Original Research Paper

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Radiology

VALUE OF MULTIPLANAR RECONSTRUCTION AND THREE DIMENTIONAL COMPUTED TOMOGRAPHY IN EVALUATION OF MAXILLOFACIAL TRAUMA.

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ABSTRACT

AIMS AND OBJECTIVES:
To determine diagnostic accuracy of Multi Planar Reconstruction (MPR) and 3D Reconstruction in Maxillo-facial trauma.

MATERIALS AND METHODS:
We conducted a prospective study of 235 patients with history of maxillofacial trauma referred to the Department of radio diagnosis, who underwent plain CT scans with facial bones protocol during January 2015 to June 2016. The imaging was performed using GE Bright Speed Elite 16 Slice CT Scanner. Post processing multi planar reconstruction in thin bone window and 3D CT reconstruction were obtained.

RESULTS:
Out of 235 patients with maxillofacial trauma 160 are males and 75 are females. The 21-30 years age group has highest percentage of maxillofacial trauma. It was found that nasal bone (67.2%) is most common to be fractured followed by zygomatic bone (51%), maxillary bone (43.4%), mandibular bone (28.9%) and pterygoid plate (16.1%). All maxillary bone and pterygoid plate fractures are detected in thin bone MPR. While 89.8% of nasal bone fractures and 91.6% of zygomatic bone fractures are detected by MPR. 3D reconstruction was able to detect only 75.9% of nasal bone fractures, 75% of zygomatic bone fractures, 73.5% of maxillary bone fractures, 86.7% of mandibular fractures and 26.3% of pterygoid plate fractures. MPR technique was found to be more detective for fractures when compared to 3D reconstruction.

CONCLUSION:
MDCT with MPR technique allowed better visualisation of maxillofacial fractures. MDCT is the preferred modality for diagnosing maxillo-facial fractures due to its higher sensitivity and specificity and plays a useful role in pre-operative planning and treat the patient in golden hour.

KEYWORDS : :

INTRODUCTION

- Injury to maxillofacial region may lead to life threatening situations caused by RTA & violence leading to airway compromise & profuse blood loss1.
- MDCT (Multi Detector CT) is the imaging modality of choice and is most important imaging tool. It helps in detecting exact site, number & extent of fractures, displacement of fragments and soft tissue injuries2.
- The added advantage of MDCT is 3-D reconstruction & multi planar reconstruction which are helpful in assessing bony architecture in complex fractures involving multiple planes that helps surgeons for appropriate planning & management3.

AIMS AND OBJECTIVES:

To determine diagnostic accuracy of Multi Planar Reconstruction (MPR) and 3D Reconstruction in Maxillo-facial trauma.

MATERIAL AND METHODS

- Source of data: We conducted a retrospective study of 235 patients with history of maxillofacial trauma who underwent plain CT scans with facial bones protocol.
- Study period: From January 2015 to July 2017.
- Sample size: 235.
- Equipment: GE Bright Speed Elite 16 Slice CT Scanner.
- Inclusion criteria : Patients of all age groups with history of trauma.
- Exclusion criteria : Non traumatic patients.

CT SCAN PROTOCOL

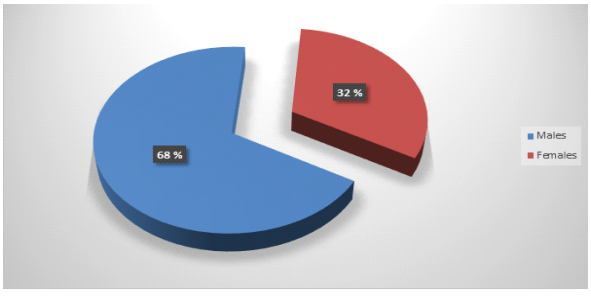
- Plain scans were performed in the axial axis, starting from the frontal bone above supraorbital ridge covering mandible.

Scanning parameters:

- Slice thickness: 3.75mm.
- Retrospective Reconstructive thickness: 0.625mm.
- Pitch: 0.562:1 ; kVp:120 ; mAs: 350 .
- Rotation Time: 0.8sec.
- Post processing multi planar reconstruction in thin bone window and 3D CT reconstruction were obtained.

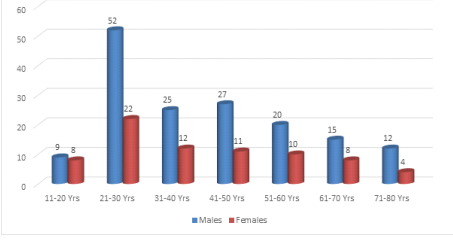
RESULTS AND OBSERVATIONS

Sex Distribution

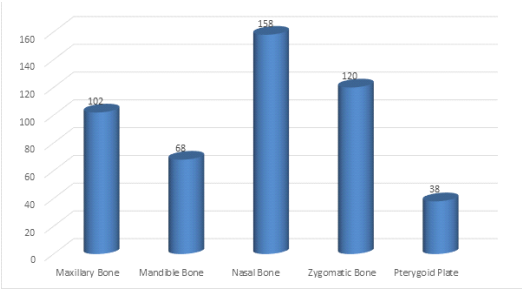


SEX	NUMBER	PERCENTAGE	MALE : FEMALE
MALE	160	68	2.1:1
FEMALE	75	32	
TOTAL	235	100.0	

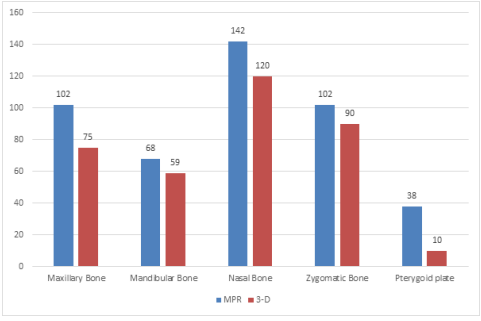
Age Distribution



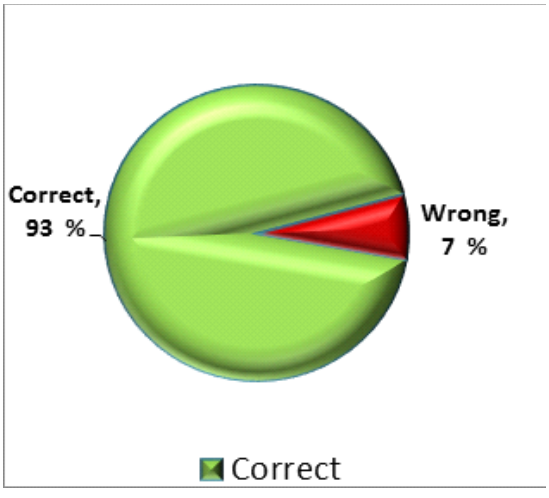
Site of Involvement



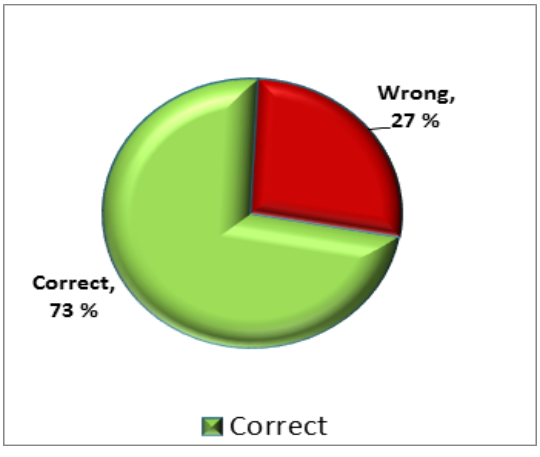
Diagnostic Accuracy of Multi Planar Reconstruction & 3-D Computed Tomography in detecting Maxillofacial Fractures



Accuracy of MPR



Accuracy of 3-D



Discussion

- We observed a Peak incidence in the 3rd decade of life.
- Multi Planar Reconstruction was superior to 3-D CT for detecting maxillofacial fractures.
- In our study, most of the victims were mostly males (68 %) & fracture of nasal bone was most common and was seen in (67.2 %) of patients.
- The 2nd most common fracture was that of Zygomatic bone (51 %) followed by Maxillary bone (43.4 %), Mandible bone (28.9 %) & Pterygoid plate (16.1 %).
- In our study all maxillary bone, mandibular bone & pterygoid plate fractures are detected by MPR.
- While 90% of nasal bone fractures and 92% of zygomatic bone fractures are detected by MPR.
- 3D reconstruction was able to detect only 76% of nasal bone fractures, 75% of zygomatic bone fractures, 73% of maxillary bone fractures, 87% of mandibular fractures and 26% of pterygoid plate fractures.

Conclusion

Maxillofacial injuries are commonly encountered emergencies which needs early diagnosis & management. The complex anatomies of facial bones require multi planar imaging techniques for a detailed evaluation. MDCT with MPR technique allowed better visualisation of maxillofacial fractures. MDCT offers excellent spatial resolution, which in turn enables exquisite multi planar reformations & 3-D reconstructions, allowing enhanced diagnostic accuracy which provides road map for surgical planning & treat the patient in golden hour.

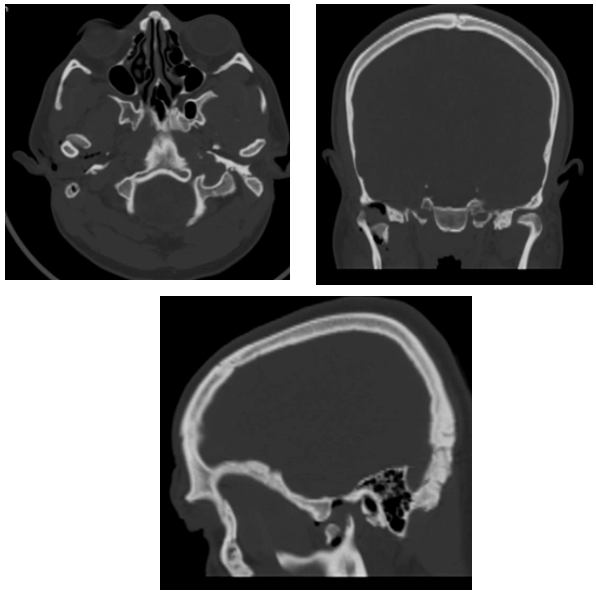
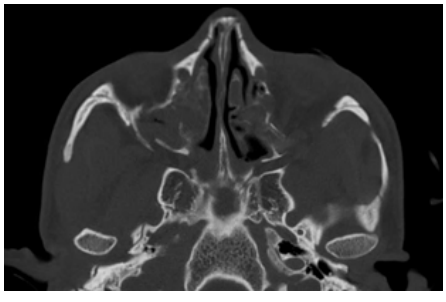


FIG A,B,C : MPR reconstruction with axial, coronal and sagittal images showing fracture neck of right side of mandible with anterior displacement of condyle which is better appreciated



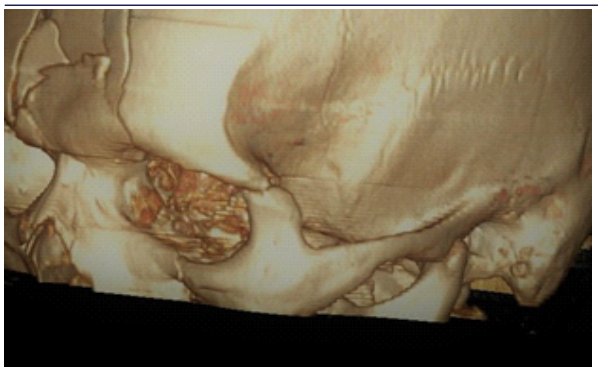


FIG D: Showing fracture left zygomatic bone which is not appreciated in 3D reconstruction in FIG E.

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References

1. Abdul Khader Farook, et.al , international journal of scientific study -2016/224 , Role of Multi planar Reconstruction Imaging and Three-dimensional Computed Tomography Imaging in Diagnosing Cranial and Facial Fractures.
2. Jolanta Myga-Porosiło et;al, Pol J Radiol, 2011; 76(1): 41-51, CT Imaging of facial trauma. Role of different types of reconstruction. Part I – bones.
S. James Zinreich; AJNR 13:893-895, May/June 1992 0 195-61 08/92/1303-0893, 3-D Reconstruction for