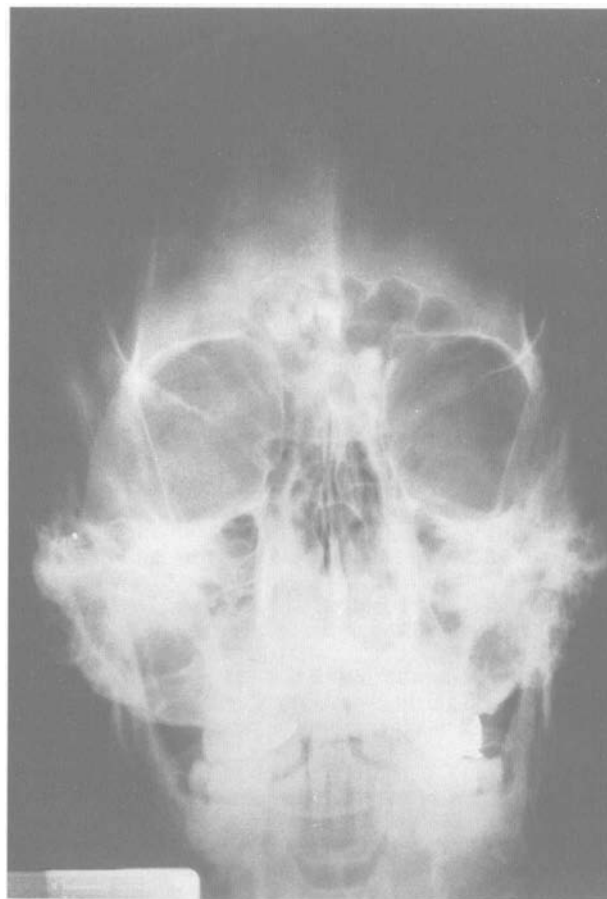


FIG. 1  
Caldwell's view of *Case 1* showing the radio-opaque particles in the frontal sinus.

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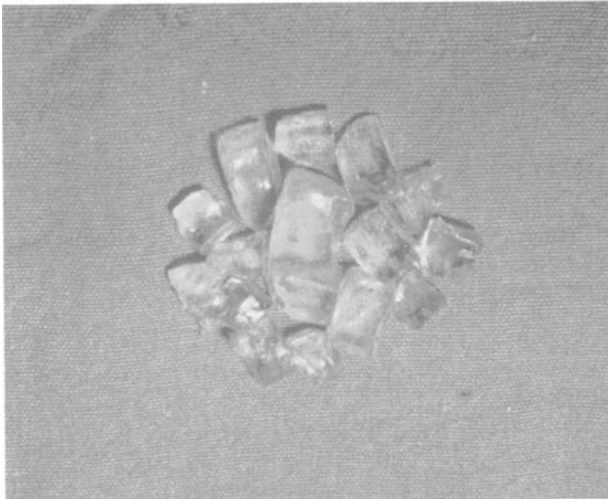


FIG. 2

All glass particles were removed from the frontal sinus.

saved. Following duraplasty, the bony defects were closed with autograft bone from the frontal bone; the patient did well after surgery and was discharged on the fifth post-operative day. He is well 15 months after surgery.

*Case 2*

A 17-year-old male patient was admitted to our department following a road traffic accident, having hit his head on the front window of the automobile. There were many facial skin lacerations and a depressed fracture of the left frontal area. No foreign body was visible. X-rays



FIG. 3

Caldwell's view of *Case 2* demonstrating small radio-opaque particles in the frontal sinus.

revealed a triangular fracture with its base on the superior orbital rim on the anterior wall of the left frontal sinus and the presence of radio-opaque particles within the sinus (Figure 3). The wound was explored and the fractured anterior wall of the sinus reflected. Two big and multiple small glass particles were removed from the sinus cavity. The posterior wall was intact. The sinus mucosa appeared normal. The fractured triangular bone was fixed with steel wires. The patient had an uneventful post-operative course and was discharged on the fourth post-operative day. He is well eight months after surgery.

*Case 3*

An 18-year-old male patient was brought to the emergency clinic of our hospital following a road traffic accident having hit his head on the windscreen of the automobile. There were many skin lacerations in the left frontal area and the underlying bone was broken into many small pieces. There were many glass particles within the wound. X-rays revealed the presence of radio-opaque foreign bodies within the left frontal sinus (Figure 4). The wound was explored under general anaesthesia and broken bone particles, four big and multiple small glass particles were removed from the sinus. The posterior wall of the sinus was broken and displaced inferiorly; there were glass particles between the dura and the intact posterior wall of the sinus. The neurosurgical team performed a frontal craniotomy and removed the glass particles. The patient had an uneventful post-operative course and was discharged at the end of the third post-operative week. He is well six months after surgery.



FIG. 4

Caldwell's view of *Case 3* showing radio-opaque foreign bodies in the frontal sinus.

## Discussion

Foreign bodies in the frontal sinuses are rare but with increasing number of road traffic accidents they may become more common. As glass is an inert foreign body, the patient may have no further symptoms. Recurrent infection or obstruction of the frontonasal duct are possibilities (Payne, 1967); therefore the presence of foreign bodies should be suspected even in seemingly trivial lacerations in cases of maxillofacial trauma (Garces and Norris, 1972).

More than 50 per cent of the foreign bodies in the paranasal sinuses are found in the maxillary sinus. The incidence of a foreign body in the frontal, ethmoid and sphenoid sinuses is nearly equal. A wide variety of foreign bodies have been reported in the paranasal sinuses. Retained roots of teeth and fillings, splinters of wood or bamboo, pieces of cotton or gauze, bullets, shrapnel fragments, knife blade and glass fragments are examples (Garces and Norris, 1972).

Conservative management of undisplaced fractures in the presence of foreign bodies may result in acute frontal sinusitis, osteomyelitis and spread to the intracranial space. Retrograde septic thrombophlebitis is the common pathway of extension (Lancer, 1982). Frontonasal duct obstruction, thrombophlebitis of the frontal lobe, focal epilepsy, meningitis, extradural, subdural and frontal lobe abscess are possible complications.

Conventional X-ray is the first examination and gives plenty of information about the foreign bodies, anterior and posterior wall of the frontal sinus, the aeration of the sinus and the condition of its mucosa. Conventional tomography in the coronal plane may give more information about these, but may be difficult to interpret. Axial CT is the examination of choice, localizes the foreign body accurately, assesses the integrity of the anterior and posterior frontal sinus wall, the condition of the mucosa, intracranial penetration and possible complications. Lack of radiographic evidence of fracture of anterior wall of the frontal sinus does not preclude the diagnosis of foreign body penetration (Lancer, 1982).

In our first case, the history of a road traffic accident, facial scars together with the history of acute frontal

sinusitis, epileptic fits and meningitis made us consider the possibility of an intracranial complication due to acute frontal sinusitis. Intracranial spread of infection may occur by direct extension via defects, osteomyelitis or infected thrombus. X-ray and computed tomography (CT) scan showed the foreign body in the frontal sinus. CT also demonstrated a possible posterior wall defect; but, exploration of the sinus revealed a posterior wall defect in two different areas and in one of them with dura laceration. In the other two patients, foreign bodies in the sinus were diagnosed early and treated before the occurrence of any complications.

For all maxillofacial trauma patients with skin laceration over the paranasal sinuses, the suspicion of foreign bodies may prevent the possibility of intracranial and intrasinus complications. The best treatment is by prevention. This must be done by reinforcing public opinion about regular use of seat belts. Although the use of seat belts in the front and back seats has been compulsory in Turkey for several years, many people avoid using them, thus leading to many avoidable injuries. Suspicion, investigation and exploration of the sinus are the next best options.

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