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Posttraumatic Delayed Tension Pneumocephalus: Case Report

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Aim: Tension pneumocephalus is a problem that requires emergent intervention for the fact that it can lead to sudden increase in intracranial pressure. In this study we present a case of late tension pneumocephaly which threatened the life of the patient.
Subject: A 63-year-old man was admitted to our emergency unit with severe headache after being involved in a traffic accident. Radiological exams showed frontal sinus fracture, frontal cerebral contusion and minimal pneumocephalus. Conservative treatment was initiated. On the eleventh day he had a disturbance in consiousness, hence another cranial computerized tomography was taken which revealed subdural, intraventricular and intraparenchymal tense air that caused high pressure on the brain and intracranial areas including the posterior fossa. The patient was operated on urgently and the tense air was evacuated. During the postoperative period the patient's state of conscious began to improve.
Result: In view of this situation, although tension pneumocephaly generally develops during the early posttraumatic period, it should be kept in mind that it can also develop in the late phase. So long-term, close observation for the patients with simple pneumocephaly is beneficial.

Key Words: Head Trauma, Delayed Tension Pneumocephalus

Posttravmatik Gecikmiş Tansiyon Pnömosefali: Olgu Sunumu

Amaç: Tansiyon pnömosefali ani intrakranial basınç artışına neden olduğu için acil müdahale gerektiren bir patolojidir. Bu çalışmada, posttravmatik geç dönemde oluşan ve hastanın hayatını tehdit eden bir tansiyon pnömosefali olgusunun sunulması amaçlandı.
Olgu: Trafik kazası nedeniyle acil polikliniğimize başvuran, giriş nörolojik muayenesi normal fakat şiddetli baş ağrısı olan 63 yaşında bir erkek hastaya yapılan BBT'de frontal sinüs fraktürü, frontal kontüzyonel kanama ve minimal pnömosefali tespit edildi. Kliniğe yatırılıp takip edilen hastanın 11. gün şuur düzeyinde gerileme olması nedeniyle yapılan BBT'de, subdural, intraventriküler ve intraparankimal basınçlı hava tespit edildi.Hava beyin dokusuna arka fossa dahil tüm intrakraniyal alanda ileri derecede bası yapıyordu. Hasta acil olarak ameliyat edilerek basınçlı hava boşaltıldı. Postoperatif hastanın şuur düzeyi açıldı.
Sonuç: Tansiyon pnömosefali, genellikle erken dönem oluşmakla beraber, posttravmatik geç dönemlerde de ortaya çıkabilir. Bu nedenle basit pnömosefali bulunan hastaların uzun dönem yakın takipleri faydalıdır.

Anahtar Kelimeler: Gecikmiş Tansiyon Pnömosefali, Kafa Travması

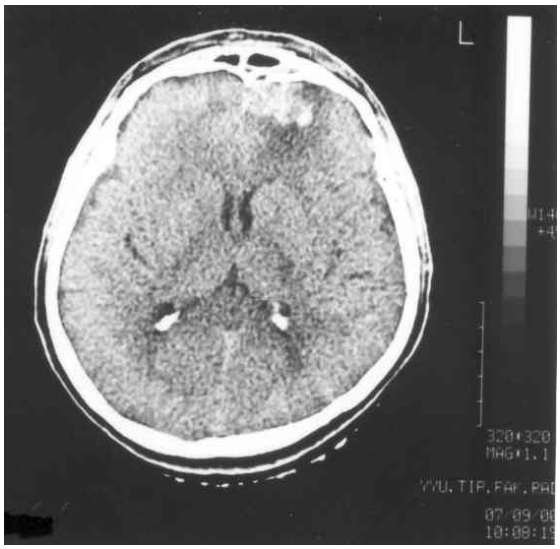
Tension pneumocephalus results from the entrapment of intracranial air due to a check valve system. It behaves like an intracranial space occupying mass and threatens life. Therefore it should be distinguished from simple pneumocephaly. Intracranial air may be situated in the epidural, subdural, subarachnoid, intraparenchymal or intraventricular spaces.[1] The air is most frequently seen in the frontal area and rarely in the posterior fossa. The diagnosis can easily be made by computerized tomography (CT). Whilst simple pneumocephaly needs no treatment tension pneumocephaly should promtly be evacuated. Evacuation of the air under high pressure results in dramatic and fast recovery. In this study we aim to contribute to the treatment procedures of tension pneumocephaly, by presenting an extensive case in the subdural, intraparenchymal, and intraventricular areas.

CASE REPORT

A 63-year-old man involved in a traffic accident was brought to the emergency unit. Neurologic examination of the

patient who had severe headache was normal. Initial CT showed frontal sinus fracture, frontal cerebral contusion and minimal pneumocephalus (Figure 1). The patient was admitted and conservative treatment was initiated. On the eleventh day of trauma, when the patient was prepared for discharge, sudden worsening in consciousness, left pupil dilatation, decrease in left pupil reflex response, right hemiparesis, positive Babinski reflex on the left side and respiratory distress were developed. An epileptic fit accompanied the herniation syndrome. Emergent CT disclosed widespread tense air occupying subdural, intraparenchymal and intraventricular spaces (Figure 2, 3). The patient was emergently taken for operation: A burr-hole was opened at the frontal area and subdural space was irrigated with physiologic saline until all air was evacuated. Abrupt recovery was observed in the early postoperative period. Neurologic examination became normal in three days. Medical therapy was admitted to control the epileptic seizures. Postoperative CT showed that the intracranial air was nearly completely evacuated (Figure 4).

Figure 1: The initial computerized tomography showing frontal sinus fracture and frontal contusion after trau



DISCUSSION

The most common cause of pneumocephaly is head trauma that leads to fracture of the base of the cranıum.[2] Besides this, craniofacial operation, transsphenoidal surgery, ventriculoperitoneal shunt procedures, posterior fossa operation in sitting position, lumbar drainage, spinal anesthesia, lumbar puncture and operation for chronic subdural hematoma can also cause pneumocephaly.[3-7] In our case tension pneumocephaly developed in the late period following frontal sinus fracture.

Figure 2: Computerized tomography showing tension pneumocephaly involving the subdural, intraventricular and intraparenchymal areas when the patient had worsened conciousness level.

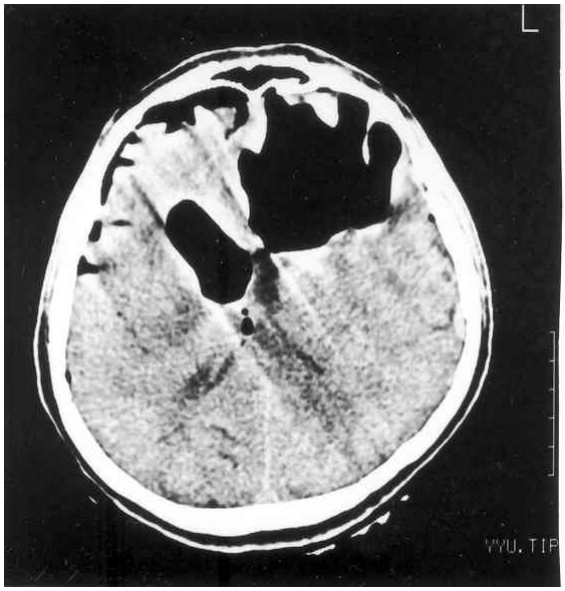


Figure 3: View of tension pneumocephaly in the posterior fossa.

Tension pneumocephaly appears suddenly as an intracranial space occupying lesion and leads to the findings of increased intracranial pressure.[8] As it was in our case, findings attributable to the increase in intracranial pressure including worsening

consciousness level, pupil dilatation, respiratory distress can be encountered. Due to the lack of early diagnosis and treatment this may result a fatal herniation syndrome which makes early identification and treatment mandatory.

Figure 4: Computerized tomography after evacuation of the tension pneumocephalus.

In tension pneumocephaly, air most frequently occupies the subdural area.[2] However, air can also occupy the epidural,subarachnoid,intraparenchymal and intraventricular areas. In our case, air exhibited the effect of a space occupying lesion in all intracranial areas including the subdural,intraparenchymal,intaventricular areas and posterior fossa.

Gönül et al presented a case of tension pnuemocephaly due to head trauma where they performed emergent decompressive surgery because of shift of intracranial midline structures. They noted that their case was interesting due to intraventricular tension pneumocephalus.[8] Ram et al presented a case of tension pneumocephaly in the posterior fossa region with cerebrospinal fluid leakage at the suture line developing at the tenth day of a posterior fossa operation.[7] Our case is special in the sense that tension pneumocephaly developed on the eleventh day after trauma and air occupied subdural, intraparenchymal, intraventricular areas and posterior fossa region.

Candira et al declared that air collection in the ventricles causes no shift effect on midline structures and thus needs no emergent intervention.[9] Arbit et al used under water closed drainage system for controlled decompression.[10] In our case we applied conservative treatment for simple pneumocephaly and burr-hole craniostomy and irrigation in tension pneumocephaly. The patient benefited from this management.

Browning CJ et al[11] appointed that intracranial air is frequently present after craniotomy, but it is normally absorbed in three to four weeks. The presence of pneumocephalus on a delayed postoperative CT scan should raise the possibility of a cerebrospinal fluid (CSF) fistula, or infection with a gas-forming organism. Many CSF fistulae require surgical closure in order to prevent potentially life-threatening central nervous system infections and tension pneumocephalus. Immediate neurosurgical repair is advisable.[11] In our case, no findings or symptoms for CSF fistula were encountered.

Huan CF et al presented a case who had right traumatic frontal intracerebral hemorrhage and frontal bone fractures. Tension pneumocephalus was diagnosed by computed tomography (CT) scan and plain skull X-rays. The fistula tract of the ethmoid sinus was investigated by radioisotope albumin cisternography. This pneumatocele was unroofed and the fistula was tamponaded by pericranial muscles and the layers were sealed by fibrin glue. They concluded that, as a surgical emergency, tension pneumocephalus can be successfully treated only by early diagnosis and early treatment.[12]

Kon T et al[13] disclosed that, tension pneumocephalus may occur as a complication several years after craniotomy because of the chronic lowering of intracranial pressure induced by a VP shunt. Complete frontal sinus repair is important during the initial craniotomy. So there is no well defined range of period values for developing tension pneumocephaly and this condition requires close, long-term follow-ups.[13]

Tension pneumocephaly may appear asa life threatening complication in trauma patients. Despite the fact that it generally occurs during early postraumatic period, it should be kept in mind that it can also occur during the late phase. Emergent intervention can be life saving. Hence, we believe, for the fact that there is an expected risk of developing tension pneumocephaly lately, long term

observation of patients with simple pneumocephaly is beneficial.

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