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Maxillomandibular fixation of dentoalveloar trauma combined with conservative management of multiple facial undisplaced fracture in a geriatric individual

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Abstract
Maxillofacial trauma such as facial fractures, dentoalveolar fractures occur as a result of road traffic accidents (RTA) [1]. The extent of the injuries sustained depends on the location, direction, momentum and force of the impact absorbed by the victim. Facial fractures usually goes unnoticed or even less importance when a patient sustains other concerning injuries. [2] The delay in treatment of such injuries leads to unnecessary complications which could have been easily thwarted. Radiographic assessment is integral in the workup of patients with significant facial trauma. Initial radiographs and CT scans are taken on admission to examine the extent of the injury to the CNS or the C-spine [3]. The helical multislice CT is an easier and faster modality to image patients with spine injuries or head injuries. Various studies report advantages and pitfalls of conventional radiography as well as CT in diagnosing facial fractures. Here we present a case of maxillofacial trauma along with other polytraumatic injuries sustained due to a RTA and how the facial fractures went relatively unnoticed until multi facial 3D CT Scan was taken and we shed light on the importance of facial 3D CT scan over conventional CT scan and radiograph.

Keywords: Oral and maxillofacial surgery, trauma, computed tomography, magnetic resonance imaging, maxillomandibular fixation, geriatric

Introduction
Maxillofacial trauma such as facial fractures, dentoalveolar fractures occur as a result of road traffic accidents (RTA) [1]. The extent of the injuries sustained depends on the location, direction, momentum and force of the impact absorbed by the victim. Facial fractures usually goes unnoticed or even less importance when a patient sustains other concerning injuries [2]. The delay in treatment of such injuries leads to unnecessary complications which could have been easily thwarted. Radiographic assessment is integral in the workup of patients with significant facial trauma. Initial radiographs and CT scans are taken on admission to examine the extent of the injury to the CNS or the C-spine [3]. The helical multislice CT is an easier and faster modality to image patients with spine injuries or head injuries. Various studies report advantages and pitfalls of conventional radiography as well as CT in diagnosing facial fractures. Here we present a case of maxillofacial trauma along with other polytraumatic injuries sustained due to a RTA and how the facial fractures went relatively unnoticed until multi facial 3D CT Scan was taken and we shed light on the importance of facial 3D CT scan over conventional CT scan and radiograph.

Case Report
A 60 year old male reported to the dental clinic with a chief complaint of generalized pain in jaw, difficulty in mastication, opening and closing his mouth for past 4 weeks. Patient's medical history revealed that he was hospitalized for a polytraumatic injury sustained due to a RTA two months prior to the current visit. History also revealed that the patient had a closed fracture of the femur in his right leg which was detected in the intial X Ray and any potential injury to CNS was ruled out after observing CT scan taken for head and neck. The patients history also revealed he was diabetic and under medication for past 10 years. Emergency surgery had been done during which his blood glucose were within the normal range.

Surgical reduction followed by internal fixation of the fractured segment had been done under general anesthesia and the patient was kept under observation for 2 days. After 3 days the patient against medical advice returned to his home native place seeking treatment from his family doctor. Admission and discharge details of the same were not available.

After 4 weeks, the patient was non-ambulatory to the injury to his leg but then had started to develop pain throughout his jaw and noticed a difficulty in chewing food. Local examination revealed limited mouth opening, mandibular deviation during opening and closing of the mouth followed by an edge to edge bite in his upper and lower anterior teeth [FIGURE 1] Mastication and speech were both affected and a reverse bite was seen. Patient's initial CT scan or radiograph of the skull did not reveal any significant abnormalities [FIGURE 2]. On consultation with a maxillofacial surgeon. He was advised a multi facial 3D CT scan. On observing, the multi facial 3D CT scan of the face it was noted that there was undisplaced fracture to the lateral wall and floor of bilateral orbital wall, undisplaced fracture in the base of right hemimandible, undisplaced fracture bilateral walls of the maxillary sinus, undisplaced fracture of the greater wing of sphenoid on the right side and pterygoid plates on both sides and segmental fracture in right zygomatic arch [FIGURE 3, 4 and 5]. It was decided to correct the patient's occlusion by a arch bar fixation and elastics. The undisplaced fractured segments were undisturbed as they did not pose any surgical intervention. Patient was informed about the extent of injuries along with the treatment procedure. Under local anesthesia, a prefabricated arch bar with hooks incorporated on the outer surface with flat malleable stainless steel metal strip was cut accurately to the length of both upper and lower dental arches. On the upper jaw, the hooks were arranged in an upward direction and to the lower jaw in a downward direction [FIGURE 6] The arch bar was adapted to the buccal surface of each arch and given shape of the arch by bending it, starting from the mesial part of last tooth progressing past the midline and finishing at the other end. It was fixed to each tooth, using prestretched 26-gauge stainless steel wire, which is passed from mesial surface of tooth to the lingual side and back on the buccal side from the distal surface of the tooth, making sure that one end of the wire is passing above the arch bar and the other below it. After this, both ends of the wire were twisted together in a clockwise manner and the arch bar was attached securely and firmly to the necks of each tooth on the buccal surface of the arch. Elastics were used as a method for Maxillomandibular fixation (MMF) and to train his normal centric occlusion. The arch bar was left for about 4 – 6 weeks. [FIGURE 7]. The fractured segments was left untouched owing to its undisplaced nature. On review after 4 weeks, the patient had achieved a normal bite and occlusion of his tooth with normal overjet and overbite. The vitality of the damaged tooth were checked later with a electronic pulp tester and were treated accordingly on the subsequent visits. The healing was uneventful and satisfactory.

Discussion

Traumatic injuries are complex and are considered a major health burden often sustained via road traffic accidents & full contact sports [4] Traumatic injuries usually involve the facial regions especially in cases of RTA. Facial fractures may initially go unnoticed, or often treated later if the patient had sustained multiple systemic injuries or other pressing medical concerns [5]

The patients are evaluated according to the Advanced Trauma Life Support Protocol and any associated injuries. Unless the traumatic Injury sustained to the facial region is causing significant hemorrhage or airway compromise, the patient is usually stabilized before facial injuries and treated [6] Early clinical knowledge of facial fractures could assist in earlier treatment and possible mitigation of related sequelae. Direct and indirect complications of facial fracture can include nerve damage, brain injury, facial cosmetic changes, infections, along with difficulties related to eating, speaking, hearing and seeing [7].

The diagnostic modalities most commonly used are conventional radiography (X-rays) and Computed Tomography (CT). Various studies report advantages and pitfalls of conventional radiography as well as CT, separately in diagnosing facial fractures.

Technological advances in computerized tomography (CT) have reduced data acquisition and reconstruction times so that three-dimensional (3D) CT images of maxillofacial injuries may be economically and quickly generated. 3DCT was judged superior to multiplanar two-dimensional CT in demonstrating the spatial relationships of fracture fragments in complex mandibular and midfacial trauma [8]. 3DCT is accurate at assessing mandibular, zygomaticomaxillary complex, and comminuted fractures of the middle third of the face with no additional scanning time or radiation exposure. Clinically relevant radiology reports can be constructed, which facilitates improved communication with referring clinicians. Sohns *et al*. [9] and Smith *et al*. [10] in their study, also found orbitozygomatico area as most commonly fractured region followed by maxillary and then nasal area. Fractures missed on X-rays are easily detected on CT, though, 3D images, though are less accurate than multiplanar 2D images, the 3D images usually, give the surgeon, an easier and faster view of fracture sites.

Fractures that are nondisplaced and exhibit no significant or mild occlusal changes are subjected to nonsurgical management, but severe traumatic involvement of the mandible requires stabilization for satisfactory healing and to restore pretraumatic maxillomandibular orientation [11]

The ultimate goal of treatment is to re-establish the patient's preinjury dental occlusion. Fractures that are nondisplaced and exhibit no occlusal changes may be amenable to nonsurgical management, but the majority of mandible fractures will require stabilization for satisfactory. Maxillomandibular fixation (MMF) using ehrichs Arch bar fixation is mostly commonly employed for treating mandible fractures. For the last century, wire-based techniques such as Ivy loops and Erich arch bars have remained a standard of care [12].

Fig 1: Preoperative 3D facial CT coronal view

Fig 2: 3D facial CT right lateral view

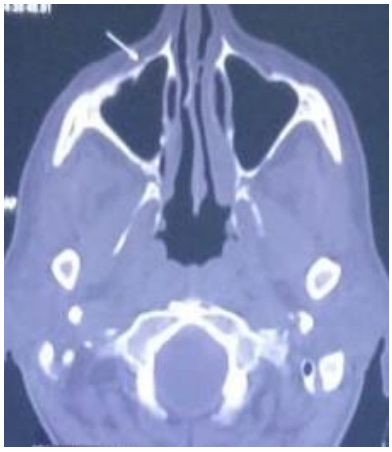

Fig 4: Axial CT view

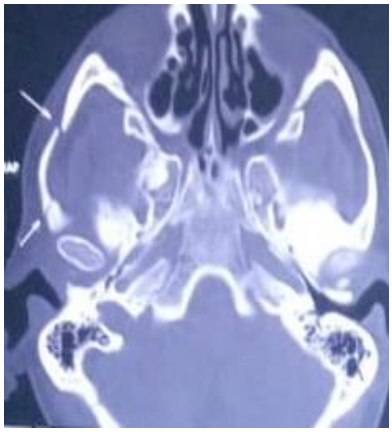

Fig 3: Axial CT view

Fig 5: Sagittal CT view

Undisplaced fracture noted in lateral wall and floor of bilateral orbits.

Undisplaced fracture noted in condylar base of right hemi mandible.

Undisplaced fracture noted in walls of bilateral maxillary sinuses.

Undisplaced fracture noted in greater wing of sphenoid in right side and pterygoid plates on both sides.

Segmental fracture noted in right zygomatic arch.

Fig 6: Radiological impression

Fig 7: Intraoperative view profile

Fig 8: Intraoperative view left side

Conclusion

Whole detection and properly time treatment effects of injury. Do conventional CT scan and radiographs are preferred during the initial period it is often time consuming and some fine details may go unnoticed especially in thr scenario where a patient has polytraumatic injuries amd facial taruma is minimal. A 3D Multi facial CT scan is fast, economical and convenient even in polytrauma or other serious injury that warrants immediate attention. Fractures missed on X-rays are easily detected on CT, thereby helping us to plan and treat the patient accordingly as soon the serious problems have been attended to and stabilized.

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