Penetrating injury of cranium: a case report

Kraniyal delici yaralanma: Olgu sunumu

Cüneyt TEMİZ, [1] Ahmet Şükrü UMUR, [1] Celal BAĞDATOĞLU, [2] Cumhur TOSUN, [1] Mehmet SELÇUKİ [1]

A 38 year-old male patient treated for paranoid schizophrenia for five years was found on a chain saw table at his workplace with a great parasagittal, linear active bleeding wound from left occiput to medial portion of left orbita. He was unconscious.with a Glascow coma score of 5 points as 1-3-1. Cranial radiographies revealed a bone defect from left occipital region to left medial border of orbita. CT scan showed also a great linear tissue damage involving left lateral ventricle, and an intracerebral hematoma located mainly at left frontoparietal region. An emergent left frontoparietal craniotomy was performed. Four centimetres laterally midline, there was a linear, vertical tissue wound. Hemostasis was achieved at first and intracerebral haematoma evacuated.

At one week postoperatively, his eyes started to react to verbal commands. At 7 months postoperatively he was attempting to cooperate with eye movements and writing. He was right hemiplegic, aphasic and on the right side deep tendon reflexes were hyperactive. His Karnofsky score was almost 40 points.

Cranial injuries due to chain saw accidents are very rare. Early surgical procedures (incl. decompression) combined with aggressive antibiotherapy seem to have a great survival benefits. However best long- term results show that this type of injuries have a great rate of mortality and morbidity despite all surgical and medical treatment procedures.

Key words : motor saw injury, cranium, neurologic parameters

Beş yıldır paranoit şizofreni tanısıyla tedavi altında olan 38 yaşında erkek hasta, işyerinde motorlu testere tablası üzerinde bulunmuş. Fizik muayenede sol oksipital bölgeden orbita mediyal duvarına kadar ilerleyen büyük , doğrusal tarzda bir parasagittal aktif kanamalı yara gözlendi. Nörolojik muayenede; bilinci kapalı olan hastanın (Glascow koma skoru yaklaşık 1-3-1; toplam 5 puan) direkt grafilerinde sol oksipital bölgeden, orbita mediyal duvarına uzanan lineer bir kemik defekti gözleniyordu. Bilgisayarlı tomografi incelemesinde ayrıca lateral ventrikülü de içine alacak şekilde, sol frontoparietal bölgede büyük bir doku yitimi alanı ve intraserebral hematom vardı. Hasta acil şartlarda ameliyata alınarak sol frontoparietal kraniyotomi uygulandı. Orta hattın dört santimetre lateralinde, parasagittal yerleşimli doku yıkımı alanı görüldü. Tüm drenaj venleri de yıkıma uğramıştı. Öncelikle hemostaz yapıldı ve daha sonra intraserebral hematom boşaltıldı.

Erken postoperatif dönemde, nörolojik tablosunda belirgin değişiklik olmayan hasta , postoperatif birinci haftada sözel uyarılara gözlerini açarak yanıt vermeye başlamıştı. Postoperatif yedinci ayda hastanın gözleri spontane olarak açıktı ve göz hareketleri ve yazı ile koopere olmaya çalışıyordu. Hasta sağ hemiplejik, afazik ve sağ tarafta derin tendon refleksleri hiperaktifti. Karnofsky performans ölçütüne göre neredeyse 40 puanlık değere ulaşmıştı.

Motorlu testereye bağlı kraniyal yaralanma nadir görülen bir olaydır. Dekompresyon gibi cerrahi işlemlerin erken dönemde uygulanması sağkalımı iyileştirmektedir.. Bu dönemde başlanacak uygun antibiyotik tedavisi ve kraniyal infeksiyonlara karşı savaşım önemli noktalardandır. Uygun cerrahi ve medikal tedaviye karşın bu hastalarda mortalite ve morbidite oldukça yüksektir.

Anahtar sözcükler: motorlu testere yaralanması, kraniyum, nörolojik parametreler

[1]Celal Bayar University, Faculty of Medicine, Department of Neurosurgery, Manisa, Turkey [2]University of Mersin, Faculty of Medicine, Department of Neurosurgery, Mersin, Turkey

[1] Celal Bayar Üniversitesi Tıp Fakültesi, Beyin-Sinir Cerrahisi Ana Bilim Dalı, Manisa
[2]Mersin Üniversitesi Tıp Fakültesi, Beyin-Sinir Cerrahisi Anabilim Dalı, Mersin

İLETİŞİM (*Correspondence*): Dr. Cüneyt Temiz, Celal Bayar Üniversitesi Tıp Fakültesi, Beyin-Sinir Cerrahisi, Ana Bilim Dalı 45020 – Manisa; Tel-Faks: 0.236.2379439: e-posta: temiz2@tr.net

INTRODUCTION

Penetrating injuries of cranium are common in neurosurgical practice. Common reasons are; bullets , sharp edged metals like knives and occasionally wooden particles. Motor chain saw injury of cranium is a rare kind of trauma style and accompanying tissue damage is different from those others.

Some factors such as penetration level, relation with elaquent brain sites and blast effect of motor chain saw because of its motion, are important in surgical planning and overcoming the problems of patients suffering from penetrating cranial injury. In such a patient with penetrating injury, which involves important structures such as lateral ventricles, internal carotid artery, middle cerebral artery and anterior cerebral artery, prognosis is poor. [1,2] Also tissue damage with superior sagittal sinus injury constitutes a poor prognostic factor. Serious deep infection after trauma has also a bad prognostic determinant as well.

In this article, we present a cranial chain saw injury patient with long- term result.

CASE REPORT

A 38 year-old male patient was found on a motor saw chain table at his work. He was unconscious and had a great blood loss. He worked as a carpenter and in his history there was a paranoid schizophrenia diagnosis that has been treated for five years.

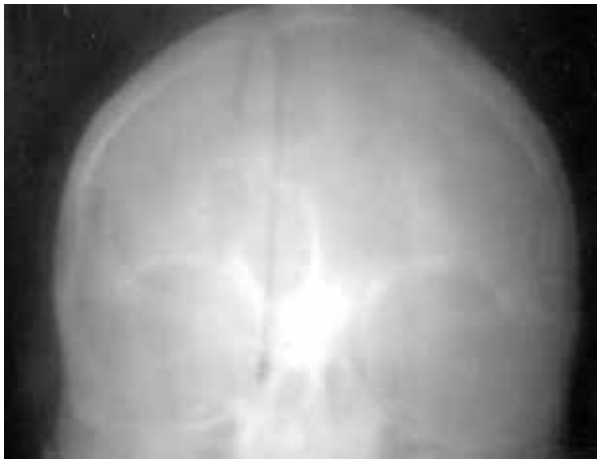

Figure 1: Pre-operative anteroposterior X- ray film of the patient.

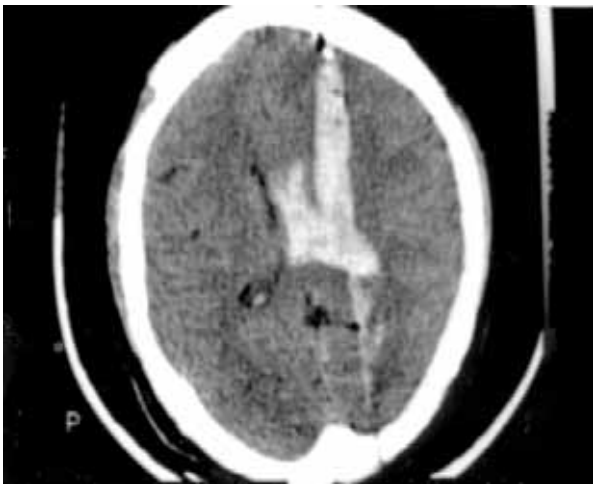

Figure 2: Pre- operative computerized tomography scanogram of the patient.

At the time of admittance into emergency service blood pressure was 80/40 mmHg, heart rate was 120 per minute and breath rate was 30 per minute. There was a great parasagittal, linear cut wound from left occiput to medial portion of left orbita. Also, active bleeding from this wound was observed.

In neurological examination; he was unconscious. Glascow coma score was 5 points as 1-3-1. Bilateral direct and indirect light responses were active. Response to painful stimuli on left side was flexor and there was no response on the right side.

X-Ray films of the head revealed a bone defect from left occipital region to left medial border of orbita (Figure 1) . CT- scan showed the same defect and revealed a great linear tissue damage, including left lateral ventricle. There was also an intracerebral haematoma located mainly at left frontoparietal region (Figure 2).

He was taken to operating theatre on urgent basis. A left frontoparietal craniotomy was performed. Four centimetres laterally from the midline, there was a linear, vertical tissue wound. All drainage veins were destructed . Hemostasis was achieved at first and intracerebral hematoma evacuated. At the deeper level of the wound, frontal horn of the left lateral ventricle was explored and repaired by hemostatic material.

On the early post operative period, neurological status of the patient was the same as preoperatively. At one week postoperatively, patient was

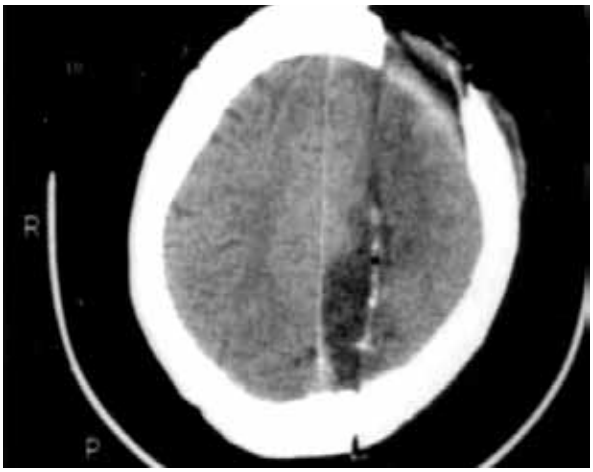

Figure 3: Computerized tomography scanogram of the patient at postoperative 7 days.

started to open his eyes to verbal commands. A CT- scan revealed a venous infarction on the left frontoparietal zone (Figure 3). On the late post operative period (7 months), patient opened his eyes spontaneously, and he was attempting to cooperate with eye movements and writing. He was right hemiplegic, aphasic and on the right side deep tendon reflexes were hyperactive. His Karnofsky score was almost 40 points.

DISCUSSION

Penetrating cranial injuries are common in neurosurgical practice. Most frequent cause of this kind of injury is high speed weapon bullets that ends up with blast damage of the tissue. [1,2] This kind of damage often results in huge destruction of the brain parenchyma. On the other hand, destruction of brain tissue by sharp edged objects, like knives are mostly linear, superficial and if not with eloquent brain parts, cause moderate neurological deficits. However, electric chain saw injuries lead to the most dramatic outcomes. Since they cause deep wounds with their vibrating mechanism , the damages incurred are more serious. Fortunately electric chain saw injuries of the cranium are rare. [1,3-6]

Prognostic factors of the patients suffering from cranial injuries due to chain save accidents depends on the depth of injury, anatomical structures like arteries and big venous sinuses, ventricles and major functional areas are prone to injury. If a lesion is deep seated, or includes important functional regions, prognosis is often poor. In the literature, rare reports was found about cranial motor chain saw injuries and all of these reports mention that, long term morbidity and mortality rates are high. [3-6] Although our patient had severe neurological deficits, at the end of the long term follow-up, he attempted to cooperate and tried to move his right leg and arm. His overall morbidity was better and survival time was longer as compared to the cases mentioned in the literature.

Massive and fast blood loss from either arterial or venous origin is the most effecting factor of mortality. Hemorrhage has two detrimental effects. The first is, it decreases systemic blood pressure and causes global cerebral ischemia, and secondly , intracerebral haemorrhage destructs brain tissue with local compression pressure. Furthermore, distal to destructed vessel, ischemia causes more damage in related brain tissue. If venous circulation was impaired, venous ischemia takes place. After local or global cerebral ischaemia, some destructive neuromediators are released and the devastating ischemic cascade begins. In our patient, CT-scans obtained at 7 days post-operatively revealed venous ischemic areas also (Figure 3).

Most of these patients have died in acute period but a small percentage of these patients survive and in these patients, deep brain infection is a major problem that effects long term mortality and morbidity. Motor saw chain is considered as a contaminated tool. There, indeed, every kind of microorganism, even *stphylococcus aureus* can be found on such a tool. These microorganisms cause serious encephalitis and/or meningitis. Avoidance of this deep brain infection can be achieved by early application of broad spectrum antibiotics and combinations. In our patient, we used cephtriaxone - gentamycine combination. We did not observe an early or late phase infection.

Because of this kind of injury was so rare in the literature, and in only one manuscript long –term survival had been reported, our patient is interesting. [6] At this report, patient had a parasagittal wound like our patient's injury and a deviation of the position of the superior sagittal sinus, and after surgery, this patient had severe neurological deficits also.

CONCLUSION

Cranial injuries due to chain save accidents are rare patholigies. This injury has a great morbidity and mortality rate depending on the location, relevance of important structures and infection. Early surgical procedures, including decompression, seem to have a great survival benefits. Also, an effective antibiotherapy against infection is important. However the best long- term results show that this type of injuries have a great rate of mortality and morbidity despite all surgical and medical treatment procedures.

REFERENCES

1. George ED, Rusyniak WG. Missile injuries of the frontal and middle fossa. In: Apuzzo MLJ ed. Brain Surgery 3 rd Ed.New York, NY : Churchill Livingstone; 1993; 1335- 1350.
2. George ED, Bland LI. Missile injuries. In: Apuzzo MLJ ed. Brain Surgery.3 rd Ed.New York, NY : Churchill Livingstone; 1993; 1953- 1965.
3. Clark SP, Delahunt B, Thomson KJ, Fernando TL. Suicide by band saw. Am J Forensic Med Pathol. 1989; 10: 332-334.
4. Campman SC, Springer FA, Henrikson DM. The chain saw: an uncommon means of committing suicide. J Forensic Sci. 2000; 45: 471- 473.
5. Reuhl J, Bratzke H. Death caused by a chain saw-homicide, suicide or accident? A case report with a literature review Forensic Sci Int. 1999; 25-105: 45- 59.
6. Rainov NG, Burkert WL. An unusual suicide attempt using a circular saw. Int J Legal Med. 1994;106:223-224.