

# Why Should We Start From Mandibular Fractures in the Treatment of Panfacial Fractures?

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**Purpose:** Clinically, the “bottom-up and outside-in” sequence is usually applied in the management of panfacial fractures (PFFs). However, findings to prove that a sequence initiated from the mandible is reasonable are not available. Our objective was to describe the distribution of mandibular fractures in PFFs and investigate the basis for initially addressing the mandible when treating PFFs.

**Patients and Methods:** The data from 107 patients with PFFs from 1998 to 2008 were analyzed retrospectively. All cases were treated with the “bottom-up and outside-in” sequence.

**Results:** The most common sites of mandibular fractures in PFFs were the symphysis and condyle. The most common type of fracture was the isolated linear fracture. No correlations between fracture type and the incidence of mandibular fractures and other fractures in PFFs were observed; however, PFFs with simple mandibular fractures had fewer complications and better treatment effects than PFFs with complex mandibular fractures. Significant differences between mandibular fractures in PFFs and general mandibular fractures were found. The type distribution in the former was simpler than that in the latter; the severity was also less serious. Most PFF patients treated with the proposed sequence presented with satisfactory effects.

**Conclusions:** Considering the important role of the mandible in facial bones, the results have provided evidence of the feasibility of the “bottom-up and outside-in” approach in the treatment of PFFs. However, some PFFs remain difficult to treat. Thus, additional studies are necessary.

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Panfacial fractures (PFFs) are defined as fractures that simultaneously involve the upper, middle, and lower face.<sup>1,2</sup> This type of trauma mainly involves the mandible, maxilla, zygomatic complex, naso-orbito-ethmoid (NOE) region, and frontal bone and is often

associated with emergencies, such as craniocerebral injury and cervical spine injury.<sup>3</sup> Clinically, the traumatic conditions of PFFs are complicated and vary between patients. However, a well-developed clinical classification that can be applied to guide treatment

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planning and prognostic evaluation has yet to be reached. Thus, the treatment of PFFs is extremely difficult for both experienced and inexperienced surgeons. In previous data, much has been written about the proper treatment sequence for PFFs.<sup>1,2,4-8</sup> Among such sequences, the “bottom-up and outside-in” approach is the most widely used approach in the management of PFFs.<sup>1,4,5,7,8</sup> According to the “bottom-up and outside-in” approach, the reduction and repair of fractures are begun from the mandible to the frontal bone (bottom-up), followed by the zygomatic complex, maxilla, and NOE region (outside-in). However, this classic approach cannot resolve all possible cases of PFFs. To solve such cases, sequences such as “top-down and inside-out” and “immobile-mobile and simple-complicated” have been proposed by other investigators.<sup>5,6,8</sup> Overall, however, the “bottom-up and outside-in” approach seems to be suitable for most PFFs, and most investigators insist that this sequence is their first choice of treatment.

Mandibular fractures in PFFs are usually the first step in the management of PFFs; however, why should treatment start from mandibular fractures? No research data in the existing data provide reliable evidence to support this choice. The present study was designed to analyze the distribution features of mandibular fractures in PFF and provide detailed data to support the initiation of PFF treatment from the mandible.

## Patients and Methods

### PATIENTS

The data from 107 patients with PFFs admitted to the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Wuhan University (China) from January 1998 to December 2008 were retrospectively analyzed. The institutional review board of Wuhan University approved the protocol, survey, and consent forms used.

The inclusion criteria were simultaneous fractures of the mandible, maxilla, and zygomatic complex, with or without fractures in the NOE region and/or frontal bone.<sup>4</sup> Patients with alveolar fractures of the mandible and maxilla were excluded.<sup>9</sup> Of the 107 patients, 96 were male and 11 were female; the male/female ratio was 8.7:1. The patient age varied from 16 to 64 years (mean 33). Of the 107 patients, 44 (41.1%) presented with concomitant injuries, including intracranial injury/hemorrhage, limb fracture, eyeball injury, and rib fracture, among others.

The epidemiologic information, fracture type, treatment details, and follow-up results were tabulated for the present study.

### FRACTURE TYPE

The mandibular fractures and midfacial fractures in the PFFs were classified as simple fractures and complex fractures, respectively. Such classification aimed to explore the relationship between mandibular fractures and other fractures in PFFs. Simple fractures included linear fractures and fractures with minimal or no displacement, and complex fractures included comminuted fractures, fractures with displacement, and bilateral simple fractures. Isolated linear fractures with displacement were regarded as simple fractures. In addition, in the midfacial regions, only simultaneously simple fractures of the zygomatic complex, maxilla, and NOE region were classified as simple fractures; if any of the 3 regions featured complex fractures, the entire midfacial region was classified as presenting complex fractures.

### TREATMENT OF PFFs

All patients underwent open reduction and internal fixation (ORIF) according to the “bottom-up and outside-in” approach. The details of the treatment were as follows.

For the mandibular fractures, ORIF was performed through intraoral or extraoral incisions. When the condyle was fractured, treatment of the condyle was performed before the other regions of the mandible. Most intracapsular, condylar neck, and subcondylar fractures were treated by ORIF through extraoral incisions. Some minor fracture fragments in comminuted intracapsular condylar fractures and free coronoid fracture fragments were usually removed without fixation.

For the frontal fractures, the frontal bone and frontal sinus were treated through a coronal incision.

For the zygomatic complex fractures, the zygomatic complex region was reduced and fixed using the sphenozygomatic sutures, zygomaticofrontal sutures, zygomatic arch, and zygomaticomaxillary sutures as guides.

For the maxillary fractures, ORIF through intraoral incisions was applied along the zygomaticomaxillary suture, infraorbital margin, and pyriform aperture, with reference to the occlusion relationship.

For the NOE fractures, the main treatment focus was the restoration of the intercanthal distance and reattachment of the medial canthal ligament. Local minor incisions were applied to coordinate with the coronal incisions.

Any bony defects observed in the fractured areas, such as the skull and orbital floor, were treated with titanium meshes, individualized reconstruction, or autogenous bone grafts.

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