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Case Report

Skull Penetrating Stab Wound with Progression of Intraparenchymal Hemorrhage, A Case Report and Literature Review

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Abstract

Penetrating skull injury leading to intracerebral hemorrhage (ICH) is a severe form of traumatic brain injury that can result in significant morbidity and mortality. This case report describes successful treatment of a 22-year-old male patient who developed a massive cerebral hemorrhage within two hours of a small cerebral hemorrhage after a stab wound to the head. The patient was initially observed for the small cerebral hemorrhage in the emergency department, but his condition deteriorated rapidly and he became unconscious. Urgent CT scans revealed a significant increase in the size of the hemorrhage, with mass effect and midline shift. The patient was taken to the operating room for urgent craniotomy and evacuation of the hematoma. The surgery was successful and the patient made a good recovery. This case report highlights the importance of early diagnosis and treatment of penetrating skull injuries with ICH.

Keywords: Skull Penetrating Stab Wound; Intraparenchymal Hemorrhage; Head Computed Tomography Scan

Introduction

Penetrating skull wound leading to intracerebral hemorrhage (ICH) is a severe form of traumatic brain injury that can result in significant morbidity and mortality.

Most of penetrating skull injury occur as result of assault, worker accidents, unexpected events, etc [1].

The exact incidence of penetrating and perforating injuries to the head in the civilian population is unknown, but current estimations indicate that bullets account for 4.6% and puncture wounds, stab, nail, etc., cause 0.4% of this kind of brain injuries [2,3].

The adult skull provides an effective protection of the brain from high energy non missile penetrating injuries. So penetrating injury of the skull with Intracranial bleeding are relatively uncommon, and when the stab wound penetrates the skull it may results in Cerebral hemorrhage which is a serious and potentially life-threatening condition requires immediate medical attention.

The progression of cerebral hemorrhage from a small to a massive size can have significant consequences patient outcomes.

In a series of stab wounds, de Villiers reported a mortality of 17%, mostly related to vascular injury and massive intracerebral hematomas [4].

In this we present a case of a 22-year-old male who developed a massive cerebral hemorrhage within two hours of a small cerebral hemorrhage after a stab wound to the head, and we review the available literature on the subject and propose a treatment protocol to deal with similar casualties.

Case Presentation

A 22-year-old male patient was brought to our emergency department at Sheikh Khalifa Medical City, Ajman with history of assault resulting in a 1 cm stab wound on left side of his head, associated with right side upper arm weakness on arrival to our hospital the patient was fully awake, and he reported that he had been involved in a fight and was stabbed with a knife which was removed immediately by the assaulter, no history of loss of consciousness no vomiting and no seizures.

Upon arrival examination: the patient was alert and oriented GCS 15/15, but had a right sided hemiparesis 1/5 of upper limb and 4/5 lower limb.

Right sided Facial palsy with slurred speech. And had a laceration on the left parietal site of his head about 1 cm.

The patient stabilized and shifted to urgent radiological assessment

Computed tomography (CT) scans at admission: (figure 1) revealed.

left parietal region with subgaleal hematoma, piercing fracture through left parietal bone with a small triangular 7x4mm elevated bony fragment from outer table and 4 x 1mm small bony fragment in left Parietal lobe along the fracture track, associated Intraparenchymal 3.5 x 3.1 x 2.5cm sized acute hemorrhage with surrounding mild edema and subarachnoid hemorrhage along overlying sulci. 2 pockets of pneumocephalus in left high parietal and left frontal region respectively.

An angiogram was not performed because there was no sign of injury to any large named artery or dural sinus, and no visible evidence of arterial bleeding.

The patient was sent back to the emergency department, where his condition rapidly deteriorated. He became unconscious with a GCS of 8/15, and he had dense right hemiplegia and right facial palsy.

So urgent Follow up Computed tomography (CT) scans (Figure 2) done which revealed increase in the size on Intraparenchymal hemorrhage, now measuring approx. 7x6x5cm in size with surrounding edema, Intraventricular extension of hemorrhage seen

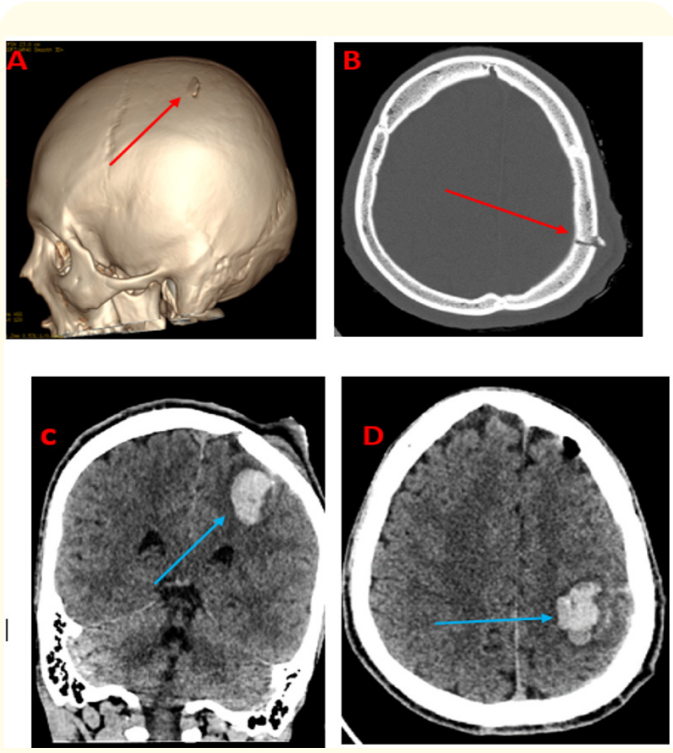

Figure 1: Computed tomography scans at admission showing: A, B-bone window, entry point of the knife resulting in skull fracture red arrows. C, D: brain window showing right parietal Intraparenchymal hemorrhage (blue arrows).

with blood seen in the lateral ventricles, in the 3rd ventricle, 4th ventricle and Sylvain fissures. Mass effect in form of midline shift to right side by 11mm. cerebral edema with effaced cerebral sulci and basal cisterns.

The patient was directly shifted to the operating theater for urgent craniotomy to evacuate the blood clot and repair the laceration.

Operative note

Under general anesthesia and tracheal intubation, a left parietal-temporal craniectomy was performed with the entry point of the surgical incision located posteriorly on the bone flap, as shown in figure (3).

The dura was opened, Brain was very tense, and there was laceration through the passage of the knife Where there were cortex small three arterial bleeders figure (4) which was controlled with

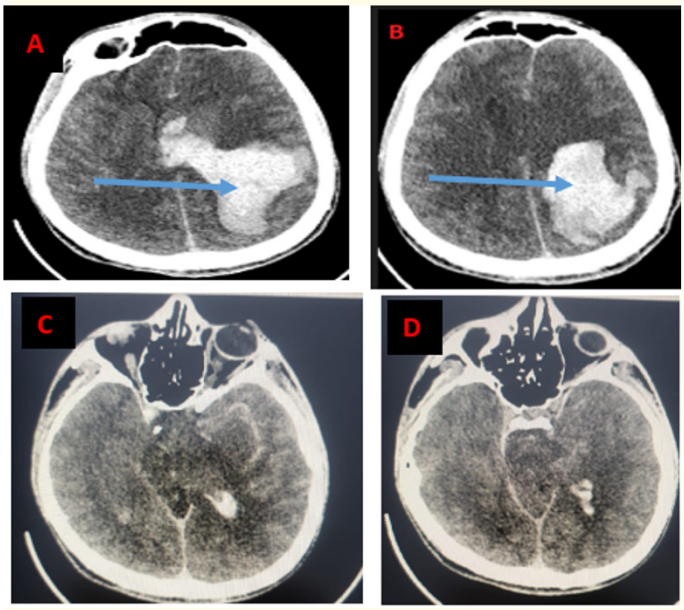

Figure 2: Computed tomography scans after 2hr showing massive increasing of Intraparenchymal hemorrhage (blue arrows) with midline shift.

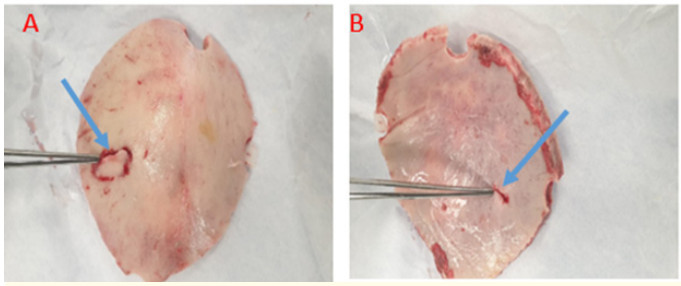

Figure 3: Computed tomography scans after 2hr showing massive increasing of Intraparenchymal hemorrhage (blue arrows) with midline shift.

bipolar electrocautery (4). Then the massive hematoma was evacuate, no further bleeders were encountered. dura closed by using dura substitute and

Postoperative CT scan: Figure (5)

Craniectomy defect involving left tempro-parietal bones, significant decrease in hematoma volume, edema and midlines shift, minimal subdural space pneumocephalus note in left frontal region. Residual intraventricular hemorrhage less than before.

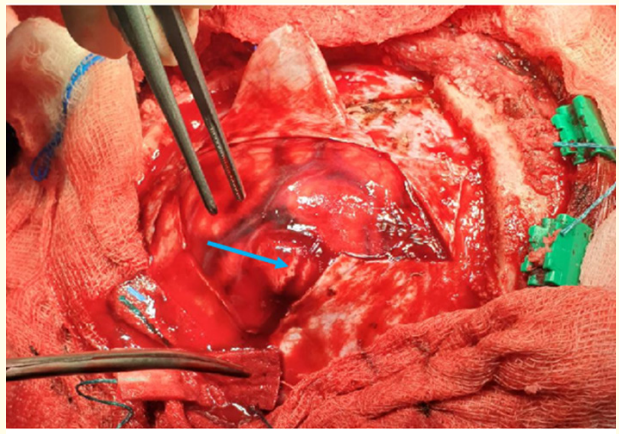

Figure 4: Laceration through the brain tissue at the site of entry point of the knife (blue arrow).

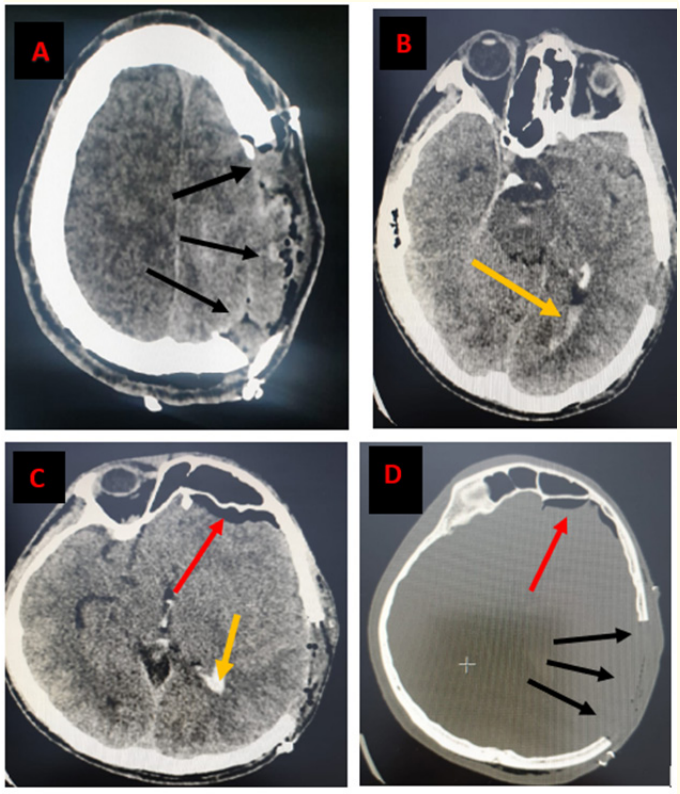

Figure 5: Post-operative Computed tomography scans revealed: A, B, C: brain window resolution of intracerebral hematoma, frontal pneumocephalus (red arrows), Residual intraventricular hemorrhage (yellow arrows), D: bone window revealed of craniectomy (black arrows).

Postoperative sequelae

A large-spectrum antimicrobial therapy was administered continuously for 2 weeks. The patient was extubated and weaned from the ventilator after 2 days, and he was shifted from the intensive care unit to the ward in the fourth postoperative day. His neurological status improved, and he became conscious and alert. However, on the 12th post-operative day, the patient became confused. A follow-up brain CT scan (Figure 6) revealed a new finding of a left fronto-temporo-parietal subdural hygroma with effacement of adjacent sulci. This was treated with prednisolone, which was started at a high dose and gradually tapered over 20 days.

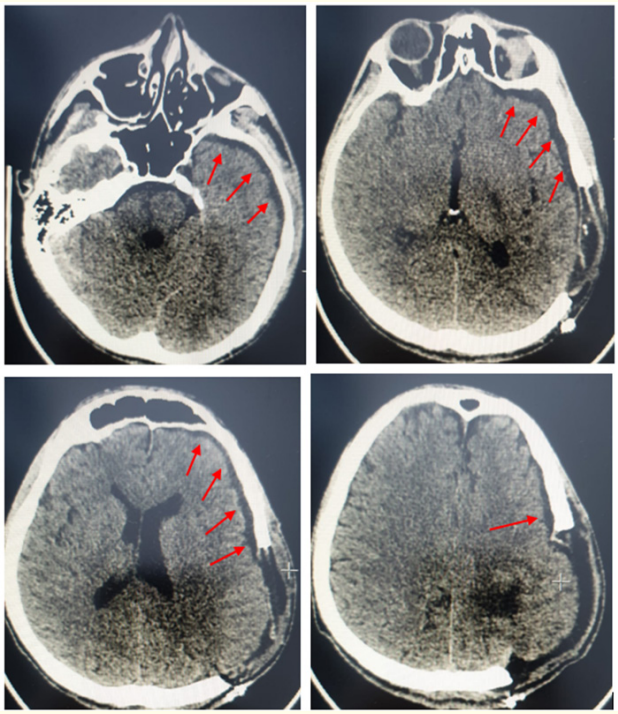

Figure 6: Brian CT revealed left fronto-tempro-parietal subdural hygroma.

On the day of discharge

The patient is conscious alert and oriented GCS 15/15 pupils equal and reactive to light improve of lower limb so he can normally walk but still has weakness of RT upper arm 3/5 and Weak grasp of RT hand 1/5. Follow up Brain Computed tomography (CT) scans on discharge day after three weeks: Figure (7).

The patient discharged to the rehabilitation center and he did Cranioplasty in other facility.

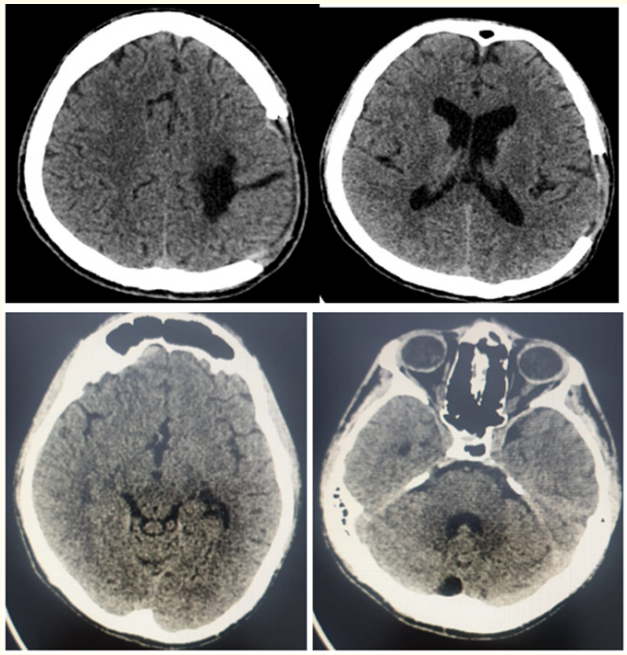

Figure 7: Computed tomography (CT) scans revealed of resolution of hygroma.

Discussion

The available literature suggests that the progression of cerebral hemorrhage is associated with a higher risk of death and disability and is more likely in patients with a larger initial hemorrhage size.

A list of objects that can cause non-missile penetrating trauma and reported in the literature include knives, crochet hooks, knitting needles, breech pins, umbrella bibs, crowbars, iron rods, pitchforks, car antenna, pairs of scissors, and even screwdrivers [3,5].

When an object penetrates the skull, it injures the brain in the entrance, along the entrance gutter and in the exit [3,6].

Most of the patients with stab wound to the head are in a good general condition. They are awake, responsive, and hemodynamically stable [7] except for the possible neurological deficits [3,8].

It is important to keep in mind that in patients where there is the possibility of an intracranial penetrating wound, subsequent CT scan and possibly cerebral angiography should be requested.

Non-contrast Computed tomography (CT) scans can help analyze the trajectory of the foreign body and observe whether the object went through any areas of major vascular significance. In case of suspicion for vascular injury, an angiography should also be performed to evaluate for traumatic aneurysm, which can develop soon after a penetrating injury.

As compound wounds, these injuries require appropriate antibiotic cover and tetanus prophylaxis.

Once the patient arrives at the emergency department, the patient must be received a prophylactic tetanus toxoid injection along with antibiotics, anti-edema therapy, and anti-convulsive medications by intravenous route. The wound's primary dressing should be ensured [9].

Further neurosurgical assessment will determine whether formal debridement, removal of hematoma together with devitalized tissue and depressed bony fragments will be deemed to be necessary [10].

The successful treatment of penetrating skull injury is fundamentally based on the removal of clots and devitalized tissues, prevention of infection and late epilepsy. Operative delay more than 48 hours from the time of injury will increases the incidence of infection from 4.6 to 36.5% [11,12]. gather with devitalized tissue and depressed bony fragments will be deemed to be necessary [10].

Conclusion

This case illustrates the potential for cerebral hemorrhage to progress from a small to a massive size within a short time frame and the significant impact on patient outcomes.

And this case report highlights necessitating swift diagnosis and intervention to prevent further deterioration and potentially fatal consequences. The successful outcome in our patient reaffirms the value of prompt surgical management through craniotomy to evacuate hematomas, control bleeding, and repair tissue damage. The literature review emphasizes that despite the relatively uncommon occurrence of penetrating skull injuries, they carry substantial risks and require a multidisciplinary approach involving neurosurgery, radiology, and critical care.

Finally, we learned from this case that the stab wounds to the brain present as simple scalp lacerations, may by hide acritical condition which need for urgent intervention.

Conflict of Interest

The authors declare no conflicts of interest.

Consent to Participate

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Ethics Approval

This case report received ethical approval from the relevant institutional review board.

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