



PENETRATING HEAD INJURIES BY KOSARA, FOUR CASES REPORT

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ABSTRACT

Background: The common causes of penetrating head injury (pHI) are well established all over the world, penetrating traumatic brain injuries (PTBIs) are low-velocity injuries which can be caused by a variety of tools, they carry a worse prognosis. We received four unusual cases to our Emergency room ER with a special rotatory high speed cutting machine KOSARA used by workers, prognosis was different according to clinical presentation and initial management of the patient. **Methods:** a retrospective study of cases of low-velocity Rotatory penetrating head injuries by KOSARA, four cases were recorded in our department. **Results:** Our 4 cases were accidental penetration by a heavy rotating tool KOSARA (a sharp high-speed rotatory cutting metal instrument used for cutting plastics, metals, woods, ceramics, etc.). all cases were male no female affected, Three cases adult tow middle age, one old age, one case young child. 2 cases with an orbito-cranial penetrating injury, with vision loss of the affected side, one of them had orbital evisceration, one case exhibited limb weakness. All four cases were operated by craniotomy and they needed support in the intensive care unit ICU., the foreign object for three cases and was removed surgically. only for the child was removed by his parents. plain X-ray, Computed tomography scan and angiography of the head were obtained in all patients. fortunately no one died. all were doing well at the most recent follow-up. There have been neither signs of meningitis, infection or seizures during admission period. All were kept on broad-spectrum antibiotics as well as prophylactic antiepileptic drugs, then discharged home. **Conclusions:** The presenting picture of penetrating injury to the head may be daunting, all were resulting from personal neglect and carelessness and not following instructions of safety maneuver steps during working. We applying the advanced trauma life support protocol in ER, acquiring the needed preoperative neuroimaging studies, and finally performing a planned stepwise surgical intervention through craniotomy in collaboration with ophthalmologist and faciomaxillary surgeon, yield an excellent functional recovery.

KEYWORDS: Kosara; penetrating head injury; computer tomography scan, angiography operation.

CASE PRESENTATION

Case report 1

History and presentation

A healthy 4-year-old boy presented by his parents to the ER department suffering from disturbance of conscious level, On examination Glasgow Coma Scale (GCS) was 7/15 (E2, V2, M3)., a 15 cm open wound in the right side of his forehead extending to left orbit with evident of a skull bone defect seen beneath it through which brain tissue can be visualized (figure 1), pupils were unequal, right pupil was dilated., and slowly reactive to light, left midway, reacting. left side motor weakness. A rotatory sharp cutting tool KOSARA was penetrating his head,

been removed by his father (figure 2). After stabilization in the resuscitation room Computed tomography (CT) scan illustrated big epidural hematoma along right fronto-temporal region (figure 3).

Operation

The decision was to intervene surgically aiming for (1) cleaning and debridement of the soft tissue wound, (2) elevation of the depressed frontal bone fracture, (3), evacuation of Epidural hematoma with hemostasis (4) Dura defect closure was done using a periosteal graft (5)closure in layers. [Figure 4]. Postoperatively, the patient was shifted to the ICU, with gradual daily

improvement of his conscious level. three days after surgery, he has regained his conscious completely to a GCS of 15/15 without any motor or cranial nerve deficits apart from a slight complaint of blurring vision in the left eye [Figure 5]. He was transferred to the inpatient ward for more observation, and followed by ophthalmologist. There have been neither signs of meningitis or surgical

site infection during his admission period nor did he develop any seizures. he was kept on broad-spectrum antibiotics as well as prophylactic antiepileptic drugs, then discharged home after 10 days. follow-up visits (for 6 months) after the surgery, he was clinically intact motor and cranial nerves' function.



Figure (1): Rotatory machine KOSARA removed by parents.



Figure (2): Child 4years old out of supervision of his parents play with KOSARA, large wounds with profuse bleeding.



Figure (3): CT scan of brain Showed large right frontal Epidural Hematoma with long open comminuted left frontal bone fracture.

Case report 2

History and presentation

Old age male 65 year, retired, arrived to ER with kosara penetrating his head ,very large cutting wound located in right frontal region extending to orbital roof (figure 4), patient was fully conscious, well oriented, no any neurological deficits GCS (15/15), patient sent urgent to lab investigations.

Operation

Preparation done for open surgery craniotomy, foreign high speed rotatory cutting metal tool KOSARA

removed gently in the operative room. dirty bone pieces around also removed, Dural repairing done, thorough hemostasis done.

Postoperatively, the patient was transferred to the ICU. Second days after surgery, he has regained his conscious completely without any motor or cranial nerve deficits [Figure 5]. He was transferred to the inpatient ward for medical care. There have been neither signs of meningitis or infection during his admission he was kept on broad-spectrum antibiotics as well as prophylactic antiepileptic drugs, then discharged home after 5 days.

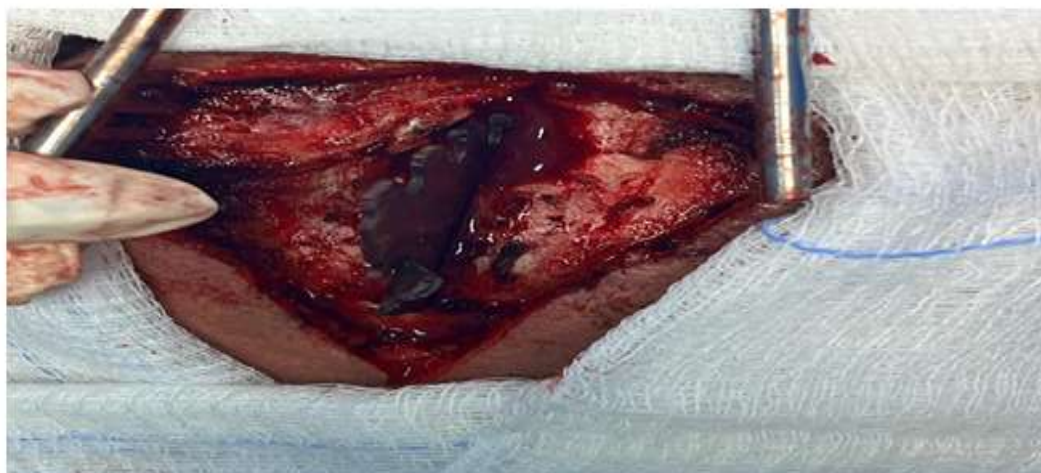


Figure (4): Rotatory metal material KOSARA removed from cranium



Figure (4): a retired Old age male accidentally prone head injury with KOSARA



Figure (4): CT scan of brain Showed large left long open comminuted left frontal bone fracture KOSARA within the skull bone.

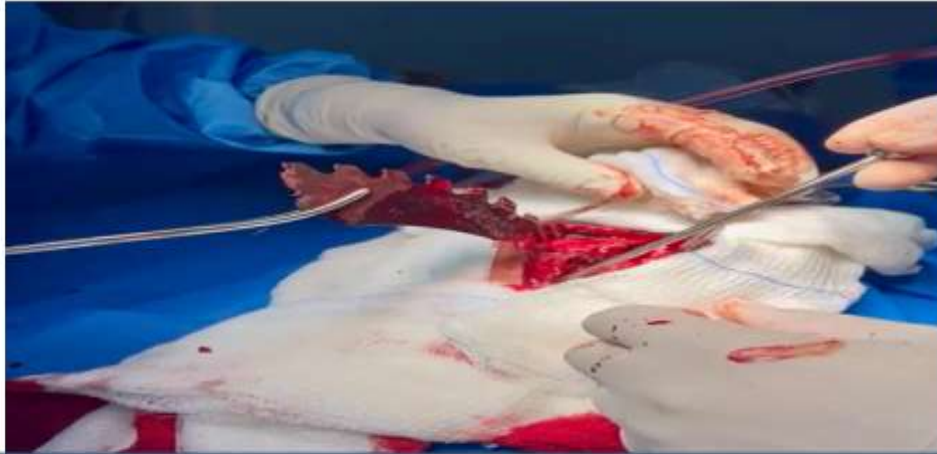


Figure (5): removing metal tool KOSARA from the skull bone intra operation as clear the length of intra cranial part.

Case report (3)

History and presentation

35 years old age young male builder accidentally he prone to head injury with kosara because of non-wearing a protected helmet special desi gned for such purpose, he came to ER by his workers colleagues, on arrival he was drowsy disoriented, pallor sings of hypovolemic shock GCS 7/15 (E2 V2 M3) a large cutting wound located in left frontal region extending to orbital roof (figure6) the advanced trauma life support protocol (ATLAS) in our ER applied for him, urgent preoperative neuroimaging studies CT tomography done (figure 7), preparation for urgent operation done.

Operation

Surgical intervention through craniotomy done in operative theatre. The KOSARA removed (figure 8) Two units of fresh blood given to him. Postoperatively, the patient was admitted to the ICU. after four days post-surgery, he regained his conscious completely to a GCS of 15/15 with any motor weakness grade 4 ,no cranial nerve deficits [Figure 9]. He was transferred to the inpatient ward for more medical care, and then discharged to home.



Figure (6): middle age male with penetrating by KOSARA within the skull

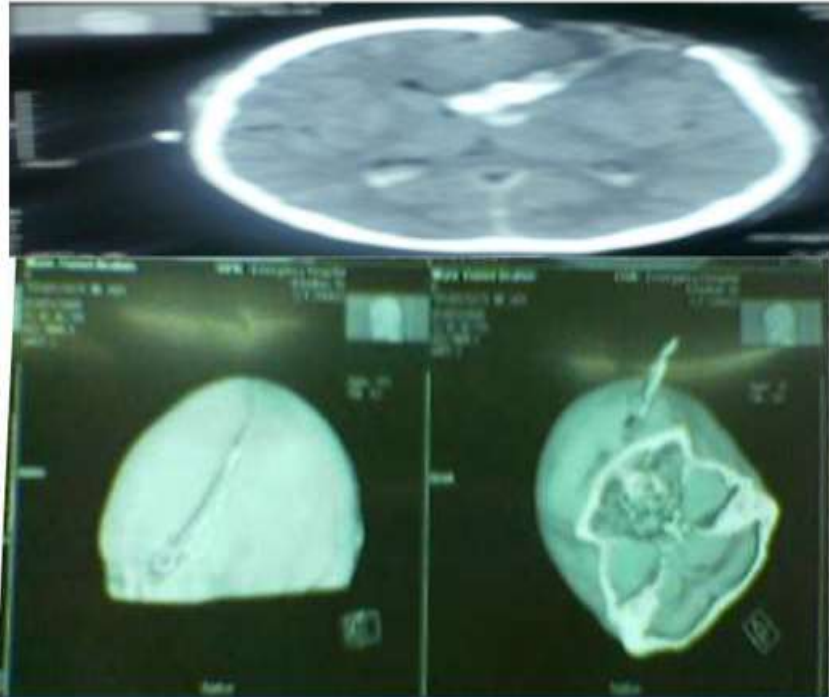


Figure (7): CT scan of brain Showed large left frontal cranial open comminuted depressed fracture extending to the left orbit.



Figure (8): intra-operative shows the metal KOSARA stuck to skull bone.



Figure (9): post-operative after 6 month follow up ,site of skull defect.

Case report 4**History and presentation**

40 years old male presented to our ER department with kosara penetrating his head, he was unconscious disoriented, very large cutting wound located in right frontal region extending to orbit (right eye globe) with profuse bleeding, the metal material KOSARA was still inside (figure 10)., urgent preoperative neuroimaging studies CT tomography done (figure 11), preparation for urgent operation done.

Operation

Open surgery craniotomy done, foreign high speed rotatory cutting metal tool KOSARA removed gently in the operative room (figure 11), evisceration of right eye done by ophthalmologist. Postoperatively, the patient transferred to the ICU. after 3 days of surgery, he regained his conscious level completely with complete right eye vision [Figure 5]. He transferred to the inpatient ward for medical care and discharge home after 7 days.



Figure (10): middle age male during working without applying any safety measures during handling of KOSARA very big wounds right frontal region extending to the orbit with eye global damage



Figure (11): CT scan brain show KOSARA in right frontal region extending to the orbit with eye global damage.



Figure (11): KOSARA that removed intra-operative

CONCLUSION

All our four cases subjected to these tragedy type of accident (very high speed rotatory cutting machine KOSARA) because of failure to follow the important

safety rules and steps during working such as.^[1] not wearing head helmet (that specially designed for such type of works),^[2] they buy poor quality tools that have no warranty of the tools,^[3] they didn't change the tool KOSARA and replace it with new one because of

economical purposes., As we had very young child prone to KOSARA resulting in family Negligence and failure to follow important safety steps put dangerous tools in special places. We recommend media and social media (governmental and civil media) to have great rules in educating peoples regarding safety rules required during working times, Preventing the sale of these dangerous tools except in their designated places, Only original, non-forged instruments are allowed for sale in special stores that sell such devices., and important things regarding family educations not to allow such dangerous machine been in the house at whole, Place dangerous tools in special, locked places out of the reach of children and always ensure that the device is safe and suitable for use.

DISCUSSION

Penetrating brain injury (PBI) is uncommon among civilian population, but involves significant morbidity and mortality.^[1] The penetration in non-missile brain injuries depends on many factors, the energy, material

shape, angle, and site of entry.^[2] pTBI is rare and constitutes only 0.4% of all brain injuries, but carries the risk of a worse prognosis than closed brain injuries.^[3] with a fatality rate approaching 40%.^[2] Following standard recommendations in the management of pTBI which includes applying the ATLS protocol in ER, acquiring the needed preoperative neuroimaging studies, avoiding moving the penetrating object till patient shifted to OR, and finally performing a planned stepwise surgical intervention through craniotomy may yield an excellent functional recovery, Miller et al have reported 42 cases with intracranial wooden pieces with a mortality rate of 25%.^[5] Despite antibiotic treatment, a brain abscess was found in 48% and infectious complications were seen in 64% of the patients described. Prompt surgical exploration is mandatory to reduce the mortality and complication rate (8).^[5] he morbidity rate is 33% in case of prompt surgery despite antibiotic treatment and rises to 53% in case of delayed surgery. The overall mortality rate is 10% with surgery and increases to 62% in the group where surgery is not performed.^[4]

Cases	Age	gender	GCS	Site	Vision	Neurological Deficit	operation	Follow up Complication
Case 1	4yrs	male	7/15	Left frontal	Left eye partially loss	non	Craniotomy	eye
case 2	65	male	15/15	Left frontal	Normal	non	Craniotomy	non
Case 3	35	male	12/15	Left frontal	Normal	non	Craniotomy	non
Case 4	40	male	10/15	Right frontal	Complete Loss	Right side weaknesses	Craniotomy	Eye ball Evisceration

The proper management for pTBI depends on the (1) Advanced Trauma Life Support (ATLS) protocol activation, focusing on the airway, breathing, and circulation to resuscitate life-threatening, (2) the presence of experienced medical personnel as initial treatment and (3) availability of important diagnostic images such as CT scan and angiography CT scan is the most useful imaging modality for preoperative planning in pTBI due to the accurate delineation of associated skull fractures, Patients with penetrating head trauma require both medical and surgical management.^[7,8,9] In our current four cases, the crucial things is anchoring position within the skull all through the emergency department (ER) proceedings because any unplanned removal of KOSARA in the ER might result in uncontrollable and fatal secondary bleeding.^[3] the surgical management for pTBI is generally done through a craniotomy, which has the advantages of early protection visualization and of neurovascular structures controlled object removal, accessible debridement of the devitalized brain tissue, associated hematoma evacuation, and adequate dural repair.^[4] These steps were contemplated in our case to ensure safe and complete object removal. The complications of penetrating pTBI are limited to the penetration trajectory pathway, Early complications include(1) parenchymal contusions,(2) tract hematoma, (3)dural tears associated with (4) cerebrospinal fluid CSF leak.^[11] (5)infection, and (6) direct blood vessels injury.^[6] Late complications

include(7) development of pseudo-aneurysms, (8) foreign body migration,(9) arteriovenous fistula, and (10) seizures.^[10] In a patient with a penetrating head injury (and therefore a contaminated wound, by definition), antibiotic therapy and effective surgery are required to prevent infection.^[12,13] In our cases, two cases were had vision problems, one complete loss evisceration done for his eye globe, other partially vision loss. As clear by CT brain that the KOSARA pass through it. Otherwise, all patients did not develop any other early or late complications. The outcome of the patients after pTBI is mainly dependent on initial admission GCS, pupil size, and the initial CT scan findings.^[10]

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