Without treatment in a timely manner, many individuals will develop future problems, the severity and consequences of which can be much greater than if the injury had been immediately repaired. However, modern craniofacial surgical techniques can now offer hope for patients with pre-existing post-traumatic facial deformities despite considerable delays between injury, diagnosis, and treatment. These innovative techniques establish a higher standard of care for the management of facial injuries.

The following sections describe the different areas and types of facial fractures:

**ZYGOMATIC FRACTURES**

The zygomatic bone occupies a prominent and important position in the facial skeleton. It plays a key role in determining facial width as well as acting as a major buttress of the midface. Its anterior projection forms the malar eminence and is often referred to as the malar bone. The zygoma has several important articulations in the midface. The zygoma forms a significant portion of the floor and lateral wall of the orbit. In addition, the zygoma meets the lateral skull to form the zygomatic arch.

The zygoma is the main buttress between the maxilla and the skull; but in spite of its sturdiness, its prominent location makes it prone to fracture. The mechanism of injury usually involves a blow to the side of the face from a fist, object, or secondary to motor vehicle accidents. Moderate force may result in minimally or nondisplaced fractures at the suture lines. More severe blows frequently result in inferior, medial, and posterior displacement of the zygoma. Comminuted fractures of the body with separation at the suture lines are most often the result of high-velocity motor vehicle accidents. In general, displaced fractures will involve the inferior orbital rim and orbital floor, the zygomaticofrontal suture, the zygomaticomaxillary buttress, and the zygomatic arch. Occasionally, however, a direct blow to the arch will result in an isolated depressed fracture of the arch only.
Radiographic evaluation of the fracture is mandatory and may include both plain films and a computed tomographic (CT) scan. The CT scan has now essentially replaced plain films as the “gold standard” in both evaluation and treatment planning. If physical findings and plain films are not suggestive of a zygomatic fracture, the evaluation may end here. However, if they do suggest fracture, a coronal and axial CT scan should be obtained. The CT scan will accurately reveal the extent of orbital involvement, as well as degree of displacement of the fractures. This study is vital for planning the operative approach.

Historically, closed reduction was the method of choice for nearly all zygomatic fractures. Multiple methods were employed, but most involved simply exerting pressure underneath the malar eminence and popping the fragments back into alignment. Not only were these results frequently unsatisfactory, but they were fraught with complications including persistent diplopia, orbital dystopia, malunion, and significant residual deformity. In our own experience, closed reductions yield unpredictable results with significant chance of relapse. We feel that plate and screw fixation is now the standard of care.

The treatment of zygomatic fractures has dramatically progressed over the past several decades from an entirely closed approach to the more aggressive open reduction and rigid miniplate fixation of today. If a zygomatic fracture is displaced, we do an open reduction and rigid stabilization with mini- and microplates. The floor of the orbit is routinely explored and reconstructed, if needed, to restore orbital volume. The complications of an inadequately or unreduced zygomatic fracture are very difficult to correct secondarily and usually avoidable. We feel that early diagnosis combined with this aggressive surgical treatment yields the best results.

MAXILLARY FRACTURES

The maxilla forms the largest component of the middle third of the facial skeleton. The maxilla is a key bone in the midface that is closely associated with adjacent bones providing structural support between the cranial base and the occlusal plane. Fractures of the maxilla occur less frequently than those of the mandible or nose due to the strong structural support of this bone. The midface consists of alternating thick and thin sections of bone that are capable of resisting significant force. This structurally strong bone provides protection for the globes and brain, projection of the midface, and support for occlusion. Reestablishing continuity of these buttresses is the foundation on which maxillary fracture treatment is based.

Renee LeFort (1901) provided the earliest classification system of maxillary fractures. His model described “great lines of weakness in the face” using low-velocity impact forces directed against cadaver skulls. A discussion of fractures of the maxilla would not be complete without a description of LeFort’s work.

The Lefort I fracture, or transverse fracture, extends through the base of the maxillary sinuses above the teeth apices essentially separating the alveolar processes, palate, and pterygoid processes from the facial structures above. This transverse fracture across the entire lower maxilla separates the alveolus as a mobile unit from the rest of the midface. Fracture dislocations of segments of the alveolus may be associated with this fracture. With high-energy injuries, the palate may be split in the midline in addition to the LeFort I fracture.

A pyramidal fracture of the maxilla is synonymous with a LeFort II fracture. This fracture pattern begins laterally, similar to a LeFort I, but medially diverges in a superior direction to include part of the medial orbit as well as the nose. The fracture extending across the nose may be variable, involving only the nasal cartilage or as extensive as to separate the nasofrontal suture.