Commentary on: The Role of Postoperative Imaging after Orbital Floor Repair

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Craniomaxillofac Trauma Reconstruction 2018;11:102–103

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This article was reviewed several times, and, as in an increasing number of articles recently processed by JCMFTR, the reviewers were widely divided in their opinions, with some for, and some against, publication.

Over the years of my practice, I have learned as much about better reductions from postoperative CT scans as I have from examination of the patients. Indeed, in a teaching setting, the residents commonly benefit from these discussions of fracture management, as do the attendings. We have routine conferences where the residents, the attending staff, and the radiologists all benefit from reviewing together preoperative and postoperative radiographic information.

Much debate has occurred, however, about the expense, value, and radiation exposure from these postoperative studies; certainly, they are indicated in the setting of postoperative problems for which the CT provides helpful information for clinical decision making.

More information on this debate is provided by high-volume centers where at least four centers have provided the information that intraoperative revision rates approach 20% when intraoperative CT scans are available.^{1–8} What is not known is the clinical importance of these revisions to patient outcomes and to improvements in the functional and aesthetic consequences of these revisions. We must assume, however, from presentations and publications, that those employing intraoperative CT scans find them essential to quality control, especially in the challenging case (Grant M, personal communication). References^{1–9} contain multiple additional references which are positive.

A recent publication summarizes what is known about these issues, and their significance¹:

“Six publications were found on the frequency of additional reduction after intraoperative imaging in ZMC fracture repair. Revision of the reduction of the zygoma was performed in 18% (95% CI 10.5%–29.0%), revision of the orbital floor was performed in 9% (95% CI 3.6%–17.2%). No publications were found on the effects of intraoperative

imaging on facial symmetry or on the accuracy of fracture reduction.

Conclusions: Information obtained from intraoperative imaging often has consequences on the surgical management of ZMC fractures. However, the effect on restoration of facial symmetry and fracture reduction is yet to be established.”¹

I think this publication is saying what the authors and I are saying, but each in quite different ways: while it is clear that one can improve results by study of postoperative imaging, and with intraoperative imaging studies, and one can revise and improve 10 to 20% of fracture reductions of the orbit and zygoma with intraoperative confirmation of reduction accuracy, the effects on function and appearance have yet to be determined with statistical significance.

Finally, errors in the reductions illustrated in this article (Figs. 1a–d) are seen in each of their figures of the patients “with and without complications,” and it is not known what the issues in these patients were, or whether the reduction variation was significant, or related to a complication, since the outcomes of these patients were not specified or illustrated. The number of patients they studied is 13/year, or just over 1/month, and the large number of residents and attendings participating in the care of these patients over a 10-year period would argue for a wide variation in data collection and clinical practice.

What is known from our experience at the University of Maryland Shock Trauma Unit, and the services of Plastic Surgery and the Wilmer Ophthalmological Institute at Johns Hopkins, is that the study of intraoperative and postoperative CT's combined with patient examinations will make more critical observers of surgeons and residents, and will improve their reduction accuracy and technique. It is also clear that with experience, one could certainly judiciously limit the use of these radiologic techniques to those which are necessary, increasing their value (cost-benefit-radiation exposure) in experienced hands.

References

- 1 van Hout WM, Van Cann EM, Muradin MS, Frank MH, Koole R. Intraoperative imaging for the repair of zygomaticomaxillary complex fractures: a comprehensive review of the literature. *J Craniomaxillofac Surg* 2014;42(08):1918–1923
- 2 Zimmerer RM, Ellis E, Aniceto GS, et al. A prospective multicenter study to compare the precision of posttraumatic internal orbital reconstruction with standard preformed and individualized orbital implants. *J Craniomaxillofac Surg* 2016;44(09):1485–1497
- 3 Zhang Y, He Y, Zhang ZY, An JG. Evaluation of the application of computer-aided shape-adapted fabricated titanium mesh for mirroring-reconstructing orbital walls in cases of late post-traumatic enophthalmos. *J Oral Maxillofac Surg* 2010;68(09):2070–2075
- 4 Rana M, Chui CHK, Wagner M, Zimmerer R, Rana M, Gellrich N. Increasing the accuracy of orbital reconstruction with selective laser-melted patient-specific implants combined with intraoperative navigation. *J Oral Maxillofac Surg* 2015;73(06):1113–1118
- 5 Gellrich N, Schramm A, Hammer B, et al. Computer-assisted secondary reconstruction of unilateral posttraumatic orbital deformity. *Plast Reconstr Surg* 2002;110(06):1417–1429
- 6 Schmelzeisen R, Gellrich NC, Schoen R, Gutwald R, Zizelmann C, Schramm A. Navigation-aided reconstruction of medial orbital wall and floor contour in cranio-maxillofacial reconstruction. *Injury* 2004;35(10):955–962
- 7 Kim JS, Lee BW, Scawn RL, Korn BS, Kikkawa DO. Secondary orbital reconstruction in patients with prior orbital fracture repair. *Ophthalmic Plastic and Reconstructive Surgery* 2016;32(06):445–447
- 8 Jung HN, Byun JY, Hyung-Jin K, et al. Prognostic CT findings of diplopia after surgical repair of pure orbital blowout fracture. *J Craniomaxillofacial Surg* 2016;44:1479–1484
- 9 Thai KN, Hummel RP, Kitzmiller WJ, Luchette FA. The role of computed tomographic scanning in the management of facial trauma. *J Trauma* 1997;43:214–217