Evidence-Based Medicine in Facial Trauma

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KEYWORDS

• Facial fractures • Facial trauma • Evidence-based medicine • Mandible fractures
• Midface fractures

KEY POINTS

- There is a relative paucity of high-quality evidence in facial trauma and most published studies are retrospective in nature.
- Antimicrobial prophylaxis is indicated for fractures of the dentate mandible, but no more than 24 to 48 hours postoperatively.
- Antimicrobial prophylaxis is not indicated for skull base fractures with cerebrospinal fluid leak.
- A 2-plate approach for open reduction and internal fixation (ORIF) of mandibular angle fractures does not appear to offer an advantage over a single superior border plate (Champy plate or lateral superior border plate).
- Lag screw fixation for anterior mandible fractures is superior to ORIF using 2 miniplates.

INTRODUCTION

Nearly 25 years have passed since the introduction of a "new paradigm"[1] in clinical practice: *evidence-based medicine*. This shift from tradition, theoretic reasoning, and expert opinion as the basis for clinical decision-making toward *evidence* backed by high-level, prospective, randomized, controlled trials (RCTs) has affected every medical specialty. This emphasis generally results in delivery of more consistent, cost-effective care in a contemporary medical environment. Large medical specialties with common diseases established the first high-level trials with large gains in management of peptic ulcer disease (triple therapy)[2] and human immunodeficiency virus (antiretroviral therapy),[3] among many others. There are unique challenges to practitioners of smaller medical fields, such as the facial traumatologist, as many of the diseases treated are relatively rare, resulting in a paucity of high-level evidence. Cost, recruitment, inconsistent follow-up, and concomitant injuries (affecting timing of treatments) lend additional challenge to large prospective trials in facial trauma. Nevertheless, this type of evidence must be sought. Our goal in formulating this article was to provide the reader with both a comprehensive review of high-level evidence-based medicine in facial trauma and to highlight areas in our field devoid of high-level evidence, that these might be explored in the future. The article is organized in the order one might approach a clinical problem: starting with the workup, followed by treatment considerations, operative decisions, and postoperative treatments. Individual injuries are discussed within each section, with an overview of the available high-level clinical evidence. We methodically searched available evidence-based databases for high-level trials and have cited the level of evidence for each topic, according to the Oxford Center for Evidence-Based Guidelines.[4]

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The vast majority of facial trauma publications are retrospective and based on small study populations. We searched a broad range of topics regarding patient evaluation, the timing of repair, method for repair, and postoperative management, generally limiting our discussion to topics for which there existed level 2 or higher evidence. This article will not only provide a quick reference for the facial traumatologist, but also allow the reader to identify areas of our practice that lack high-level evidence, perhaps motivating future endeavors. Previous investigators have also reviewed evidence-based management of facial fractures[5] and readers are directed toward this quality review.

Despite emphasis on evidence-based medicine, tacit knowledge derived from clinical experience must not be disregarded. There are editorialized sections of this article, where the authors insert their preferences and these sections are clearly marked for the reader.

IMAGING

Ultrasonography for Diagnosis of Facial Fractures, Level 2a

Historically, plain film series were used for evaluation of facial bony injuries. Today, this has been supplanted by computed tomography (CT) with high-resolution, 3-dimensional (3D) images providing unparalleled accuracy of bony anatomy, particularly for operative planning. Ultrasound represents a relatively simple, noninvasive modality for evaluating bony facial trauma, without the radiation exposure of CT. With advances in high-resolution ultrasound,[6] imaging of deeper bony structures is possible. Limitations of ultrasound include the need for probe placement, which can be painful in the acute setting, and limited use in the setting of massive soft tissue edema.

Adeyemo and Akadiri[7] conducted a systematic review of the use of ultrasound in facial fracture diagnosis. Included were 17 articles; all but 1 are prospective in nature and included use of ultrasound in orbital (9 articles), midface (3 articles), nasal (3 articles), and mandible fractures (3 articles). Pooled analysis showed a high sensitivity and specificity for diagnosis of nasal fractures, orbital fractures, anterior maxillary wall fractures, and zygomatic arch fractures. Limitations of ultrasound were noted, including poor ability to image orbital floor fractures extending more than 4 cm from the orbital margin, inability to delineate multiple complex fractures, difficulty differentiating new fractures from old, and difficulty in detecting nondisplaced fractures. No strong evidence exists currently for the use of ultrasound in diagnosing mandible fractures, although the authors suggest that the use of ultrasound in detection of subcondylar fractures remains a promising area of investigation.

This demonstrated utility of ultrasound in facial fracture imaging not only has implications in diagnosis, but also in intraoperative assessment where the small footprint of the ultrasonography equipment represents an advantage over other imaging modalities.

Intraoperative Imaging for Facial Fracture Management, Level 2a

The possibilities of limiting postoperative imaging and reoperation, as well as the ability to assess unexposed buttresses, have led many facial traumatologists to use intraoperative imaging, particularly in complex and pan-facial fractures. There is, however, a lack of scientific evidence proving the superiority of intraoperative imaging. One must also consider cost and availability ($200,000–$850,000 for a portable CT scanner[8]), as well as the potential additional radiation exposure to the patient.

Among isolated facial fractures, zygomaticomaxillary complex (ZMC) fractures are uniquely challenging to the facial traumatologist. As 4 bony articulations are affected, the clinician must decide which, and how many, to expose in an effort to achieve appropriate reduction, balancing the potential increased morbidity associated with additional approaches. Van Hout and colleagues[9] reviewed intraoperative imaging (CT or ultrasound) for ZMC and orbital floor fractures, with 6 studies meeting inclusion criteria. The outcome measure of all studies was the frequency of additional reduction after the initial reduction was assessed intraoperatively. The pooled revision rates for zygoma fractures and orbital floor fractures were 18% (0%–54%) and 9% (0%–15%), respectively. The investigators note that the revision rate in the lone study using ultrasound for assessment of zygoma reduction was 54%, and if this study was omitted from analysis as an outlier, the remainder of the studies, using CT, had a revision rate of 11% (0%–20%). The investigators conclude that intraoperative imaging often affected surgical treatment, but none of the available studies evaluated functional and aesthetic outcomes related to the use of intraoperative imaging.

Further investigation is necessary to determine whether intraoperative imaging improves clinical outcomes in patients with facial trauma, but early experience is certainly promising.