



## TECHNICAL NOTE

### Journal Section

# A Novel Method in Restoring Form and Function Following Malunited Isolated Zygomatic Arch Fractures- A Technical Note

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#### Abstract

Isolated zygomatic arch fractures of the facial skeleton are rare. Blunt force to the cheek can result in an isolated zygomatic arch fracture, with resulting aesthetic issues such as indentations and functional impairments such as trismus. Symptomatic or visible isolated zygomatic arch fractures are commonly treated using either the Keen (intraoral) or Gillies (temporal) approaches to reduce the fracture while avoiding visible scars. Typically, the reduced fractures are not rigidly fixated but rather held in place by the native periosteal sleeve. However, cold fractures of the zygomatic arch are difficult to treat as they require a wide area of exposure for re-osteotomy and fixation. In the present technical note, we describe a novel technique to overcome this. Through a minimally invasive approach, two osteotomies were made proximally and distally to the fracture segment, and the segment was rolled 180 degrees along the sagittal axis. The medially depressed zygomatic arch is now projected laterally and was found to give adequate prominence and relieve restrictions in mouth opening. This is a novel method for reestablishing the prominence of the zygomatic arch and aiding in mandibular function following malunion of the fractured, isolated zygomatic arch.

#### KEYWORDS

Isolated Zygomatic Arch Fractures; Malunion; Trismus; Deformity

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## 1 | INTRODUCTION

A facial feature that affects both width and projection is the zygomatic arch. A single blow to the lateral cheek is usually the cause of isolated arch fractures.<sup>1</sup> If the fractures are not treated, functional deficiencies, asymmetry in the facial shape, and psychological effects

may occur.<sup>2</sup>

Trismus and poor mouth opening are reported to happen with an isolated zygomatic arch fracture.<sup>3</sup> We suggest an approachable, novel technique for raising the prominence of a fractured, depressed arch.

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## 2 | CASE STUDY

A 46-year-old woman claimed to have had a steel pole fall on her face and to have been experiencing discomfort on the left side of her face for the previous two weeks. Upon clinical examination, a noticeable depression was observed over the left zygomatic arch region. There was also mild mouth-opening restriction and minimal pain. A displaced, broken left zygomatic arch that was malunited was discovered by radiographic and CT examination (Fig. 1). The patient's left zygomatic arch fracture was scheduled for open reduction and internal fixation. The left side had a preauricular incision made, exposing the arch. The anterior portion of the arch's shattered segments was visible after blunt dissection was completed. Two bone osteotomy were made, one proximally and the other distally, to the depressed, displaced portion of the arch using piezotome equipment. When the cuts were made and the segment became mobile, it was rotated 180 degrees along its long axis (Fig. 2). This resulted in the concavity generated by the medial depression turning outward, resulting in convexity and projection (Fig. 3). After that then segment was secured using miniplates and layer wise closure was done. After review, the patient expressed satisfaction with the corrected form and had no new concerns about restricted mouth opening or pain.

## 3 | DISCUSSION

Ten percent of zygomatic bone fractures and five percent of all face fractures are isolated zygomatic arch fractures.<sup>4</sup> Patients with isolated zygomatic arch fractures frequently experience difficulties opening their mouth fully. This is explained by the coronoid process's free movement impinging on the arch medially.<sup>5</sup> Furthermore, in extreme situations, preauricular hollowing could be seen, which would be ugly because the zygomatic arch is so important to face aesthetics.<sup>6</sup> An isolated zygomatic arch fracture usually features two medially displaced bone segments that resemble an open gate rather than being comminuted. The zygomatic body anteriorly, the zygomaticotemporal suture line centrally, and the zygomatic root posteriorly are the locations of the three fractures. In order to reduce this isolated zygomatic arch fracture, force directed outward must be used to "close

the gate." When implanted from an intraoral (gingivobuccal) or Gillies (temporal) approach, an elevator may be employed for reduction.<sup>5</sup> However, the only available treatment option in "cold" cases of isolated arch fractures, where the fractured segments may have started the first phase of skeletal repair or even advanced to the stage of malunion, has been to surgically expose the segments and decrease the fracture after osteotomies. We tried a unique method in the case to restore the zygomatic arch's projection without requiring several osteotomies to remobilize all the individual fractured segments. Only two osteotomies, one proximal and one distal to the depressed region, were necessary to accomplish this. The depressed fractured segment was then rotated 180 degrees and fixed back to the arch, freeing it from its periosteal and soft tissue attachments. This effectively turned the previously concave hollow depression over the preauricular region into an adequate projection over the soft tissue in this area. The benefits include a shorter recovery period and maybe improved functional and aesthetic results because of the large increase in space that allows the coronoid process to move freely during mouth opening.

## 4 | CONCLUSION

After malunited isolated zygomatic arch fractures, this procedure may help determine the pre-traumatic zygomatic arch prominence and contour as well as mandibular function. To corroborate these findings, nevertheless, further cases involving a greater number of individuals are required.

### Acknowledgements

Nil

### Conflict of interest

The authors have no conflicts of interest to declare.

### Supporting Information

Additional supporting information may be found at the journal's website.

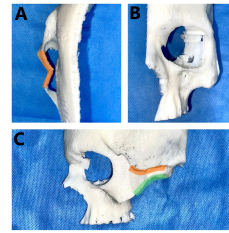
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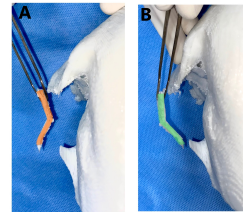
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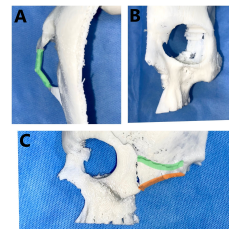
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**FIGURE 1** A) Superior view of left zygomatic arch showing malunited tripod fracture. B) Frontal view showing loss of prominence of the left zygomatic arch. C) Left lateral view showing depressed zygomatic arch. \*Anatomical superior border depicted in orange outline; anatomical inferior border depicted in green outline.



**FIGURE 2** A) Tripod fractured segment osteotomized proximally and distally and planned for 180° roll along the sagittal axis. B) Segment after roll. The anatomical lower border is now along the superior aspect.



**FIGURE 3** A) Superior view of left zygomatic arch showing restored prominence. B) Frontal view showing restoration of the prominence of the left zygomatic arch. C) Left lateral view showing the near-anatomic form of the zygomatic arch.