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CASE REPPORT
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ZBRINJAVANJE IZOLOVANOG PRELOMA ZIGOMATIČNOG LUKA KINOVIM PRISTUPOM: PRIKAZ SLUČAJA

MANAGEMENT OF ISOLATED ZYGOMATIC ARCH FRACTURE USING KEEN'S APPROACH: A CASE REPORT

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Sažetak

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Uvod: *Frakture zigomatične kosti spadaju među najčešće prelome u predelu srednjeg dela lica. Izolovane frakture zigomatičnog luka čine oko 10% svih fraktura zigomatične kosti.*
Materijal i metode: *U ovom radu prikazan je slučaj izolovane frakture zigomatičnog luka koja je tretirana primenom Keen-ovog pristupa.*
Rezultati: *Submentoverteksna radiografija pokazala je uspešnu repoziciju koštanih fragmenata u njihov anatomski položaj.*
Zaključak: *Keen-ov pristup predstavlja pouzdanu metodu u lečenju izolovanih fraktura zigomatičnog luka, jer omogućava adekvatnu repoziciju bez stvaranja vidljivih ožiljaka, čime se postiže i zadovoljavajući estetski rezultat.*

Ključne reči: *izolovana fraktura zigomatičnog luka, Keen-ov pristup, estetska procedura*

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Abstract

Introduction: *Zygomatic bone fractures are more prevalent among other associated midface fractures. Isolated fractures of the zygomatic arch comprise 10% of all zygomatic bone fractures.*
Matherials and methods: *This report presents a case of isolated zygomatic arch fracture which was treated through Keen's approach.*
Results: *The submentovertex radiograph revealed a successful reduction of the fractured fragments into its anatomical position.*
Conclusion: *Keen's approach is comparatively reliable method in the management of isolated zygomatic arch fracture without any scarring.*

Key words: *isolated zygomatic arch fracture, Keen's approach, cosmetic procedure*

Introduction

The zygomatic bone is formed by the lateral surface of the midface, inferior and the lateral orbital rims and the malar prominence, which constitutes its bony projection and facial width[1]. Zygomatic arch fractures comprise 10−15% of all facial fractures, and trauma being the most common etiological factor[1,2]. Patients with isolated zygomatic arch fractures present with a restriction in the mouth opening and painful lateral excursion of the mandible. Clinically, presents as a depression over the zygomatic arch. Management of isolated zygomatic arch fracture includes Gilles' temporal approach, Keen's vestibular approach, hooks elevation technique, intranasal transantral approach, sigmoid notch technique and modified lateral coronoid technique[3]. The present case report describes a fracture of an isolated zygomatic arch, which was surgically operated through Keen's approach under general anesthesia.

Case Presentation

A 25-year-old female reported to the Department of Oral Surgery with a complaint of pain and inability to close her mouth. The event history revealed that she had a fall from the bike 2 hours before the time of presentation. On inspection, abrasions on the right side of the face, arms and legs were elicited. Depression over the right zygomatic arch was evident, which signifies a zygomatic arch fracture. On palpation, tenderness was elicited over the right malar region and zygomatic arch. Submentovertex revealed a medially displaced fracture of the zygomatic arch (Figure 1).

According to Knight and North 1961, the present case was classified as group II arch fracture. Based on the clinical and radiographic interpretation, the present case was diagnosed as a right isolated zygomatic arch fracture, which was surgically planned for open reduction through Keen's approach. The authors certify that they have obtained written informed patient consent for images (the images enclosed in the current case report refers to authors: Dr. Balamurugan Rajendran and Dr. Karthik Kattur Premkumar) and other clinical information to be reported/published in the journal with an understanding that names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

***Figure 1*:** Submentovertex radiograph showing isolated fracture of the zygomatic arch on the right side

Surgical procedure

General anesthesia was administered through nasal endotracheal intubation. Standard painting and draping were done to ensure a sterile surgical procedure. Markings were placed for Keen's approach. A surgical incision measuring 1cm in length was placed in the right upper buccal sulcus behind the zygomatic buttress. Further dissection was carried out to contact the infratemporal surface of the zygomatic bone (Figure 2). The elevator was then inserted in position, and gentle force was applied to reduce the medially displaced zygomatic arch. Once the fracture was reduced, a click sound was heard, which indicates that the fracture segments are snapped back to its anatomical position. The reduction of the fracture was confirmed by palpating over the zygomatic arch. The surgical site was irrigated with povidone iodine and approximated with 4-0 Vicryl sutures.

Postoperative outcome

The postoperative outcome was uneventful. The patient was subjected to a submentovertex radiograph, which revealed successful approximation of the fracture fragments in their anatomical position without any discontinuity in the zygomatic arch (Figure 3).

Figure 2. Maxillary vestibular incision was initiated, and further dissection was performed to contact the infratemporal surface of the zygomatic bone

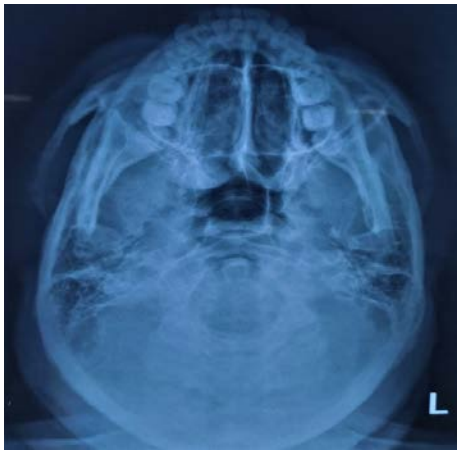

Figure 3. Submentovertex radiograph showing adequate reduction of the fracture segments in its anatomical position on the right side

Discussion

Zygomatic arch is often injured with trauma as the structure of the bone is long and thin, projecting outwards from the facial bones. Zygomatic arch fracture may be a single component when it is associated with other fractures of the midface. Isolated zygomatic arch fractures cause both cosmetic and functional disturbances when not intervened at the early stages[4]. In the present case, the authors have advocated the use of Keen's approach in the reduction of zygomatic arch fracture and postoperatively, a successful reduction was

achieved with good cosmetic results. The Gillies temporal approach is the most commonly employed method in combination with Keen's approach in the management of zygomatic arch fractures. The chances of damage to the middle temporal veins and the risk of hemorrhage may be a predominant drawback associated with the Gilles temporal approach[5].

Numerous alternative surgical treatment options for zygomatic arch fractures have been discussed in the English literature[1-3,6,10]. Bezuhly M et al.[6] performed Gillies' temporal approach combined with percutaneous fixation using Kirschner wire in the management of isolated zygomatic arch fracture. The author emphasized that although this technique restored the facial contour, there were certain disadvantages, including malar asymmetry and decreased sensation of the infraorbital nerve. However, Cohn JE et al.[1] claimed to have improvement in the zygomatic deformity, trismus and paresthesia of the infraorbital nerve with the use of the above technique.

Sorghabi W et al.[2] described a new technique in the management of zygomatic arch fracture using a percutaneous approach under local anesthesia. This technique was performed by placing a stab incision parallel to the skin tension line. Curved hemostatic forceps were then inserted through subcutaneous tissue and masseter muscle, reaching the deepest point of the fracture site. A curved dental elevator was then placed inside the pocket below the level of the fracture and meticulously reduced by pulling the elevator in a lateral motion. Further, the instrument was oriented along the entire length of the zygomatic arch to ensure adequate reduction and proper positioning of the fracture segments in its anatomical site. This technique offered a maximum mouth opening of 40 mm with no facial asymmetry. However, a visible scar was encountered at the incised site post-surgery.

Hayashi K et al.[3] utilized a modified towel clip method to reduce the zygomatic arch fracture and found that the authors have achieved an adequate reduction of the zygomatic arch with the favorable mouth opening of about 45 mm without any visible postoperative scars. The modified towel clip method is simple and minimally invasive technique, however, the events of encountering the associated nerves and blood vessels must be considered while performing such method of operation. Inclusion of C-Arm helps in acquiring adequate reduction of the zygomatic arch fracture intraoperatively. This method is of prime importance because C-Arm aids in better visualization and immediate monitoring of the reduced fracture, thereby eliminating the need for postoperative radiographs and imaging modalities[7,8].

Endoscopic guided reduction of arch fractures provides excellent visibility of the operating site, but the insertion of endoscopically assisted tools either through intraoral or extraoral approach may result in numerous postoperative complications such as damage to the neurovascular structures, infections and scar formation[3,9]. Krishnan B et al.[10] used dental forceps as an armamentarium in reducing the fracture of the zygomatic arch through Keen's approach. The author states that the use of dental forceps has brought a successful reduction of the fracture. However, a long delay during the reduction may lead to partial consolidation of the fracture fragments, causing difficulty in reducing the fracture through the intraoral method.

The employment of Keen's approach for the management of zygomatic arch fractures offers various advantages:

1. Keen's approach is advocated intraorally; hence, the use of extraoral intervention is eliminated.
2. The maxillary buccal sulcus incision is relatively simple and technically easier.
3. Intraoperatively, the technique involves minimal dissection and controlled bleeding.
4. The amount of force required to reduce the fracture is less and requires simple closure of the mucosa.
5. Highly cosmetic, as the scar line is not visible and lies within the maxillary vestibule.

Conclusion

The present case report illustrates the importance of Keen's approach in the surgical management of isolated zygomatic arch fracture. The Keen's approach using a maxillary vestibular incision is found to be a superior technique in providing adequate accessibility with definitive reduction and good cosmetic support.

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Conflict of Interest: Nil

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