Aesthetic Patient-Centric Approach to a Unilateral Zygomaticomaxillary Fracture: Computer-Guided Osteotomy of the Non-Injured Side

Chun-Shin Chang, MD; Yen-Chang Hsiao, MD; Jung-Ju Huang, MD; Jyh-Ping Chen, PhD; Philip Kuo-Ting Chen, MD; and Gavin Chun-Wui Kang, MD, MEng

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Facial asymmetry, malar flattening, loss of lateral and anterior facial projection, enophthalmos, and dystopia are the main aesthetic sequelae of injury to the zygomaticomaxillary complex.

A 24-year-old woman presented to us in February 2014, one month after a motorcycle accident causing a left displaced zygomaticomaxillary fracture that was not treated acutely as she initially had no access to tertiary care. She had no other injuries. Examination revealed mild left anterior malar depression and moderate loss of left facial anterolateral projection, but she otherwise had no enophthalmos, dystopia, diplopia, or other functional problems. Facial computed tomography (CT) scans showed an anterolateral zygomaticomaxillary fracture that was comminuted and depressed by about 7 mm, and orbital walls were intact (Figure 1).

We offered the patient open reduction and internal fixation of the left zygomaticomaxillary fracture adding that zygomaticic osteotomy might be required for reduction considering the late presentation. However she outright preferred the slimmer appearance of the injured side and instead desired symmetrical reduction of her broader more prominent right hemiface. We then proposed to her the patient-centric solution of a paradoxic right reduction malarplasty - with her clear understanding that this would mainly reduce and symmetrize right lateral facial projection with little effect on anterior projection, and that any shortfall on the left would be fat-grafted.

Using computer 3D software (Amira version 5.0, FEI Software, Hillsboro, OR) to mirror-analyze facial asymmetry on CT scans done at 6 months post-injury, the difference in anterolateral projection between injured and non-injured sides was determined to range from 6.2 to 7.2 mm (Figure 1). On this basis we planned for right reduction malarplasty rotating the segment inward then moving it posteriorly for approximately 5 mm.

We essentially performed an aesthetic malarplasty popularized in Asia for bizygomatic prominence via both a 1.5 cm vertical incision above the arch and a labiobuccal vestibular approach. The osteotomies were fixed in the desired position with plates and screws and any step was burred smooth. The left anterior malar shortfall, together with a palpable left infraorbital rim bony-step and any remnant right arch step, were easily addressed with 4 mL of abdominally-harvested autologous fat grafted using a microautologous fat transplantation (MAFT)-gun (Dermato-Plastica Beauty Co., Ltd, Kaohsiung, Taiwan).

At one year follow-up there were no complications and the patient verbally expressed she was very pleased with her appearance (Figure 2).

Drs Chang, Hsiao, Huang, Chen, and Kang are Attending Plastic Surgeons, Craniofacial Research Center, Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, Linkou, Taiwan. Dr Chen is a Professor of Engineering, Department of Chemical and Materials Engineering, College of Engineering, Chang Gung University, Taoyuan, Taiwan.

Corresponding Author:
Dr Gavin Chun-Wui Kang, 5 Fu-Hsing Street, Kuei Shan Hsiang, Taoyuan, Taiwan, ROC.
E-mail: gavinkangcw@yahoo.com
Figure 1. (A) Axial facial CT scan of a 24-year-old woman with left unilateral depressed zygomaticomaxillary fracture sustained one month prior. The patient preferred the slimmer appearance of the injured left hemiface and desired a symmetry procedure for the broader more prominent right hemiface. (B) Axial facial CT scan showing mirror image-mapping of the fractured left side onto the uninjured right side to measure the difference in projection to correct during right zygomatic reduction for symmetry. (C, D) 3D CT frontal views of the patient showing the left depressed zygomaticomaxillary fracture and 3D software mapping effects. (E, F) 3D CT oblique views showing the depressed zygomaticomaxillary fracture and 3D software mapping.

Figure 2. (A, C) Frontal and basal views of the same 24-year-old woman with left unilateral zygomaticomaxillary fracture before surgery showing a broader more prominent uninjured right hemiface compared to the slimmer left profile. (B, D) Frontal and basal views of the patient one year after computer-designed right reduction malarplasty and left facial fat-grafting to achieve harmonious symmetry. (E) Preoperative axial CT scan with mirror overlay, and postoperative one-year scan with mirror overlay (F) for comparison. Note the significantly improved symmetry of lateral facial projection. (G) Postoperative frontal 3D CT after contralateral malarplasty. Note the skeletal symmetry.
This unique case challenged our rooted conventional management paradigms of fixing the injured part of the face to restore normal appearance. In such East Asian societies as Taiwan, China, Korea, and Japan, a slim oval-shaped face is highly-prized as an aesthetic ideal by young women who may go to great lengths including zygomatic and mandible angle reduction to improve the appearance of a broad prominent and square short face. Prominent zygomas in East Asia are deemed masculine and give an aged look from illusory temporal and buccal hollowing. For this many techniques and their variations of zygomatic malarplasty have evolved. Therefore the preference of the patient for the appearance of the injured slimmer hemiface did not surprise us and triggered our ingenuity to match her right hemiface to what misfortune had oxymoronically improved on the left.

When faced with such opportune situations, we invite the craniofacial surgeon to explore this alternative patient-centric aesthetic approach to the unilateral zygomaticomaxillary fracture analyzing its aesthetic and functional impact and clearly considering the patient’s aesthetic preference. In the absence of any functional impairment on the injured side, and aligning with the cosmetic desires of the patient, one can perform paradoxical reduction malarplasty of the non-injured hemiface for aesthetic benefit and optimize patient satisfaction. This strategy is especially appropriate if the injured hemiface is significantly comminuted making ipsilateral osteotomy and reduction-fixation very challenging.

To achieve as accurate a reduction of the non-injured zygoma as possible and for overall harmonious symmetry, we recommend planning the malarplasty more objectively using computer 3D software or navigation. Any minor mismatch on the injured side can be precisely corrected with microautologous fat-transfer using the MAFT-gun, helping to restore youthful malar, buccal, and nasolabial volume, and iron out post-traumatic bony steps.

We believe this paradigm shift in concept of unilateral facial fracture management based on a patient-centric aesthetic approach will appeal highly to well-selected and especially female patients who incidentally desire a slimmer more aesthetic facial contour. Assessing the aesthetic outcome and satisfaction rate of this same approach when applied to large patient series would be the next goal.

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