



Rare Fracture of Coronoid Process Along with Zygomatic Complex Fracture- A Case Report

**Kalyani Bhate^{1*}, Deepak Kulkarni¹, S. N. Santhoshkumar¹, Kapil Kshirsagar²,
Vivek Pawar¹ and Ajit Bhagwat³**

¹Dr. D. Y. Patil Vidyapeeth's D. Y. Patil Dental College and Hospital, Pimpri, Pune-18, India.

²D. Y. Patil Dental School, Charoli Bk, Pune, India.

³M. A. Rangoonwala Dental College, Pune-01, India.

Authors' contributions

This work was carried out in collaboration between all authors. Author KB wrote the draft of the manuscript. Author SNS managed the literature searches. Authors KK and VP designed the figures, managed literature searches and contributed to the correction of the draft. Authors DK and AB provided the case, the figures and supervised the work. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJMPCR/2016/25429

Editor(s):

(1) Manuel Marques Ferreira, Area of Dentistry, University of Coimbra, Portugal.

Reviewers:

(1) Bhushan P. Mundada, Datta Meghe Institute of Medical Sciences, Wardha, India.

(2) Anonymous, Krishna Institute of Medical Sciences, India.

(3) Promila Verma, George Medical University, India.

(4) Samuel Ebele Udeabor, King Khalid University, Abha, Saudi Arabia.

Complete Peer review History: <http://sciencedomain.org/review-history/14563>

Case Study

Received 2nd March 2016

Accepted 3rd May 2016

Published 11th May 2016

ABSTRACT

Road traffic accidents (RTAs) are changing their presentations over the years, as the type of causative factors evolve. With advent of faster motorbikes and racing cars the RTAs with much greater impact are seen. The most commonly fractured facial bone is the mandible followed by maxilla, zygomatico-maxillary complex, orbital floor, naso-orbitoethamoidal complex, nasal and frontal. One of the important factors determining the success of treatment of midfacial fractures is early and correct diagnosis. Fractures of the coronoid process are uncommon and can easily be missed. The incidence of coronoid process fractures is 1% of all mandibular fractures analyzed. Moreover, the incidence of zygomatic fracture causing fracture of underlying coronoid process is extremely rare. Here we report a rare case of coronoid fracture accompanying zygomatic complex fracture, which was diagnosed solely due to clever 3D CT scan image interpretation.

*Corresponding author: E-mail: kalash4@rediffmail.com;

Keywords: Coronoid process fracture; zygomatic complex fracture; 3D computed tomography.

1. INTRODUCTION

According to National Crime Records Bureau Report, India recorded more number of deaths from road traffic accident (RTA) than any other countries in the world [1]. Every year 20–50 million people suffer from nonfatal injuries worldwide [2] and the most important cause of maxillofacial trauma is RTAs [3-5]. RTAs are changing their presentations over the years, as the type of causative factors evolve. With advent of faster motorbikes and racing cars the RTAs with much greater impact are seen. Although use of helmets does reduce the incidence of RTAs in motorbike riders, [6] people still resist its use causing varied and complex maxillofacial injuries. It is a challenge to maxillofacial surgeon to correctly diagnose and treat such varied and complex maxillofacial fractures. The most commonly fractured facial bone is the mandible followed by maxilla, zygomatico-maxillary complex, orbital floor, naso-orbitoethmoidal complex, nasal and frontal [5]. The prevalence and patterns of mandibular fractures most commonly were parasymphiseal followed by condyle and angle [7]. The most important factor determining the success of treatment of midfacial fractures, is early and correct diagnosis [8,9]. The 3D computed tomography (CT) scan is an important tool advised in initial investigations. CT scan is considered superior to conventional radiographs in diagnosing and assessing complex mid-face fractures [10].

Fractures of the coronoid process are rare and can easily be missed. The incidence of coronoid process fractures is 1% of all mandibular fractures analyzed [11,12]. Moreover, the incidence of zygomatic fracture causing fracture of underlying coronoid process is extremely rare. On our Pubmed search we found only three articles reporting similar fracture [13,14,15]. Here we report a rare case of coronoid fracture accompanying zygomatic complex fracture, which was diagnosed solely due to clever 3D CT scan image interpretation.

2. CASE IN DETAIL

A 20 year old male patient reported to the Department of Oral and Maxillofacial Surgery with a chief complaint of pain and swelling on the right side of his face. History revealed RTA with direct impact of his bike's handle to his face. On examination, diffuse swelling on right periorbital

region (Fig. 1); lacerations on right cheek and forehead were evident.



Fig. 1. Profile view showing diffuse swelling on right periorbital region and lacerations on right cheek

No apparent diplopia was seen. Tenderness was evident on right zygomatic arch region.

Trismus was also noted. The patient was prescribed anti-inflammatory medications. After 3 days, on palpation, right zygoma found depressed as compared to left side (Fig. 2). Patient was advised routine blood and urine investigations. In our institute, 3D CT scan is advised for all trauma patients as one of the initial investigations as routine protocol. Accordingly, 3D CT scan was advised for this patient. The 3D CT scan revealed a comminuted right zygomatic arch fracture accompanied by fracture of the coronoid process of the mandible (Fig. 3).

Under general anaesthesia, with Gillie's temporal approach, the zygomatic arch was elevated using Rowe's zygoma elevator (Fig. 4).

Intra-operative oral opening of 40 mm was achieved. Patient was followed up once a week for 1st month and once a month for next 6 months. Post-operatively, active physiotherapy was advised to avoid ankylosis of coronoid process to the zygomatic arch. Postoperative mouth opening remained 40 mm, which was maintained throughout the follow-ups. Follow-up CT scan after 4 months showed satisfactory healing of the zygomatic arch fracture and no ankylosis between the coronoid process and the zygomatic arch (Fig. 5). The coronoid process also showed satisfactory healing.

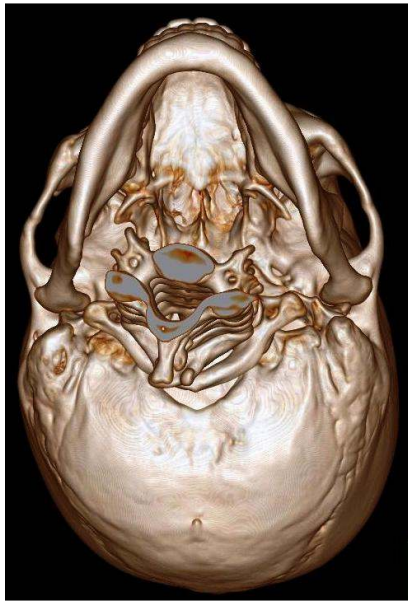


Fig. 2. Worm's eye view showing depressed right zygoma as compared to left side



Fig. 3. 3D CT scan revealed a comminuted right zygomatic arch fracture accompanied by fracture of the coronoid process of the mandible

3. DISCUSSION

Zygomatic arch fractures are the most commonly occurring fractures of the middle third of facial skeleton [16]. By virtue of its fracture, many important structures in infratemporal region are protected, including the coronoid process of mandible. Thus, only a direct and forceful impact of the face on that side can lead to fracture not

only of zygomatic arch but also underlying coronoid process of the mandible [13]. The coronoid process has attachment of the temporalis muscle, which has a very strong pull action to close the mandible. Thus, disturbance leading to dystonia of the muscle might lead to coronoid fracture and trismus [17].



Fig. 4. Gillie's temporal approach

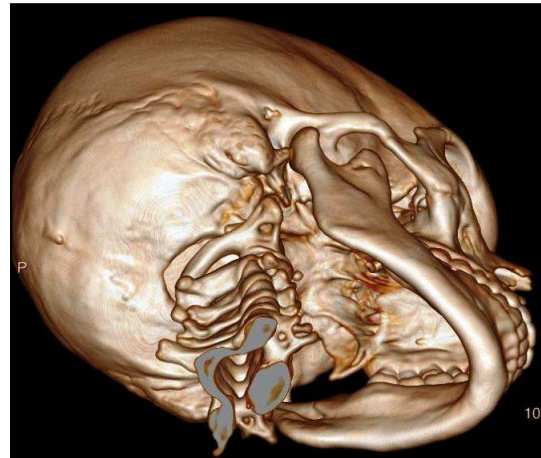


Fig. 5. 4 months follow-up CT scan showing satisfactory healing of the zygomatic arch fracture and no ankylosis between the coronoid process and the zygomatic arch

Conservative management is first recommended for such fractures with minimal displacement or restriction of mouth opening. For patients with significant fracture displacement and trismus, or with concomitant fractures of the zygoma, zygomatic arch, or mandibular ramus, open reduction and internal fixation (ORIF) via the modified retromandibular approach through the

posterior border of the parotid gland is an alternative method of treatment [18]. Though elevation of arch through Gillie's temporal approach is a tried and tested procedure, the comminuted nature of fracture makes it susceptible to movement. The coronoid fractures ankylose with some portion of delicately repositioned zygomatic arch. This remains a concern in postoperative phase [19]. Therefore, active physiotherapy for mouth opening has to be advised.

One of the important factors determining the success of treatment of midfacial fractures is early and correct diagnosis [8,9]. It is proved that CT scan is superior to conventional methods for the diagnosis of zygomatico-maxillary complex fractures for two reasons - first, since the exact diagnosis of displacement of each of the five major articulations of the zygoma can be evaluated better with CT scan and it facilitates best surgical approach selection [20] secondly, depression of zygomatic arch may trap the coronoid process of the mandible and this complication is more easily appreciated on CT scan [21].

4. CONCLUSION

We emphasize the use of 3D CT scan for zygomatico-maxillary complex fractures in routine diagnosis. Though rare, fracture of coronoid process should be ruled out in cases of zygomatico-maxillary complex fractures. We also emphasize active physiotherapy post-operatively, to avoid ankylosis of coronoid process to the zygomatic arch.

CONSENT

We, the authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images'.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Government of India. Ministry of Home Affairs. National Crime Records Bureau.

Accidental Deaths and Suicides in India; 2012.

[Last accessed on 2014 Jul 15].

Available: <http://www.ncrb.gov.in/CD-ADSI-2012/ADSI2012.pdf>

2. World Health Organization. Road Traffic Injuries. Fact Sheet; 2013. [Last accessed on 2014 Jul 15]. Available: <http://www.who.int/mediacentre/factsheets/fs358/en/>
3. Haug RH, Foss J. Maxillofacial injuries in the pediatric patient. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2000;90:126-134.
4. Aksoy E, Unlu E, Sensoz O. A retrospective study on epidemiology and treatment of maxillofacial fractures. *J Craniofac Surg.* 2002;13:772-775.
5. Motamedi MH, Dadgar E, Ebrahimi A, Shirani G, Haghghat A, Jamalpour MR. Pattern of maxillofacial fractures: A 5-year analysis of 8,818 patients. *J Trauma Acute Care Surg.* 2014;77(4):630-4.
6. Christian JM, Thomas RF, Scarbecz M. The incidence and pattern injuries in helmeted versus non-helmeted motorcycle accident patients. *J Oral Maxillofac Surg.* 2014;72(12):2503-6.
7. Barde D, Mudhol A, Madan R. Prevalence and pattern of mandibular fracture in Central India. *Natl J Maxillofac Surg.* 2014; 5(2):153-6.
8. Marciani DR, Gonty AA. Principles of management of complex craniofacial trauma. *J Oral Maxillofac Surg.* 1993;51:532-542.
9. Stoker DJ. Skeletal trauma-acute injuries. In: Murray RO, Jacobson HG, (eds). *The radiology of skeletal disorders.* London: Churchill Livingstone. 1977;1:200-207.
10. Tanrikulu R, Erol B. Comparison of computed tomography with conventional radiography for midfacial fractures. *Dentomaxillofac Radiol.* 2001;30:141-146.
11. Boole JR, Holtel M, Amoroso P, Yore M. 5196 mandible fractures among 4381 active duty army soldiers, 1980 to 1998. *Laryngoscope.* 2001;111:1691-6.
12. Boffano P, Kommers SC, Roccia F, Gallesio C, Forouzanfar T. Fractures of the mandibular coronoid process: A two centres study. *J Craniomaxillofac Surg.* 2014;42(7):1352-5.
13. Scrimshaw GC. Malar/orbital/zygomatic fracture causing fracture of underlying coronoid process. *J Trauma.* 1978;18(5):367-8.

14. Vanhove F, Dom M, Wackens G. Fracture of the coronoid process: Report of a case. *Acta Stomatol Belg.* 1997;94(2):81-5.
15. Boffano P, Kommers SC, Roccia F, Gallesio C, Forouzanfar. T Fractures of the mandibular coronoid process: A two centres study. *J Craniomaxillofac Surg.* 2014;42(7):1352-5.
DOI: 10.1016/j.jcms.2014.03.025
Epub 2014 Apr 3.
16. Iida S, Kogo M, Sugiura T, Mima T, Matsuya. 1502 patients with facial fractures. *Int J Oral Maxillofac Surg.* 2001; 30(4):286-90.
17. Mohanty S, Gulati U. Mandibular angle and coronoid process fracture secondary to orofacial dystonia: Report of a case. *Int J Orofacial Myology.* 2013;39:24-30.
18. Shen L, Li J, Li P, Long J, Tian W, Tang W. Mandibular coronoid fractures: treatment options. *Int J Oral Maxillofac Surg.* 2013;42(6):721-6.
19. Agarwal M, Gupta DK, Tiwari AD, Jakhar SK. Extra-articular ankylosis after zygoma fracture; A case report & review of literature. *Journal of Oral Biology and Craniofacial Research.* 2013;3(2):105-107.
DOI: 10.1016/j.jobcr.2013.05.003
20. Assael LA. Clinical aspects of imaging in maxillofacial trauma. *Radiol Clin North Am* 1993;31:209-220.
21. Gentry LR, Manor WF, Turski PA, Strother CM. High resolution CT analysis of facial struts in trauma: 2: Osseous and soft tissue complications. *Am J Roentgenol,* 1983;140:533-541.

© 2016 Bhate et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<http://sciencedomain.org/review-history/14563>