

Craniomaxillofacial Trauma

The Utility of Patient Specific Implants in the Trauma Setting

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Purpose:

There have been significant advances in CAD/CAM technology in the decade since its inception. The use of patient specific implants (PSP) have been increasingly adopted as an accurate and reliable technique to increase precision and reduce operating room time. In the sub-categories of orthognathic surgery and reconstructive surgery, PSPs have gained significant traction as reported in the literature; however, applications in the trauma setting are less frequently described, if at all. Although PSPs are not immediately available for the acute treatment of the trauma patient, we have found indications for the use of this technology in the sub-acute trauma patient.

This retrospective study aimed to assess which injury patterns were treated using patient specific implants to answer the following clinical question, “what types of injuries are patient specific implants being used and how frequently?”

Methods: A retrospective chart review was performed from 2015 -2019 at a single institution, Legacy Emanuel Medical Center, Portland Oregon, to determine the volume of cases and injury pattern where patient specific implants were used in trauma cases. All cases where PSPs were used during the study years were first identified. Their inclusion was determined by type

reconstruction case. Oncology, benign tumor reconstruction, and orthognathic cases were excluded. Trauma cases were defined as motor vehicle accidents (all modes of transport), interpersonal violence, osteomyelitis/pathologic fracture, gun-shot wounds, sports injuries, and falls. A mandibular reconstruction plate was determined to be not only qualified as a “reconstruction plate” by the vendor, but also at least 2.0mm in thickness. Using this qualification, not all mandible fractures during the study period were included in the review. The number of PSP cases was then compared against the total number of cases performed, based on injury pattern

Results:

A total of 38 mandibular reconstruction plates were placed during the study period of which 17 were custom (45%). A total of 33 orbital wall/floor fractures were documented during the study period of which 9 were customized (27%). No patient specific implants were fabricated for any other injury pattern.

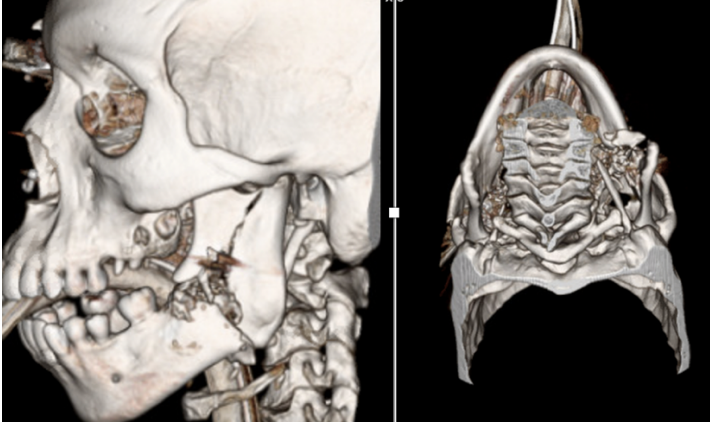
Conclusion: This review demonstrated that the use of customized hardware is feasible option in the trauma setting but limited to specific types of injury patterns. The use pattern is likely attributed to the perceived difficulty of reconstruction with more complex injuries reserved for PSP use. Poly trauma patients often undergo several procedures with orthopedics, general surgery, and neurosurgery depending on patient acuity and injury severity with acute, life threatening injuries prioritized over more stable injuries. Outside of distinct emergent scenarios such as bleeding and airway compromise, most maxillofacial trauma procedures can be deferred until the patient is hemodynamically stable and other, more critical procedures have been completed, allowing for time to plan and manufacture PSPs. Additionally, mandible fractures can be “temporized” with maxilla-mandibular fixation. This review demonstrates that PSPs have a viable role in maxillofacial trauma and should not be overlooked as option for the maxillofacial trauma patient. The case included demonstrates the utility of PSPs in a single hospital admission, supporting the practicality of their use.

Case Example: Comminuted mandible fracture treated with custom reconstruction plate during a single hospitalization.

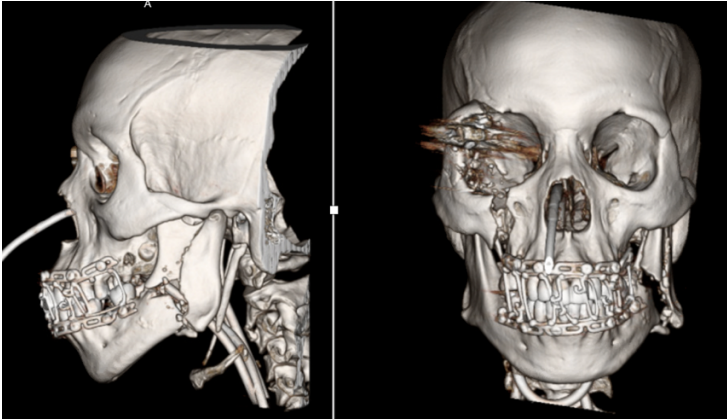
Figures a-c

- a) 10/7/2020: Arrival GSW to Zone 1, 2 left neck. Trajectory terminating posterior to right orbit
- b) 10/8/2020: Debridement, Tracheostomy, Dental Impressions, Placement of Arch Bars/Maxillo-Mandibular Fixation
- c) 10/21/2020: placement of reconstruction plate

a.



b.



c.

