Pneumocephalus caused by Compressed Air Injury without Fracture

Dong Hun Kim¹, Jung-Ho Yun², Ja Hea Gu³

¹Department of Surgery, Trauma Center, Dankook University Hospital, Cheonan, Korea

²Department of Neurosurgery, Trauma Center, Dankook University Hospital, Cheonan, Korea

³Department of Plastic and Reconstructive Surgery, Dankook University Hospital, Dankook University College of Medicine, Cheonan, Korea

Pneumocephalus and orbital emphysema without fracture or sinusitis is a rare condition. A 64-year old man suffered from right orbital trauma by a compressed-air-gun shooting. The right half of his face was swollen and a deep laceration of the right medial canthus was observed. Computed tomography showed extensive subcutaneous emphysema in the right periorbital soft tissue through the right temporal and zygomatic areas to the right upper neck, and disseminated pneumocephalus.

(Trauma Image Proced 2017(1):10-12)

Key Words: Pneumocephalus; Face; Injuries

CASE

A 64-year-old man was admitted with swelling in the

right periorbital area and right face and conjunctival hemorrhage with blurred vision in the right eye (Fig. 1), which had been exposed to a compressed air gun.

Fig. 1. An external photograph of the face reveals swelling of the right eyelids and cheek, and laceration of the right medial canthus (A, B).

Received: February 12, 2017 Revised: March 3, 2017 Accepted: March 12, 2017

Correspondence to: Jung-Ho Yun, Department of Neurosurgery, Trauma Center, Dankook University Hospital, 201 Manghyang-ro, Dongnam-gu, Cheonan, Chungnam 31116, Korea

Tel: 82-41-550-7119, Fax: 82-41-550-0039, E-mail: tjburk@hanmail.net

Copyright © 2017 Korean Association for Research, Procedures and Education on Trauma. All rights reserved.

©This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited

Fig. 2. CT scans of the face and brain. (A) Coronal CT of the facial bone shows the right orbital emphysema and extensive subcutaneous emphysema of the right cheek. (B) Axial CT of the facial bone shows pneumocephalus in the sella along the optic canal. (C, D) Brain CT shows disseminated pneumocephalus along the basal cistern (arrow) and third ventricle (arrow).

Physical examination revealed conjunctival laceration, iritis, and corneal erosion in the right eye, a deep laceration of the right medial canthus, and right lacrimal canaliculi division. Computed tomography (CT) scan of the brain and facial bone showed extensive subcutaneous emphysema in the right periorbital area, which spread to the right temporal, retrobulbar, masseter, buccal, parapharyngeal, submandibular, and left periorbital areas, and disseminated pneumocephalus was noted in the subar-

achnoid space of the skull base without fracture of the facial bone and skull (Fig. 2.). There was no neurologic symptom or sign caused by the pneumocephalus. Lacrimal duct reconstruction for the right lacrimal canaliculus injury was performed on hospital day 2. A broadspectrum antibiotic was applied for the pneumocephalus. Follow-up CT scan of the brain on hospital day 6 showed complete resolution of pneumocephalus and markedly decreased emphysema in the right face. The patient was

discharged on hospital day 9 with improving blurred vision.

DISCUSSION

Although traumatic pneumocephalus with orbital emphysema usually is associated with skull fracture or paranasal sinusitis, compressed air injury often causes pneumocephalus without skull and facial bone fracture (1). Emphysema caused by compressed air (high-pressure) exposure can spread extensively to various regions, including the orbit, face, neck, mediastinum, and intracranial cavity (2). The mechanism of the air flow into the cranial cavity from the orbital cavity comes in through the dissection beneath the Tenon fascia, around the optic nerve, and through the optic canal into the subarachnoid space (3,4). Treatment of the pneumocephalus is mostly via conservative therapy with systemic and topical prophylactic antibiotics. Prophylactic antibiotic therapy has an important role in preventing intracranial infection through the air entry route, because the protective barriers of the brain have broken down. The various emphysema and visual acuity conditions may resolve to normal within several days to 1 month (2).

Conflict of Interest Statement

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Chung HJ, Lee BH, Hwang YJ, Kim SY. Pneumocephalus due to Compressed Air Injury without Facial Bone Fracture. *Journal of the Korean Society of Radiology*. 2011; 65(4):333-5.
2. Hiraoka T, Ogami T, Okamoto F, Oshika T. Compressed air blast injury with palpebral, orbital, facial, cervical, and mediastinal emphysema through an eyelid laceration: a case report and review of literature. *BMC ophthalmology*. 2013; 13(1):68.
3. Yuksel M, Yuksel KZ, Ozdemir G, Ugur T. Bilateral orbital emphysema and pneumocephalus as a result of accidental compressed air exposure. *Emergency radiology*. 2007;13(4):195-8.
4. Williams TR, Frankel N. Intracerebral air caused by conjunctival laceration with air hose. *Archives of Ophthalmology*. 1999;117(8):1090-1.