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ROLE OF HELMET IN THE PREVENTION OF ZYGOMATICO-MAXILLARY COMPLEX FRACTURE

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ABSTRACT

Zygomatico-maxillary fractures are the second most common mid-facial bone fractured after the nasal bones. The incidence and etiology shows that zygomatic bone fractures were commonly found among young males and the most common cause was found to be road traffic accidents. These fractures are more common for unhelmeted motorcyclists compared to helmeted motorcyclists. Three male patients of nearly same age group reported with zygomatico-maxillary fracture sustained in a motorcycle accident as they were not wearing helmets. They were managed by ORIF through keen's approach. The zygomatic bone or zygoma is a strong buttress of the middle third of the facial skeleton. Direct blow on the malar eminence causes disruption at the weaker part. Motor vehicle accidents were the predominant etiology of the zygomatic fractures followed by assaults and accidental falls. Data confirm that the wearing of helmet reduces mortality, traumatic brain injury, and cervical spine injury and improve functional outcomes after a motorcycle crash.

INTRODUCTION

The face occupies the most important position in the human body rendering it susceptible to injuries quite commonly. The eminence of the zygomatic region predisposes it to bearing the impact of the facial injuries[1]. Because of its position, it is the second most common mid-facial bone fractured after the nasal bones and overall represents 13% of all craniofacial fractures [1,2].

However, the incidence and etiology varies from area to area as another study shows that zygomatic bone fractures were commonly found among young males and the most common cause was found to be road traffic accidents [3].

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The causes of the fractures were mainly attributed to assault and road traffic accidents (RTA), which is consistent with worldwide experience. However, in many places, either RTA or assault was consistently the main contributing cause with one of these two consistently dominating the other by a large degree [2]

Zygomatico-maxillary fractures caused by the road traffic accidents are more common for unhelmeted motorcyclists compared to helmeted motorcyclists.

Hereby we are presenting a series of 3 young male who were not wearing helmets and sustained a zygomatico-maxillary fracture in the road traffic accident while riding a motorcycle during rainy season.

Case -1

A patient age- 23 yrs, male reported to the department of oral and maxillofacial surgery with a chief complaint of depression on right side of face (fig-1) after

he met with road side accident. He gave history that while going home on his bike, his bike collided with another bike and the handle of his bike hit on the right side of his face. He was then taken to some private hospital where primary management was done and after about 5 days from the date of injury he was referred to our department for facial depression. On examination there was flattening of right malar eminence and periorbital echymosis in relation to right eye. No diplopia was present. Lateral sub-conjunctival haemorrahage was present in right eye. Mouth opening was adequate and occlusion was satisfactory. There was paresthesia in the region of right infraorbital nerve supply. Step was palpable at right frontozygomatic suture, right zygomatico-maxillary buttress, right infraorbital margin, and right zygomatic arch. Provisional diagnosis of right zygomatic complex fracture was made. Submentovertex and PNS view (digital) was advised to confirm the diagnosis (fig-2).

Management- after taking informed and written consent and routine blood investigations patient was taken for ORIF under general anaesthesia. After infiltration with 1:200000 adrenalline in the upper right vestibule, vestibular incision was given with 15 no surgical blade from maxillary lateral incisor to maxillary first molar. Flap was reflected with the help of Howarth's periosteal elevator to expose the right zygomatic bone (fig-3). Space for the elevator behind the body of the zygoma was made with the help of molt's no 9 periosteal elevator. With the help of howarth's elevator the body of the zygoma was elevated and reduced. As soon as the force was applied a click sound was heard. The fracture site was inspected and was found to be reduced at zygomatico-maxillary buttress region. Simultaneously step at frontozygomatic suture and infraorbital margin were found to be reduced. An L-shaped four hole ss plate with gap was adapted and fixed with 1.5 mm x 6 mm ss screws at the zygomaticomaxillary buttress to reinforce it (fig-4). Closure was done with 3-0 round body silk suture. Facial symmetry was restored (fig-5). Post operative radiograph showed reduced fracture zones (fig-6). Follow up period was uneventful.

Case -2

A patient age-18 yrs, male reported to the department of oral and maxillofacial surgery with a chief complaint of depression on right side of face after he met with road side accident. He gave history that while returning to home from tution on his bike; his bike collided with a car. The mirror of the car hit on the right side of his face. He was then taken to some private hospital where primary management was done and was referred to our department for facial depression. On examination there was periorbital echymosis in relation to right eye. No diplopia and paresthesia was present. Lateral sub-conjunctival haemorrahage was present in right eye. Mouth opening was adequate and occlusion was slightly deranged on right side. Step was palpable at right frontozygomatic suture, right zygomatico-maxillary buttress and right infraorbital margin. Provisional diagnosis of right zygomatic complex fracture was made. Submentovertex and PNS view (digital) was advised to confirm the diagnosis.

Management- after taking informed and written consent and routine blood investigations patient was taken for ORIF under general anaesthesia. After infiltration with 1:200000 adrenalline in the upper right vestibule, vestibular incision was given with 15 no surgical blade from left maxillary lateral incisor to maxillary right first molar. Flap was reflected with the help of Howarth's periosteal elevator to expose the right zygomatic bone. The zygomatico-maxillary buttress was found to be shattered. Space for the elevator behind the body of the zygoma was made with the help of molt's no 9 periosteal elevator. With the help of howarth's elevator the body of the zygoma was elevated and reduced. As soon as the force was applied a click sound was heard. Step at frontozygomatic suture and infraorbital margin were found to be reduced. Due to shattering at the zygomatico-maxillary buttress there was space at the buttress region. A C-shaped 1.5 mm X 6 hole with gap titanium plate was adapted and fixed with 1.5mm X 6mm Ti screws at zygomatico-maxillary buttress. Closure was done with 3-0 round body silk suture. Post operative radiograph showed reduced fracture zones. Follow up period was uneventful. Facial symmetry was restored

Case -3

A patient age-25 yrs, male reported to the department of oral and maxillofacial surgery with a chief complaint of depression on left side of face after he met with road side accident. He gave history that while returning to home from his farm on his bike; his bike collided with a truck. After collision, he fell and his face hit the ground. He was then taken to some private hospital where primary management was done and was referred to our department for facial depression. On examination there was periorbital echymosis in relation to left eye. No diplopia and paresthesia was present. Lateral sub-conjunctival haemorrahage was present in left eye. Mouth opening was reduced and occlusion was slightly deranged on left side. Step was palpable at left frontozygomatic suture, left zygomatico-maxillary buttress, left infraorbital margin. Provisional diagnosis of left zygomatic complex fracture was made. Submentovertex and PNS view (digital) was advised to confirm the diagnosis.

Management after taking informed and written consent and routine blood investigations patient was taken for ORIF under general anaesthesia. After infiltration with 1:200000 adrenalline in the upper left vestibule, vestibular incision was given with 15 no surgical blade from left maxillary lateral incisor to maxillary first molar. Flap was reflected with the help of Howarth's periosteal elevator to expose the right zygomatic bone. Space for the elevator behind the body of the zygoma was made with the help of

molt's no 9 periosteal elevator. With the help of howarth's elevator the body of the zygoma was elevated and reduced. As soon as the force was applied a click sound was heard. The fracture site was inspected and was found to be reduced at zygomatico-maxillary buttress region. Simultaneously step at frontozygomatic suture and infraorbital margin were found to be reduced. A left L-shaped four hole ss plate with gap was adapted and fixed with 1.5 mm x 6 mm ss screws at the zygomatico-maxillary buttress to reinforce it. Closure was done with 3-0 round body silk suture. Post operative radiograph showed reduced fracture zones. Follow up period was uneventful. Facial symmetry was restored.

Figure 1. Preoperative photograph showing flattening of right malar eminence (Hence Asymmetrical Face)

Figure 2. Preoperative PNS and SMV are showing right ZMC fracture.

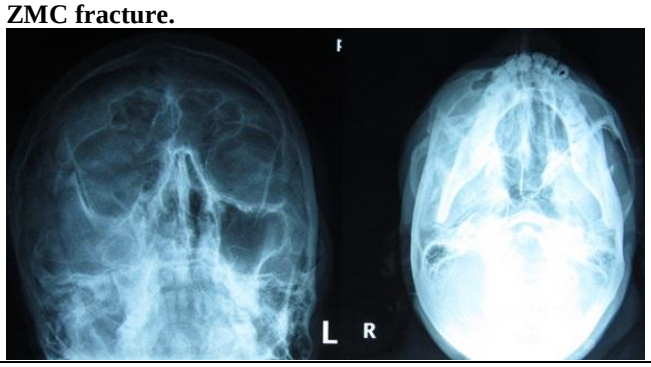


Figure 3. Intraoperative photograph showing depressed fracture site.

Figure 4. Intraoperative photograph showing reduced and fixed fracture site

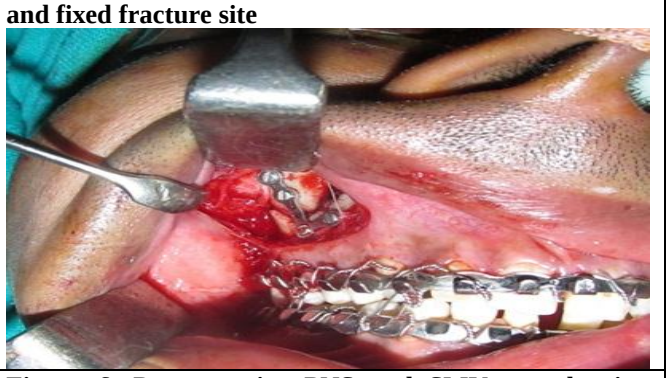
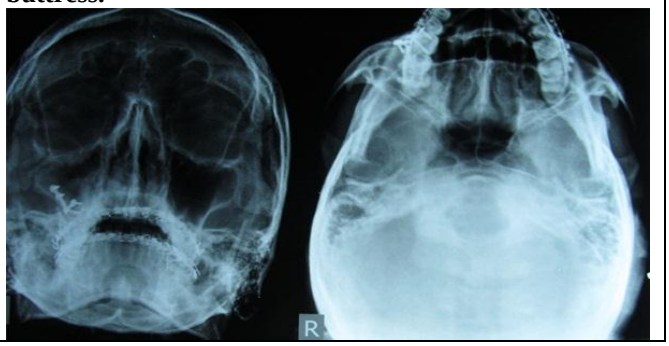


Figure 5. Postoperative follow up photograph showing fullness on the right side of the face (Hence Symmetrical Face)

Figure 6. Postoperative PNS and SMV are showing restoration of the arch form and zygomatico-maxillary buttress.



DISCUSSION

The zygomatic bone or zygoma is a strong buttress of the lateral portion of the middle third of the facial skeleton sandwiched between the zygomatic processes to the frontal bone and the maxilla. Due to its prominent position, it often gets fractured, alone or along with other bones of the midface. Direct blows usually first strike on the most prominent part which is the malar eminence and causes disruption at the comparatively weaker part which are the zygomatic arch, the frontal process, and the zygomatico-maxillary suture [4]. The clinical signs and symptoms are related to displacement or rotation of the fragments which include enophthalmos, hypothalmos, proptosis, diplopia, trismus, mallar flattening, and hypoesthesia [4-8].

In our three cases clinical symptoms include malar flattening, hypoesthesia in one case and trismus was seen in one patient. The diagnosis of fracture of zygoma and maxilla can usually be made with systematic clinical examination and ample radiological evaluation. Plain radiograph commonly used in midfacial fracture is Occipito-mental or Water's view which can evidently demonstrate the bone discontinuity in the zygomatico-maxillary buttress and the inferior orbital rim. The submentovertex view more noticeably detects fractures of the zygomatic arch [7]. In our all the three cases Water's view and submentovertex view was used to confirm the diagnosis. The zygomatic complex fractures are commonly caused by traffic accidents, assaults, accidental falls and sports injuries. According to some authors, motor vehicle accidents were the predominant etiology of the zygomatic fractures followed by assaults and accidental falls. Helmet use significantly reduced risk of serious facial injury to upper and middle face regions by approximately 65%compared to non-users.

Facial injuries were more common for unhelmeted motorcyclists compared to helmeted motorcyclists. The association between motorcycle helmets and facial injury has been limited by confounders and limited sample sizes. Some investigations [9,10] have not found any association between helmets and facial injury, whereas a few studies suggest that helmets are protective [11-14]. In the Cochrane study [15] review and Sauter et al [16] found riders with helmets were significantly less likely to suffer injuries of the face compared with nonhelmeted riders. The collective estimate from the 8 studies in the Cochrane review showed that helmets compared with no helmets considerably protect against facial injury. In our cases, all the three patients were not wearing helmet when they met with the accident. Various surgical techniques have been described for the reduction of zygomatic complex fracture. Open reduction with surgical incisions has been accomplished through Keen's approach, Gillies' approach, coronal flap approach or the more popular Dingman's approach [17]. The zygomatico maxillary buttress approached intraorally using the buccal sulcus incision has advantages like fracture segments can be directly visualized, reduced and fixed using this approach with no visible scars. This approach was used in our all the three cases to reduce and fix the zygomatico-maxillary complex fracture.

CONCLUSION

Fracture of zygomatic bone is more common in adult males who are more exposed to outdoor activities. Motor vehicle accidents are the predominant etiology of the zygomatic fractures. Significant data confirm that the use of helmets reduce mortality, traumatic brain injury, and cervical spine injury and improve functional outcomes after a motorcycle crash.

Thus one should follow the instructions already imposed by the law agencies for the welfare of the public while using any kind of powered two wheelers to avoid such kind of morbidities.

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