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ABSTRACT SUBMISSION TITLE: *C5 - Patient-Specific Virtual Planning leads to Superior Symmetry for Post-Traumatic Deformity after Facial Fracture*

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Abstract Text:

PURPOSE:

Post-traumatic deformity after facial fractures is notoriously difficult to correct because of soft tissue contraction and loss of anatomic landmarks. Patient-specific virtual planning has been successfully used in head and neck reconstruction and orthognathic surgery. In order to study whether patient-specific virtual planning was also useful in post-traumatic facial deformity correction, we studied comparative groups for volumetric symmetry and patient satisfaction.

METHODS:

Post-traumatic facial deformity patients with displaced, healed zygomatic maxillary complex (ZMC) and orbital floor fractures were divided into 2 equal, consecutive groups: 1) No Virtual Planning (intraoperative on-table attempt to reposition ZMC based on contralateral malar projection-the 'eyeball test') and 2) Virtual Planning (3D CT scan mirrored-image ZMC repositioning with cutting guides and custom plates) over a 12 year period (n=28). Surgery involved complete soft tissue release and repositioning of

ZMC based on 'eyeball test' or mirrored position; in addition, orbital floor was reconstructed with an implant. Outcomes were compared using Volumetric affected-side to nonaffected-side comparison of hard tissue (CT scan immediately postoperative) and soft tissue (3D scanning at 6 months). For Patient satisfaction, Patient-Reported Outcomes Measurement Information System (PROMIS) surveys were used for psychosocial indicator assessment.

RESULTS:

The Group 1) No Virtual Planning (eyeball test) and 2) Virtual Planning (3D mirrored-image) were similar with preoperative volume deficiencies (cc vs cc), demographics, and comorbidities. No Virtual Planning (eyeball test) had greater deviation from perfect hard tissue volumetric symmetry (0cc) either under-correction (-4.3cc mean in 71%) or over-correction (3.9cc mean in 29%). By contrast, Virtual Planning (3D mirrored-image) had closer hard tissue symmetry with under-correction (-0.3cc mean in 14%) or over-correction (0.9cc mean in 86%). Soft tissue volumetric symmetry was also closer with Virtual Planning (3D mirrored-image). Orbital volumetric volume symmetry after orbital implant placement was also closer to the unaffected side in the Virtual Planning (3D mirrored-image). With regard to patient satisfaction, Psychosocial Indicators (PROMIS scores) were superior with Virtual Planning (3D mirrored-image) with: Anxiety (59.5+6.6 vs. 55.2+8.6), Depression (51.6+7.6 vs. 47.7+9.4), Meaning and Purpose (53.6+7.6 vs. 49.7+9.4) but were variable with other indicators.

CONCLUSIONS:

For post-traumatic facial deformity after zygomatic maxillary complex and orbital floor fracture, Virtual Planning (3D mirrored-image) had superior outcomes with regard to soft and hard tissue malar symmetry compared to No Virtual Planning (eyeball test).