

Disseminated pneumocephalus secondary to an unusual facial trauma

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Abstract

Pneumocephalus can be secondary to a postintrathecal procedure, sinus fracture, basilar skull fracture, congenital skull defect, neoplasm, gas producing organism, barotrauma, neurosurgery, paranasal sinus surgery, mask or nasal continuous positive-airway pressure. Unusual facial traumas can also be rare causes of pneumocephalus. Here, we present such a case in whom an air compressor tip injury to both eyes led to the disseminated pneumocephalus. We report this rare case with the computed tomography findings and try to explain the possible mechanism of the pneumocephalus. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Pneumocephalus; Computed tomography; Facial trauma

1. Introduction

Pneumocephalus has been associated with various conditions such as postintrathecal procedure, sinus fracture, open fracture, basilar skull fracture, congenital skull defect, neoplasm, gas-producing organism, barotrauma, neurosurgery, paranasal sinus surgery, mask or nasal continuous positive-airway pressure [1–3]. Severe facial trauma may result in fracture of the orbits or sinuses, thus leading to the accumulation of air within the orbits or even within the brain [4]. As air is gradually absorbed, pneumocranium usually resolves without any neurologic sequelae or any need for treatment [5]. Unusual facial traumas are rare causes of pneumocephalus. Air compressor injury is a type of unusual facial trauma and has been reported in numerous cases in the literature. We report a case in whom the trauma with an air compressor tip to the right orbit medially and left orbit laterally led to the disseminated pneumocephalus. We could not demonstrate any basilar skull

fracture, thus presumed that air arrived there by an unusual route.

2. Case report

A healthy 16-year-old man was struck by his friend with an air compressor tip in both eyes. The patient complained of severe pain and experienced swelling of the eyelids and the face. There was minimal bleeding from the puncture sites. The patient was sometimes conscious and sometimes confused mentally. There were lacerations of right nasal and left temporal conjunctiva.

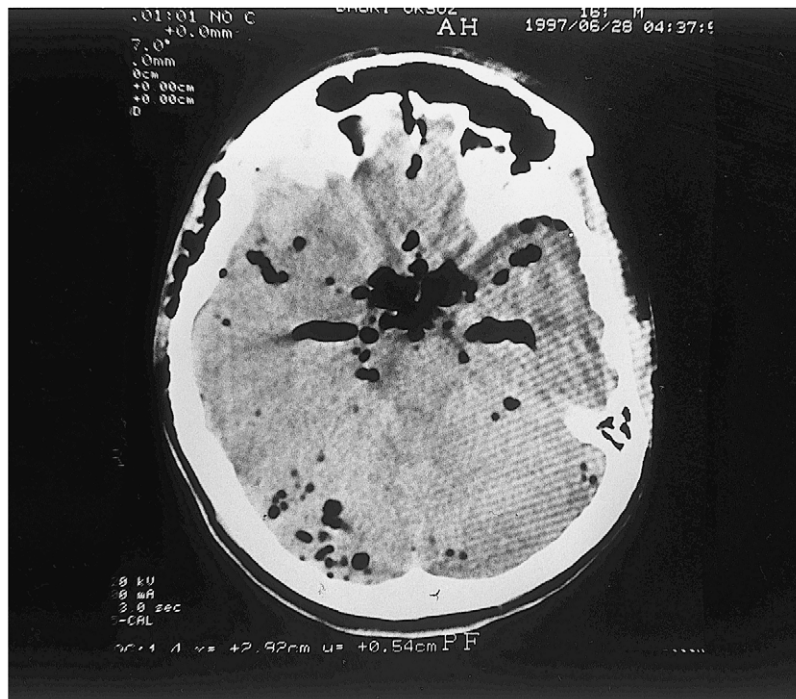
A computed tomographic (CT) scan of the head and the orbits was obtained. There was disseminated accumulation of air within the internal and the external subarachnoid spaces (Fig. 1a,b). There was no bony fracture of the maxillofacial region. Air-fluid level was seen in the right side of the sphenoid sinus, but bone fracture could not be detected. Bilateral optic nerves and extraocular muscles were normal. Both of the eyeballs were intact (Fig. 1c). There was air in the preseptal and postseptal compartments of the orbits, especially around the optic nerves and optic canals, and

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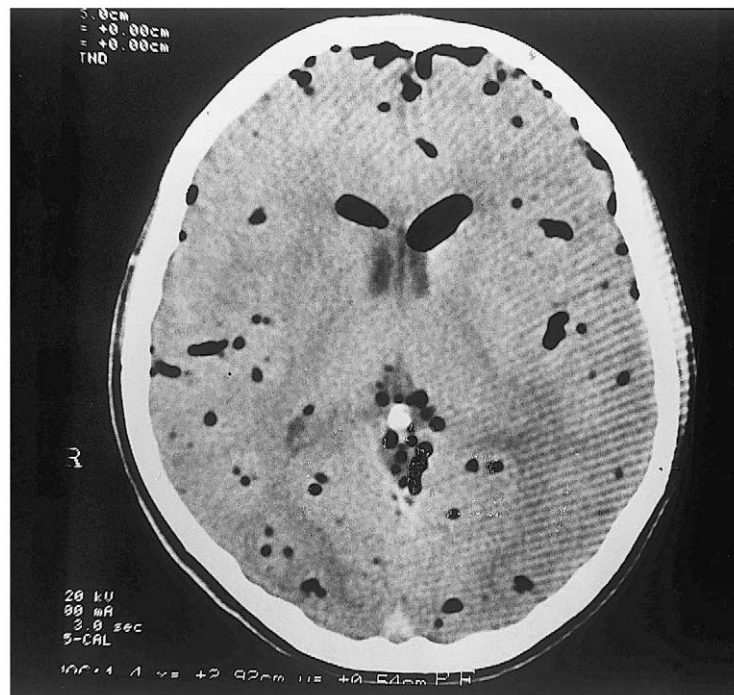
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within the left globe (Fig. 1d). There was also disseminated air within the soft tissues of the face, subgaleal and infratemporal fossae bilaterally. The patient re-

gained his consciousness during the following days and eyelid and other soft tissue swellings resolved during the next several weeks.

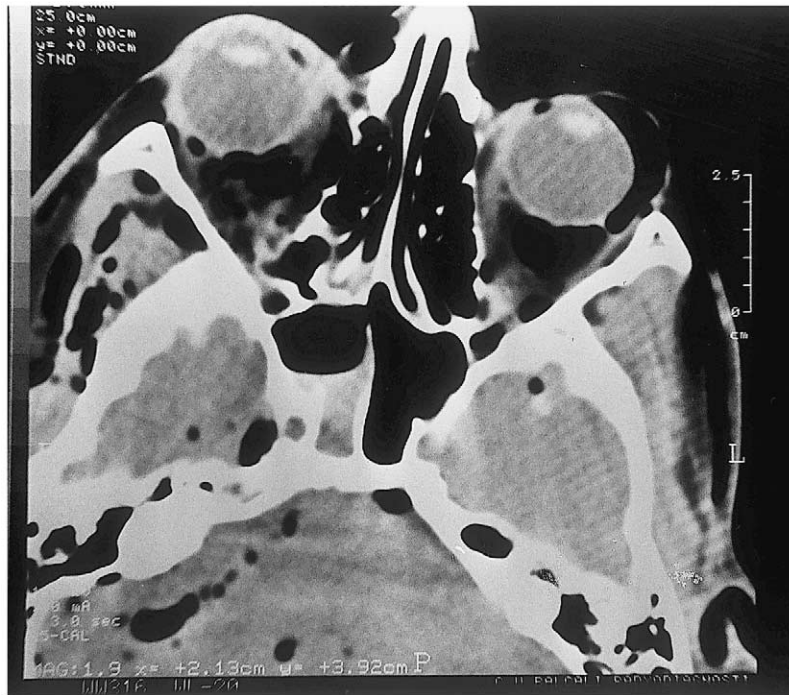


(a)

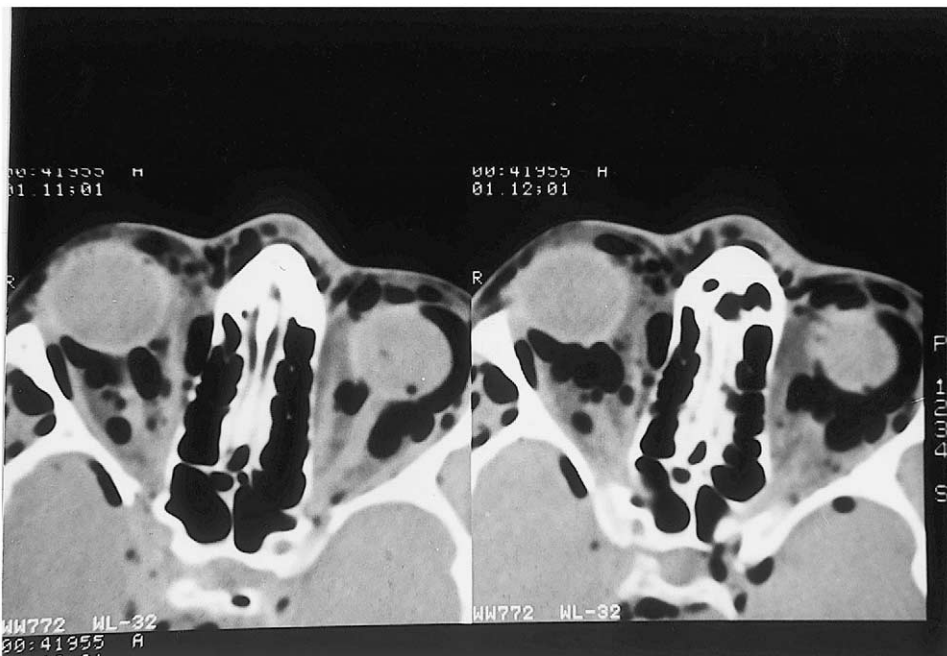


(b)

Fig. 1. Sixteen-year-old man with disseminated pneumocephalus secondary to air compressor injury. (a,b) Axial CT scans show disseminated pneumocephalus in the internal and the external subarachnoid spaces. (c) CT scan at the level of the orbits shows accumulation of air within the preseptal and postseptal compartments and air-fluid level in the right side of the sphenoid sinus. Both of the eye balls are intact. (d) Axial CT scans show air around the optic nerves and optic canals bilaterally and within the left globe.



(c)



(d)

Fig. 1. (Continued)

3. Discussion

Pneumocephalus has been described in several clinical situations, including facial trauma [6,7]. Facial trauma may result in pneumocephalus secondary to basilar skull fracture. In our case, we could not demonstrate any fracture. There was some fluid in sphenoid

sinus that could be consistent with blood and medial wall fracture of the sphenoid sinus. But, there was no fracture of the superior wall of the right orbit that we could demonstrate on either axial or coronal CT images. To our knowledge, disseminated pneumocephalus secondary to air compressor trauma demonstrated with CT is rare. We presumed that air compressor tip dis-

sected the right medial and left lateral extramuscular space by perforating the orbital septum and also caused laceration of the conjunctiva and the Tenon fascia. We also presumed that air within the subarachnoid space arrived there by dissecting the Tenon fascia unilaterally or bilaterally, then around the optic nerve and through the optic canal into the internal and external subarachnoid spaces. A similar case was reported in 1999, in which a healthy 47-year-old white man was struck by an air compressor hose [8]. This pathway is possible because the cerebrospinal fluid surrounding the optic nerve is in continuity with the intracranial subarachnoid space. This can be a possible route of air passage when any bony fracture can not be detected. We thought that air within both infratemporal fossae arrived there through the inferior orbital fissures.

The presence of pneumocephalus is of concern to the clinician, because it indicates that the protective barriers of the brain have been violated. Intracerebral air is generally well tolerated. In our case because of the disseminated pneumocephalus, the patient was initially

confused. But, during the following days the patient regained his consciousness as the pneumocephalus and soft tissue swellings resolved.

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