



Brain Perfusion Changes in a Patient with Facial Trauma

Yüz Travmalı Bir Hastada Beyin Perfüzyon Değişiklikleri

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¹University of Ioannina Faculty of Medicine, Department of Nuclear Medicine, Ioannina, Greece

²University of Ioannina Faculty of Medicine, Department of Radiology, Ioannina, Greece

³University of Ioannina Faculty of Medicine, Department of Psychiatry, Ioannina, Greece

⁴University of Ioannina, Neurosurgical Institute, Ioannina, Greece

⁵University of Ioannina Faculty of Medicine, Department of Neurosurgery, Ioannina, Greece

⁶University of Ioannina Faculty of Medicine, Department of Maxillofacial Surgery, Ioannina, Greece

Abstract

A 69-year-old male was admitted to our hospital because of left facial trauma with bone fractures, including the maxillary sinus, zygomatic arch, and ethmoid and sphenoid bones. Brain computed tomography was unremarkable but regional cerebral blood flow with hexamethyl-propylene-amine oxime single-photon emission computed tomography (SPECT) showed hypoperfusion of the left hemisphere, which was reversible since a repeat SPECT 4 months later was substantially improved. Brain perfusion SPECT may provide information on cerebrovascular status in some cases of facial injury.

Keywords: Brain perfusion imaging, cerebral blood flow, HMPAO, facial trauma, computed tomography, neuroimaging

Öz

Altmış dokuz yaşında erkek hasta, maksiller sinüs, zigomatik ark, etmoid ve sfenoid kemikleri içeren kemik kırıkları ile prezente sol yüz travması nedeniyle hastanemize başvurdu. Beyin bilgisayarlı tomografisinde özellik yoktu ancak heksametil-propilen-amin oksim tek foton emisyonlu bilgisayarlı tomografi (SPECT) ile sol hemisferde bölgesel serebral kan akışında hipoperfüzyon görüldü. Bu hipoperfüzyon geçici olduğu ve 4 ay sonra tekrarlanan SPECT ile önemli ölçüde gerilediği gözlemlendi. Beyin perfüzyon SPECT, bazı yüz yaralanmalarında serebrovasküler durum hakkında bilgi sağlayabilir.

Anahtar kelimeler: Beyin perfüzyon görüntüleme, serebral kan akımı, HMPAO, yüz travması, bilgisayarlı tomografi, nörogörüntüleme

Address for Correspondence: Asst. Prof. Chrissa Sioka, University of Ioannina Faculty of Medicine, Department of Nuclear Medicine, Ioannina, Greece

Phone: +00302651099377 **E-mail:** csioka@yahoo.com ORCID ID: orcid.org/0000-0002-2184-4945

Received: 06.05.2022 **Accepted:** 15.11.2022

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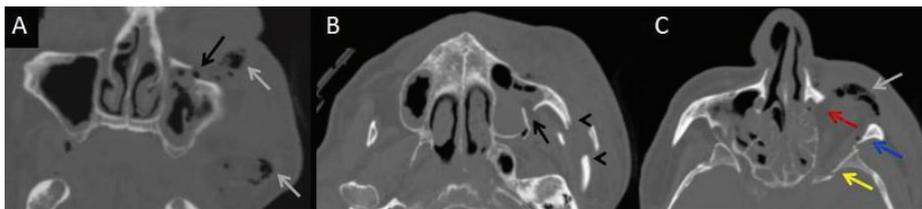


Figure 1. A 69-year-old male was admitted to our hospital because of left facial trauma with facial bone fractures (Figure 1). Axial computed tomography (CT) scan images showed several bone fractures and air bubbles (white arrows) in the left maxillary sinus (black arrows) (A, B) and the zygomatic arch (arrow head) (C), lamina papyracea of the ethmoid bone (red arrow) (C), greater wing of sphenoid (yellow arrow) (C), and zygomatic bone (blue arrow) (C). Brain CT was unremarkable (not shown).

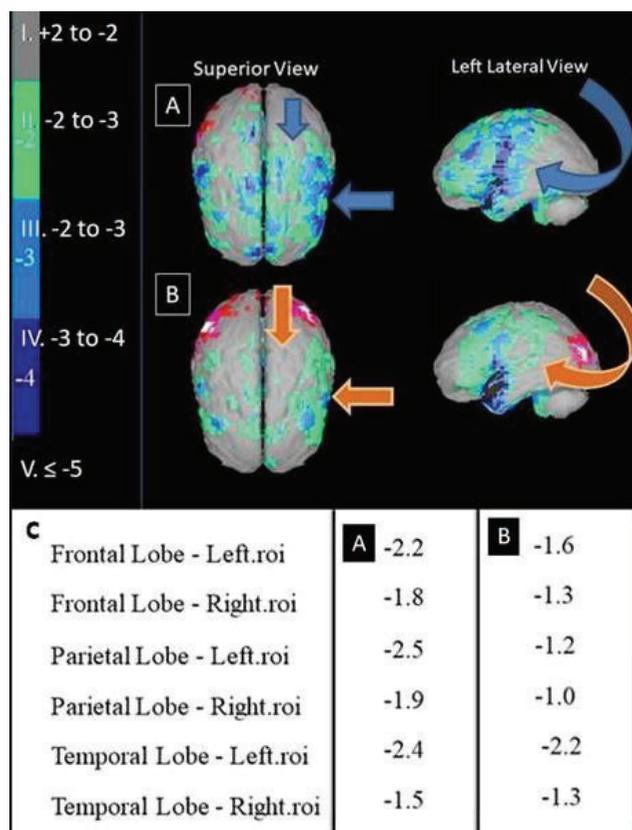


Figure 2. Further evaluation included regional cerebral blood flow (rCBF) distribution with Tc-99m hexamethyl-propylene-amine oxime (HMPAO) single-photon emission computed tomography (SPECT) using NeuroGam software for the semiquantitative evaluation of perfusion of left and right hemispheres. The standard deviation difference over 2-fold was considered an abnormal value. rCBF with HMPAO SPECT showed hypoperfusion of the left frontal and parietal lobes (Figure 2A), which was reversible since a repeat SPECT 4 months later was improved (Figure 2B). In the left temporal lobe, the second SPECT showed mild improvement in rCBF, which could have been related to the patient's psychological status after the accident, since this lobe has been linked to emotions such as depression (1).

SPECT cerebral perfusion imaging represents a sensitive method to assess brain perfusion changes even after minor traumatic brain injury (2). In addition, as in this case, it may show even subtle reversible changes in facial injury without brain damage. Figure 2 shows the reversibility of the perfusion deficit between the first (A) and the second examination (B). Blue arrows show the hypoperfused areas (A) and orange arrows show the reversibility (B). The colored scale in the image demonstrates the hypoperfused brain areas and their severity (≤ -2) seen in the left frontal and parietal lobes.

This case demonstrated that during facial trauma without obvious cerebral abnormalities, brain perfusion was temporally reduced; however, this phenomenon was reversible. There is insufficient experience related to the impact of craniomaxillofacial injuries on the cerebrovascular bed. A recent retrospective study on 753 patients with such injuries demonstrated blunt cerebrovascular injuries in 3.1% of facial fracture patients (3). Similar results were reported in another study on 428 patients that showed that patients with craniofacial fractures exhibited a 3 to 4-fold increased risk for blunt cerebrovascular injuries (4). Thus, although brain imaging is not part of facial trauma evaluation, in some cases brain perfusion SPECT may provide further information on cerebrovascular status related to facial injury.

Ethics

Informed Consent: Written informed consent was obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: C.S., A.Z., V.R., Concept: C.S., V.R., Design: A.Z., V.R., Data Collection or Processing: A.Z., P.P., A.A., Analysis or Interpretation: P.P., G.A., Literature Search: A.A., G.A., Writing: C.S., V.R.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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