ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 3, Issue – 2, April - 2020, Page No. : 16 - 22

Management of Zygomatic Arch Fractures by Gillies Temporal Approach: Case Series

[1]Dr. Mansi Dey, MDS Student, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[2]Dr. Amit Sarkar, MDS, Student, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[3]Dr. Udit Rohatgi, MDS, Student, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[4]Dr. Shivam Agarwal, MDS, Senior Lecturer, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[5]Dr. Vidhi C. Rathi, MDS, Reader, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[6]Dr. Gagan Khare, MDS, Professor, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

[7]Dr. Sanjeev Kumar, MDS, FRCS, Head of Department, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

Corresponding author: Dr. Mansi Dey, MDS Student, Oral and Maxillofacial Surgery, ITS Centre for Dental Studies and Research, Muradnagar, Ghaziabad, Uttarpradesh, India

Citation of this Article: Dr. Mansi Dey, Dr. Amit Sarkar, Dr. Udit Rohatgi, Dr. Shivam Agarwal, Dr. Vidhi C. Rathi, Dr. Gagan Khare, Dr. Sanjeev Kumar, "Management of Zygomatic Arch Fractures by Gillies Temporal Approach: Case Series", IJDSIR- April - 2020, Vol. – 3, Issue -2, P. No. 16 – 22.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Purpose: To evaluate the treatment outcomes of Gillies temporal approach in the management of displaced zygomatic arch fractures.

Materials and Method: We did a prospective study on 10 patients who underwent treatment of the zygomatic arch fractures by Gillies temporal approach. All the patients were evaluated postoperatively for the presence of complications like persistent infraorbital hypoaesthesia, fracture redisplacement, diplopia, enophthalmos, or residual facial asymmetry.

Results: All of them showed successful treatment outcome with normal facial width, and no postoperative complications or difficulty in mouth opening.

Conclusion: Closed reduction of zygomatic arch fractures by Gillies temporal approach is an effective treatment

modality requiring less intraoperative time and having minimal postoperative complications.

Keywords: Zygomatic arch fractures, Gillies temporal approach

Introduction

Zygomatic fractures are the most commonly encountered facial fractures next to nasal fractures, that need to be managed by the maxillofacial and plastic surgeons. They have been found to occur since 1650 B.C.[1]. Fractures of the zygomatic arch commonly occur along with other fractures of the zygomatico-maxillary complex, but they have also been known to occur separately[2]. About 5% of all facial traumas and 10% of zygomatic bone fractures are the isolated zygomatic arch fractures[3,4] and they occur as pond-like depression on the affected side of the face[5]. Zygomatic arch fractures are characterized by ecchymosis and edema in the periorbital region and buccal sulcus, facial asymmetry, trismus and pain. Severe pain does not occur commonly in zygomatic arch fractures unless the fractured segment is movable[6]. Most of the patients seek admission on account of limited mouth opening which is observed in 45% of the cases of zygomatic arch fractures[7] and occurs because the coronoid process gets seized up to the displacing part of the zygomatic arch inward during mouth opening[7,8]. Occipitomental view (or posteroanterior of waters) and submentovertex view(or of Hirtz) are the most commonly used diagnostic radiographs because of low cost and easy implementation[9,10]. The former helps in proper visualization of fractures in the zygomatic bone while the latter is most commonly used for the diagnosis of the zygomatic arch fractures.[6,10]. Computed tomography is also widely used, but it is not available in every institution[11].

A number of extra-oral as well as intra-oral approaches are available for the management of zygomatic arch fractures, such as Gilles temporal approach, percutaneous approach, bicoronal scalp flap approach, Dingman's or lateral supraorbital approach, upper eyelid, transconjunctival, infraciliary lower eyelid, and intraoral vestibular approaches such as Keen's and Quinn's approach[12-15]. Here we present a case series of displaced zygomatic arch fractures that were treated by closed reduction using Gillies temporal approach.

Materials and Method

This prospective cohort study was conducted between July 2018 to October 2019 in the department of Oral and Maxillofacial Surgery at ITS Centre for Dental Studies and Research. The study was conducted in accordance with The Code of Ethics of the World Medical Association(Declaration of Helsinki) and was approved by the institutional review board. Full case histories and written informed consent was obtained from the patients before the procedure.

The study population consisted of ten patients with the age ranging from 18-45 years.. All patients with displaced zygomatic arch fractures, either isolated or associated with other complex maxillary fractures, who were systemically healthy and were willing to come for follow-up were included in the study. Patients with undisplaced zygomatic arch fracture, having systemic conditions or those who were not willing to come for follow-up were excluded from the study. All the data were collected by a single researcher and then registered in a specific sheet. The variables that were analyzed are as follows:Gender, etiology of trauma, side of the fracture, type of treatment, presence of infraorbital hypoaesthesia, fracture redisplacement, diplopia, enophthalmos, residual facial asymmetry and lesions in the facial nerve. The occipitomental as well as submentovertex view were used to confirm the zygomatic arch fractures along with displacement of the fractured segment. Some at also come

with Computed Tomography scans of the face. All the patients underwent closed reduction by the Gillies temporal approach.

Surgical technique

The patients were treated under general anesthesia after the routine laboratory investigations and preanesthetic checkups had been done. For performing Gillies temporal approach, a 3x3cm area of hair was shaved approximately 2.5cm above and 2.5cm anterior to the helix of the ear. A cotton pellet was placed within the external auditory canal to prevent blood from entering during surgery. The bifurcation of superior temporal artery was identified to serve as landmark for incision(Fig.1). After local anesthetic with adrenaline was injected at the surgical site, marking for a 2.5cm incision was made at an angle running from anterosuperior to posteroinferior in the area previously shaved(Fig.1). It was made superior to the bifurcation of the superficial temporal artery so that both the branches could be avoided.

Fig.1:Identification of the bifurcation of the superficial temporal artery(black arrow) and marking of the incision(red arrow) for Gillies temporal approach

The incision was made along the marking through the skin and the subcutaneous tissue until the white glistening surface of the temporalis muscle was visualized(Fig.2a). Second incision was made through the temporalis fascia to the temporalis muscle, which could be found bulging out slightly through the incision(Fig.2b).

Fig.2a: Photograph showing the white glistening layer of the temporal fascia.b:Second incision made through the temporalis fascia to the temporalis muscle.

A flat periosteal elevator was then inserted deep to the temporalis fascia(between the fsacia and the muscle and it was swept anteriorly and posteriorly as the tip was moved inferiorly until the medial aspect of the zygomatic arch and the infratemporal surface of the body of the zygoma was felt. The instruments were made to glide freely in this plane because of the absence of dense attachment between the temporal muscle and temporal fascia. In cases with medially displaced zygomatic arch fractures, it was difficult to pass the instruments medially to the zygomatic arch. Hence in any such case the tip of the instrument was pressed medially until the medial aspect of the zygomatic arch was reached. After the periosteal elevator had done its work, it was removed and a Rowe zygomatic elevator was inserted medial to the zygomatic arch(Fig.3). The external handle was elevated firmly to apply force in an anterior, superior and lateral direction while the other handle was used to stabilize the working blade position. The elevation of the arch was accompanied by an audible crunch or a cracking sound.

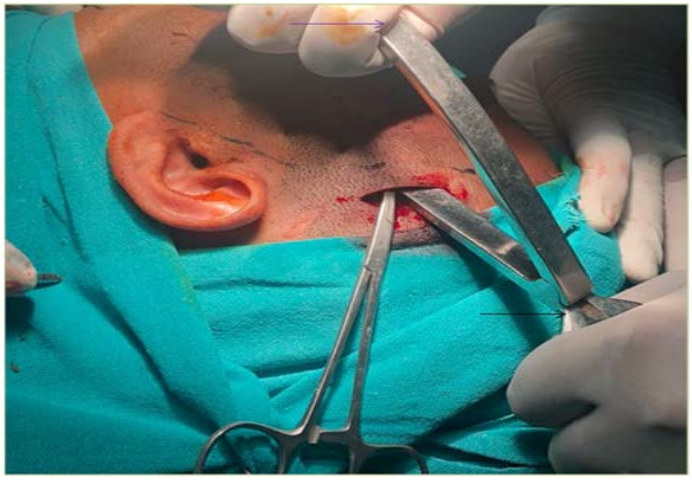

Fig.3:Elevating the zygomatic arch using Rowe zygomatic elevator. Elevating handle(purple arrow) indicates the position of the blade while the other handle(black arrow) is used for stabilization.

Results

A total of 10 patients were included in the study, out of which most of the subjects were male (90%,n=9), with a mean age of 30.9 years and road traffic accident was the major cause (60%,n=6) of injury(Table 1). The right and the left sides were equally affected(50%,n=5) and about half the patients of zygomatic arch fractures had other associated fractures of the zygomatico-maxillary complex(50%,n=5)(Table 1).

Table 1: Preoperative demographic data

N	Gender	Age	Etiology	Side	Concomitant zygomatic bone fractures
1	M	17	Motorcycle accident	L	Present
2	M	18	Workplace accident	R	Present
3	M	35	Automobile accident	L	Present
4	M	42	Sports accident	L	Absent
5	M	38	Domestic violence	R	Present
6	F	32	Motor cycle accident	R	Absent
7	M	28	Motor cycle accident	R	Absent
8	M	30	Motor cycle accident	L	Absent
9	M	24	Motor cycle accident	L	Absent
10	M	45	Interpersonal violence	R	Present

The operative time required in performing Gillies temporal method ranged from 15-20 minutes only and the time period for hospitalization following surgery ranged from 1-2 days.. There was no damage to the branches of the temporal artery in any of the cases. None of the patients complained of difficulty in mouth opening postoperatively and neither did they develop complications like persistent infraorbital hypoaesthesia, fracture redisplacement, diplopia, enophthalmos, or residual facial asymmetry. The facial width seemed to be normal in all the cases and hence no second surgery was

required. Postoperative radiographs also showed well-aligned zygomatic arches.

Discussion

Zygomatic arch projection is important not only for function but also for facial esthetics, as the facial width and projection of the cheek are dependent on it. Displaced zygomatic arch fractures cause flattening of the cheek, noticeable lateral depression of midface, and asymmetric reduction of facial width. Reduction of such fractures should be done in the first 1 to 2 weeks after the injury in adults, and within the first week in children[14] in order to avoid malunion and need for corrective osteotomies.

The Gilles temporal approach is a commonly used surgical technique for the reduction of zygomatic arch fractures, was first described by Gillies, Kilner and Stone (1937). It is quite simple method that hardly requires more than 15-20 minutes unless fixation techniques are necessary[16]. It also aids in concealing of the scar, protection of the facial nerve and reduces the postoperative hospitalization. It is asscociated with few complications. Some of the disadvantages are hemorrhage that can occur due to the encounter of the middle temporal veins during instrumentation, facial scar in the hairline and risk of facial nerve palsy.

In comparing the Gillies approach to open reduction and internal fixation for the management of displaced zygomatic complex fractures, some of the authors have found better results with the use of the latter in terms of long-term symmetry in projection, height, and lateral position[17,18]. However, the zygomatic arch was not specifically addressed in these studies and hence they cannot comment on the need for rigid fixation in this area. Also, open reduction with internal fixation has been found to be associated with a significantly more extensive surgical trauma, and should be preserved for comminuted fractures or those requiring further exposure of the zygomaticofrontal junction or the inferior orbital rim through coronal incision. Long term studies have shown that the Gillies method gives successful treatment outcomes with regard to stabilization and esthetic means[19-22].

Conclusion

Closed reduction of zygomatic arch fractures by Gillies temporal approach is an effective treatment modality requiring less intraoperative time and having minimal postoperative complications.

Ethical: The work done is in accordance with the Code of Ethics of the World Medical Association(Declaration of Helinski)

Patient consent: Written informed consent was obtained from all patients

References

1. Balakrishnan R. Versatility of Gillie's temporal approach in the management of ZMC fractures. Biomedical and Pharmacology Journal. 2015 May 2;7(1):253-6.2.
2. Hindin DI, Muetterties CE, Mehta C, Boukovalas S, Lee JC, Bradley JP. Treatment of isolated zygomatic arch fracture: Improved outcomes with external splinting. Plastic and reconstructive surgery. 2017 May 1;139(5):1162e-71e.
3. Kim J, Kim S, Chung S, Chung YK. Zygomatic arch fracture: a new classification and treatment algorithm with epidemiologic analysis. Journal of Craniofacial Surgery. 2014 Jul 1;25(4):1389-92.
4. Swanson E, Vercler C, Yaremchuk MJ, Gordon CR. Modified Gillies approach for zygomatic arch fracture reduction in the setting of bicoronal exposure. Journal of Craniofacial Surgery. 2012 May 1;23(3):859-62.

5. Tones GM, Speculand B. A splint for the unstable zygomatic arch fracture. British Journal of Oral and Maxillofacial Surgery. 1986 Aug 1;24(4):269-71.
6. Torres CS, Almeida DV, Neto NR, Oliveira MA, Sobrinho JB. Containment cerclage in fracture of the zygomatic arch: A case report. Rev Cir Traumatol Buco-Maxilo-fac. 2008;8:29-34.
7. Adam AA, Zhi L, Zu Bing L, Xing WZ. Evaluation of treatment of zygomatic bone and zygomatic arch fractures: a retrospective study of 10 years. Journal of maxillofacial and oral surgery. 2012 Jun 1;11(2):171-6.
8. Mermod M, Zweifel D, Hoarau R, Broome M. Isolated bilateral zygomatic arch fracture: an unusual pattern. Journal of Craniofacial Surgery. 2014 May 1;25(3):1111-2.
9. Vier FV, Marinho SA, Gabriel JG, Costa NP, Veeck EB, Warszawsky D. Sequela after zygomatic fracture reduction using Kirschner wire: A case report. Radiol Bras. 2005;38:157-60.
10. Cavalcante JR, Junior JR, Peixoto TS, de Albuquerque TT, Cavalcanti AL. Reduction and fixation of unstable fractures of the zygomatic arch: report of a series of cases. Journal of surgical technique and case report. 2015;7(2):29-31.
11. Sassi LM, Dissenha JL, Bezeruska C, Guebur MI, Hepp V, Radaelli RL, et al. Fractures of the zygomatic: Report of 50 cases. Rev Bras Cir Cabeç Pescoço. 2009;38:246–7.
12. Ellis E, Kittidumkerng W. Analysis of treatment for isolated zygomaticomaxillary complex fractures. Journal of oral and maxillofacial surgery. 1996 Apr 1;54(4):386-400.
13. Farber SJ, Nguyen DC, Skolnick GB, Woo AS, Patel KB. Current management of zygomaticomaxillary complex fractures: A multidisciplinary survey and literature review. Craniomaxillofacial trauma & reconstruction. 2016 Nov;9(04):313-22.
14. Ellstrom CL, Evans GR. Evidence-based medicine: zygoma fractures. Plastic and reconstructive surgery. 2013 Dec 1;132(6):1649-57.
15. Birgfeld CB, Mundinger GS, Gruss JS. Evidence-based medicine: Evaluation and treatment of zygoma fractures. Plastic and reconstructive surgery. 2017 Jan 1;139(1):168e-80e.
16. Dingman R. 0., and Natvig, P.: Surgery of Facial Fractures.
17. Czerwinski M, Martin M, Lee C. Quantitative comparison of open reduction and internal fixation versus the Gillies method in the treatment of orbitozygomatic complex fractures. Plastic and reconstructive surgery. 2005 Jun 1;115(7):1848-54.
18. Rohrich RJ, Watumull D. Comparison of rigid plate versus wire fixation in the management of zygoma fractures: a long-term follow-up clinical study. Plastic and reconstructive surgery. 1995 Sep;96(3):570-5.
19. Yamamoto K, Murakami K, Sugiura T, Fujimoto M, Inoue M, Kawakami M, Ohgi K, Kirita T. Clinical analysis of isolated zygomatic arch fractures. Journal of oral and maxillofacial surgery. 2007 Mar 1;65(3):457-61.
20. Poswillo D. Reduction of the fractured malar by a traction hook. British Journal of Oral Surgery. 1976 Jul 1;14(1):76-9.
21. Geijerstam B, Hultman G, Bergström J, Stjärne P. Zygomatic fractures managed by closed reduction: an analysis with postoperative computed tomography follow-up evaluating the degree of reduction and remaining dislocation. Journal of oral and maxillofacial surgery. 2008 Nov 1;66(11):2302-7.

22. Ellis E, El-Attar A, Moos KF. An analysis of 2,067 cases of zygomatico-orbital fracture. Journal of Oral and Maxillofacial Surgery. 1985 Jun 1;43(6):417-28.