

Management of Craniofacial Trauma Associated with Extradural Hematoma: A Rare Case Report

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ABSTRACT

Background: In today's fast paced world, road traffic accidents involve trauma to the head and neck region, altering the aesthetics which are very apparent. The fractures of the facial skeleton cause various complications like enophthalmos, diplopia, facial deformity, malocclusion etc. The standard trauma protocol must be followed with emphasis on ensuring adequate airway, breathing, circulation, central nervous system and cervical spine. Computerized tomography is the gold standard imaging modality in identifying the facial fractures and the treatment should focus on achieving the near anatomic reduction and restoring the function of the facial skeleton. Here we describe a case report of the management of craniofacial trauma associated with extradural hematoma of a 28-year-old male patient.

Keywords: Frontal Bone Fracture, Maxillofacial Injuries, Extradural Hematoma, Open Reduction and Internal Fixation, Craniotomy.

INTRODUCTION

Craniofacial trauma includes trauma to the facial bones as well as associated injuries to the head and neck, including the brain and the most common cause of these injuries is due to road traffic accidents (RTA). A thorough review of literature indicated that the frequency of neurological injury with facial fractures was as high as 76% [1]. Frontal bone fractures are some of the least common fractures affecting the facial skeleton with an incidence of 5-15%. As the frontal area makes up the part of brain case, the fatality of these injuries is much greater than with other facial fractures and hence a thorough neurological examination is necessary [2]. Around 2% of all head injuries presenting to the emergency department are extradural hematomas (EDHs), with associated significant morbidity and mortality, especially with advancing age. It is more common in the male, pediatric and middle age population. Generally, it is

located beneath a fracture [3]. Intracranial hemorrhage can be classified as intra-axial (within the brain parenchyma) or extra-axial (outside the brain). An extradural hematoma (also termed an epidural hematoma) is an extra-axial bleed occurring between the dura and skull bone [4]. The nature of the injury sustained by the patient often leads to directly life-threatening conditions and requires the quick transportation of the patient to a hospital emergency department. These injuries result in very serious and diverse morphological and functional as well as esthetic complications. The knowledge of associated injuries can lead to the rapid assessment and initial treatment of these patients. According to Pappahoun, there is limited evidence regarding the correlation between maxillofacial fractures and head injury. Trauma continues to be a major threat to public health. Maxillofacial trauma occurs in a significant number

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of severely injured patients and maybe a clue to concomitant serious or life-threatening injuries [5]. Here we briefly report a case of management of craniofacial trauma associated with extradural hematoma.

CASE REPORT

A 28-year-old male patient met with a road traffic accident (RTA). After receiving primary care at Govt. Hospital, patient reported 2 days later to the department of oral and maxillofacial surgery with a chief complaint of pain and swelling in the left frontal region. On history of presenting illness there was loss of consciousness for 30 minutes, history of bleeding from left nostril. His general condition was good with a glasgow coma scale (GCS) score of 15/15. On extra oral examination, there was a sutured wound and mild facial edema noticed over the left eye brow and left malar region (figure 1). On palpation, step deformity was palpated over the left infraorbital rim and zygomatic buttress area. On intra oral examination, mild open bite was seen (figure 2). Clinical examination and radiographic analysis revealed multiple facial fractures. The PNS view revealed the fractures at frontozygomatic area, infra orbital area and posterior wall of left maxillary sinus. Computed tomography (CT) scan revealed comminuted fractures at the left frontal bone, frontozygomatic suture, infra orbital rim, floor of the orbit and maxilla. The CT scan of brain revealed the presence of extradural hemorrhage along the left frontal convexity (figure 3). The 3D CT revealed comminuted fractures of the frontal bone, hairline fracture of the frontozygomatic suture, infra orbital rim and zygomatic buttress (figure 4).

Based on the investigations and clinical examination, a final diagnosis of craniofacial trauma involving the following fractures of the frontal bone, frontozygomatic suture, floor of the orbit, nasomaxillary buttress and zygomatic buttress. Open reduction and rigid internal fixation (ORIF) of the following fractures was done under general anesthesia. By giving hemi coronal incision, evacuation of extradural hematoma was done by craniotomy of the parietal bone (Figure 5). The parietal bone was fixed back into its original position by using two 1.5mm two holed miniplate (Figure 6). Vacuum drainage system was applied and incision was closed with surgical staples by neurosurgeon. Inter maxillary fixation (IMF) was

done prior to open reduction and rigid internal fixation.



Fig 1: Extra oral - mild facial edema over the left malar region



Fig 2: Intraoral examination - mild open bite

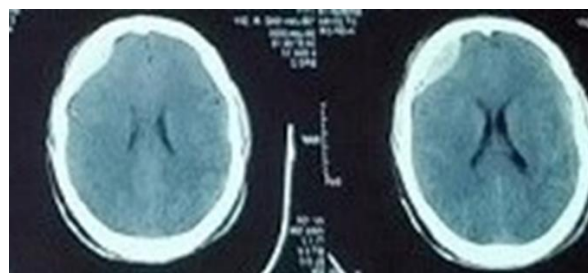


Fig 3: CT brain scan showing the extradural hematoma.

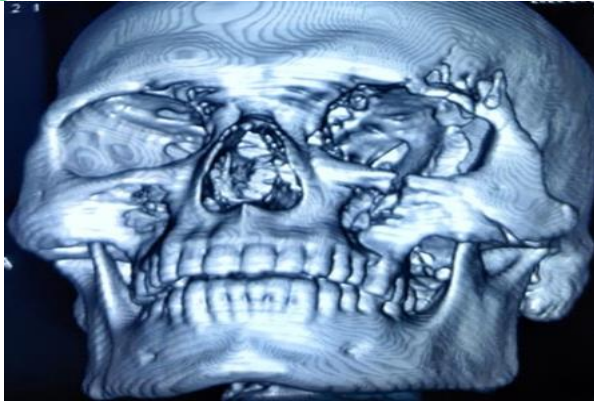


Fig 4: 3D CT Scan – Fractures of left fz region , Infra orbital rim.

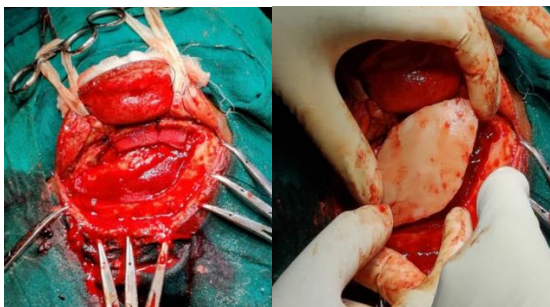


Fig 5, 6: Evacuation of extradural hematoma by craniotomy of the parietal bone

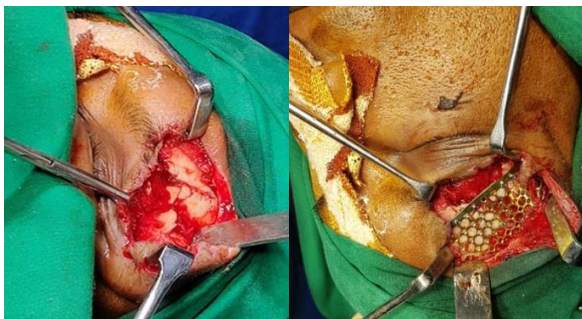


Fig 7, 8: Comminuted fractures of the left frontal bone with Titanium mesh stabilizing frontal bone fractures



Fig 9: Intraoral left maxillary vestibular approach to fix left Zygomatic buttress



Fig 10: Sutures in situ



Fig 11: PNS View – ORIF of Facial Bones

Existing scar was used to explore the fracture of the left frontal bone and left frontozygomatic suture (Figure 7). After thorough debridement, comminuted fracture segments of left frontal bone were reduced and fixed with titanium mesh implant with 6mm screws followed by layer wise closure (figure 8). Through left side infra orbital incision, infra orbital rim fracture and the nasomaxillary buttress fracture was exposed and reduced after which the lateral portion of the infra orbital rim fracture fixation was done using four holed 1.5mm miniplate with 6mm screws and the nasomaxillary buttress fracture fixation was done using two holed 1.5mm miniplate with 6mm screws . By giving left maxillary vestibular incision, zygomatic buttress fracture was exposed, reduced and fixed with 'L' shaped four holed 2mm miniplate with 8mm screws. (Figure 9) After fixation of miniplates, incisions were closed in layers using 3-0 vicryl and 4-0 proline (Figure 10). Post-operative care and regular follow up was maintained (Figure 11). Post-

operative stability and functions were satisfactory with an imperceptible scar.

DISCUSSION

Motor vehicle accidents are the most frequent cause of combined cranial and facial fractures followed by fall from height which also correlates with the reported case with fractures of upper and middle face associated with extradural hematoma [6,7,8]. The anatomic composition of the upper and middle face makes them more susceptible to fracture compared with the mandible. According to a report, upper facial skeleton was involved in 63.6% cases followed by lower face. According to the literature, headache (88.8%) and vomiting (86.1%) and loss of consciousness (75%) all were more common in patients with fractures of upper and middle face which correlates with the reported case with the presence of headache and loss of consciousness. Patients with involvement of upper and middle face had more incidence of nasal bleeding. Oral bleeding was commonly associated with lower and middle facial fractures and ear bleed was associated with upper facial fractures [9], in accordance to the observations made by Dr.A.Agarwal in his study, which also correlates with the reported case. Craniofacial fractures are simultaneous fractures involving cranium and facial bones. However recent investigations have suggested that the face (particularly upper and middle face) may actually transmit forces directly to the neurocranium, resulting in more serious neurological injuries. Injuries to upper and middle facial region significantly increase the risk of neurological injury and are crucial in the assessment of patients with craniofacial trauma [10,11,12]. The face is made up of horizontal and vertical buttresses which are thicker and helps to transmit the forces of mastication to the skull base. It also absorbs the impact avoiding damage to the brain in case of trauma; this is a rare case where the upper and midface injuries caused extradural hematoma. Properly aligned skeletal unit gives structural and functional stability to the middle third of the face [13]. Craniofacial trauma needs a multidisciplinary approach, a neurosurgeon, maxillofacial surgeon for management of head injuries and facial bones fractures respectively. Treating these fractures is aimed to restore the pre-operative functions, anatomy and three-dimensional facial contours. The mode of injury helps to identify the probable energy

of the impact and the likely extent of trauma as well [14]. Early surgical intervention avoids postoperative deformity or unacceptable aesthetics. Extradural hematomas are typically traumatic and arterial, occurring most commonly in younger men. The majority of EDHs are traumatic in nature, therefore should be managed as per the ATLS protocol. Conservative management typically involves serial CT imaging and close neurological observation. Extradural hematomas can be managed conservatively or surgically depending on a number of factors including size, midline shift, and GCS [15,16]. EDH in this case was treated surgically by craniotomy. Post-operatively, patients should be observed on either a neuro critical care or high dependency unit with close neuro-observations and routine post-operative CT scans to ensure adequate clot removal. Ongoing Neuro rehabilitation is often required. Risk factors for poor prognosis include increasing age, temporal location, low GCS at presentation, and evidence of herniation or raised intra-cranial pressure [17]. Craniofacial injuries particularly of upper and middle face are associated with increased risk of neurological and other injuries and immediate neurosurgical intervention is frequently required. A timely detection and prompt treatment should lead to improved results and outcome [18,19].

CONCLUSION

The successful treatment of craniofacial injuries is of utmost importance as they can be associated with an underlying brain injury and hence a neurological evaluation is necessary before treating the craniofacial fractures. The surgical approach to facial fracture management should focus on attaining proper occlusal, vertical and horizontal relationships of the facial frame along with restoration of orbital, oral and nasal cavities. A proper diagnosis, thorough clinical and radiological evaluations, timing of repair, regular follow up and a multidisciplinary approach plays a key role in a successful management. The above case report emphasizes the treatment modalities and levels of intervention in treating a craniofacial trauma associated with a brain injury.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

- [1] Tariq ahmed , Wardah Farhat , Nigam Sattar , Muslim Khan , Atta ur Rehman , Shuja Riaz Ansari. Association of traumatic bone injury with midface fractures in patients reporting to oral and maxillofacial surgery, Khyber college of dentistry. JKDC December 2016, Vol. 7, No. 1
- [2] Anurag Singh, Vikrant Bhardwaj, S. Sharma. Frontal Sinus Fracture: A Case Report. J. Maxillofac. Oral Surg. DOI 10.1007/s12663-010-0131-7
- [3] Z Cakir, M Cakir, M Emet, S Aslan, A Saritas. Acute epidural hematoma due to contrecoup head injury: a case report. Hong Kong j. emerg. med. Vol. 16(4). Oct 2009.
- [4] Andrew M. Naidech. Intracranial Hemorrhage. Am J Respir Crit Care Med. 2011 Nov 1; 184(9): 998–1006.
- [5] Alvi A, Doherty T, Lewen G. Facial fractures and Concomitant Injuries in Trauma Patients. Laryngoscope 2003;113:102-6.
- [6] Haug RH, Adams JM, Conforti PJ, Likavec MJ. Canadian CT head rule for patients with minor head injury. Lancet 2001; 357: 1391–1396
- [7] Haug RH, Savage JD, Likavec MJ, Conforti PJ. A review of 100 closed head injuries associated with facial fractures. J Oral Maxillofac Surg 1992; 50: 218–222
- [8] Hanley DF, Williams MA, Naff N. Intracranial hemorrhage: time for an intervention. Crit Care Med 1999; 27: 477–478
- [9] A. Agrawal, R. B. Prasad, L. Shetty, S. Nachiappan , M. Manju. Characteristics of Craniofacial Trauma in a Rural Hospital in South India. Annals of African Medicine Vol. 5, No. 1; 2006: 33 – 37
- [10] Sinclair D, Schwartz M, Gruss J, McClellan B. A retrospective review of the relationship between facial fractures, head injuries and cervical spine injuries. The journal of emergency medicine. 1998;6(2):109-12.
- [11] Keenan HT, Brundage SI, Thompson DC, Maier RV, Rivara FP. Does the Face Protect the Brain?: A Case Control Study of Traumatic Brain Injury and Facial Fractures. Archives of Surgery. 1999;134(1):14-7.
- [12] Mulligan RP, Mahabir RC. The prevalence of cervical spine injury, head injury, or both with isolated and multiple craniomaxillofacial fractures. Plastic and reconstructive surgery. 2010;126(5):1647-51.
- [13] Sourav Sharma, Vandana Dhanasekaran. Surgical Approaches and Management of Panfacial Trauma: A Case Report. DOI:10.7860/JCDR/2015/14468.6392
- [14] Dongmei He, Yi Zhang, Edward Ellis III. Pan facial fractures: Analysis of 33 cases treated late. J Oral & Maxillofac Surg. 2007;65:2459-65
- [15] Rosenthal AA, Solomon RJ, Eyerly-Webb SA, Sanchez R, Lee SK, Kiffin C, Davare DL, Hranjec T, Carrillo EH. Traumatic Epidural Hematoma: Patient Characteristics and Management. Am Surg. 2017 Nov 01;83(11):e438-e440.
- [16] Khairat A, Waseem M. Epidural Hematoma. 2020 Jan
- [17] Bose G, Luoma AMV, Postoperative care of neurosurgical patients: general principles, Anaesthesia and intensive care medicine (2017), <http://dx.doi.org/10.1016/j.mpaic.2017.03.004>
- [18] Teasdale GM, Murray G, Anderson E, et al. Risks of acute traumatic intracranial haematoma in children and adults: implications for managing head injuries. Br Med J 1990; 300: 363–367.
- [19] Teasdale GM, Murray L. Revisiting the Glasgow coma scale and coma score. Intensive Care Med. 2000; 26:153–154.