Bilateral elongated mandibular coronoid process in an Anatolian skull

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Abstract: Elongation or hyperplasia of coronoid process of mandible is rare condition characterized by abnormal bone development which cause malocclusion and the limited mouth opening. In this study, in an Anatolian skull, a case of bilateral elongation of mandibular coronoid process was presented. Levandoski panographic analysis was performed on the panoramic radiographie to determine the hyperplasia of the coronoid process. The right condylar process was exactly hyperplastic. The measurements of Kr-Go/Cd-Go were 95.10 mm/79.03 mm on right side and 97.53 mm/87.80 mm on left side. The ratio of Kr-Go/Cd-Go on the right side was 1.20. Elongated coronoid process is one of the factors cause mandibular hypomobility, it as reported here might lead to limited mouth opening. The knowledge of this variation or abnormality can be useful for the radiologist and surgeons and prevent misdiagnosis.

Key words: Mandible, Elongated coronoid process, Panoramic radiograph, Embryology, Coronoid process hyperplasia

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Introduction

Mandibular ramus has two processes (coronoid and condylar). The coronoid process projects upwards and slightly forwards as a triangular plate of bone. Its posterior border bounds the mandibular notch and its anterior border continues with mandibular ramus [1]. Although the coronoid process is not part of the temporomandibular joint, its hyperplasia or elongation can effect the mandibular movement [2]. The elongation of coronoid process of mandible is rare condition characterized by abnormal bone development which cause malocclusion or facial asymmetry and the limited mouth opening which was responsible to oral hygiene failure and pain [3-6]. In this condition, coronoid process consists of histologically normal bone [6]. It leads to impingement of the coronoid process on the body or arch of the zygomatic bone on opening of the mouth [5, 7].

This condition was firstly described by Lagenbeck in 1853 and a similar problem which was characterized by a synovial pseudoarticulation between zygoma and hyperplastic coronoid process was described by Jacob in 1899 [8]. It was seen in a large range of age from 3 to 78 [6] but was often in the 2nd–3rd decade [4, 6, 8]. The aetiology of the hyperplasia is not clear. Trauma, endocrine stimulus, hyperactivity of the masticatory muscles, pathological muscle tissue, heredity were suspected [5, 6, 9-12]. This study displays a new variant of bilateral elongation of coronoid process with different presentations in an Anatolian skull.

Case Report

The present case of elongation of the coronoid process was obtained as an incidental finding in adult skull from the Department of Anatomy, Medical Faculty, Ondokuz Mayıs University, Samsun, Turkey.

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University, Turkey. The coronoid processes of this mandible bilaterally, seen so longer than normal. We used panographic analysis for the bilateral case and took photographs (Figs. 1, 2). All of the measurements were taken by using a digital caliper. The length of coronoid was measured as distance between tip of the coronoid process and mandibular notch. The lengths of coronoid processes were 2.5 cm and 2 cm for right and left sides, respectively. The right coronoid process extended about 1.6 cm above the inferior rim of zygomatic arch. It was 1 cm for left coronoid process.

In our case, Levandoski panographic analysis [13] was performed on the panoramic radiographie to determine the elongation or hyperplasia of the coronoid process. We made a reconstruction with the dry mandible and a skull in the aim of taking the panoramic radiography to which we planned to apply the Levandoski panographic analysis. The mandible was articulated with the skull by the condylar process. To obtain the original teeth distance between mandible and maxilla on the front view, which was occured by the absence of teeth, we used a cotton tamponade which has average 15 mm thickness, than after we took the panoramic radiography (Fig. 3).

To perform the Levandoski panographic analysis [13], three reference points were taken condylion (Cd), gonion (Go) and koronion (Kr) and marked on the radiogram. After that, four lines were taken as follows: line 1, the maxillary vertical midline passing through the nasal septum; lines 2-3-4, perpendicular to the line 1, passing through the lower border of the mandibular symphysis, tip of the condyle and the tip of the coronoid process, respectively (Fig. 3). The measurements were taken from the tip of the condylar process and the tip of the condyle to the mandibular symphyseal line at vertical direction and the ratio of these two measurements (Kr-Go/Cd-Go) were obtained. The right condylar process was exactly hyperplastic. The measurements of Kr-Go/Cd-Go were 95.10 mm/79.03 mm on right side and 97.53 mm/87.80 mm on left side. The ratio of Kr-Go/Cd-Go on the right side was 1.20. The other bones of skull were normal.

**Discussion**

The elongation of the coronoid process was a rare condi-

![Fig. 1. Photograph showing of the left elongated coronoid processes (e) and zygomatic arch (z).](image1)

![Fig. 2. Photograph showing of the right elongated coronoid processes (e) and zygomatic arch (z).](image2)

![Fig. 3. Panoramic radiograph showing the determination of bilateral elongated coronoid process (Levandoski panographic analysis). In determination of the elongation of coronoid process, reference points: gonion (Go), koronion (Kr), and condylion (Cd). Reference lines: line 1, maxillary vertical midline passing through nasal septum; line 2, 3, and 4, lines perpendicular to line 1 and passing from the lower border of the symphysis of the mandible, tip of the condyle and the tip of the coronoid process, respectively.](image3)
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The variations in the number, mitotical activation and the rate of division of stemcells can effect ontogenetic and phylogenetic modification of mandibular morphology [21]. The
hyperactivity of the temporal muscle and evolutionary change in the mandibular morphology can cause elongation of coronoid process [21-23]. To our knowledge, the elongated coronoid process of skull that was determined, using Levandoski panoramic analysis has not been reported yet. Elongated coronoid process is one of the factors cause mandibular hypomobility [24], it as reported here might lead to limited mouth opening. The knowledge of this variation or abnormality can be useful for the radiologist and surgeons and prevent misdiagnosis.

References

1. Standring S. Gray’s anatomy: the anatomical basis of clinical practice. 40th ed. Edinburg: Churchill & Livingstone; 2008. p.530-2.
2. Hönig JF, Merten HA, Halling F, Korth OE. An X-ray study of the incidence of asymptomatic hypertrophy of the coronoid process. Schweiz Monatsschr Zahnmed 1993;103:281-4.
3. Lucaya J, Herrera M, Vera J. Unilateral hyperplasia of the coronoid process in a child: a cause of restricted opening of the mouth. Radiology 1982;144:528.
4. Mulder CH, Kalaykova SI, Gortzak RA. Coronoid process hyperplasia: a systematic review of the literature from 1995. Int J Oral Maxillofac Surg 2012;41:1483-9.
5. Pregarz M, Fugazzola C, Consolo U, Andreis IA, Beltramello A, Gotte P. Computed tomography and magnetic resonance imaging in the management of coronoid process hyperplasia: review of five cases. Dentomaxillofac Radiol 1998;27:215-20.
6. McLoughlin PM, Hopper C, Bowley NB. Hyperplasia of the mandibular coronoid process: an analysis of 31 cases and a review of the literature. J Oral Maxillofac Surg 1995;53:250-5.
7. Gibbons AJ. Case report: computed tomography in the investigation of bilateral mandibular coronoid hyperplasia. Br J Radiol 1995;68:531-3.
8. Capote A, Rodriguez FJ, Blasco A, Muñoz MF. Jacob’s disease associated with temporomandibular joint dysfunction: a case report. Med Oral Patol Oral Cir Bucal 2005;10:210-4.
9. Munk PL, Helms CA. Coronoid process hyperplasia: CT studies. Radiology 1989;171:783-4.
10. Zhong SC, Xu ZJ, Zhang ZG, Zheng YH, Li TX, Su K. Bilateral coronoid hyperplasia (Jacob disease on right and elongation on left): report of a case and literature review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e64-7.
11. Costa YM, Porporatti AL, Stuginski-Barbosa J, Cassano DS, Bonjardim LR, Conti PC. Coronoid process hyperplasia: an unusual cause of mandibular hypomobility. Braz Dent J 2012;23:252-5.
12. Ilguy M, Kursoglu P, Ilguy D. Three cases of elongated mandibular coronoid process with different presentations. Iran J Radiol 2014;11:e4031.
13. Kubota Y, Takenoshita Y, Takamori K, Kanamoto M, Shirasuna K. Levandoski panographic analysis in the diagnosis of hyperplasia of the coronoid process. Br J Oral Maxillofac Surg 1999;37:409-11.
14. Izumi M, Isoye M, Toyama M, Arijy Y, Gotoh M, Naitoh M, Kurita K, Arijy E. Computed tomographic features of bilateral coronoid process hyperplasia with special emphasis on patients without interference between the process and the zygomatic bone. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99:93-100.
15. Javid B. Unilateral hyperplasia of the coronoid process of the mandible: case report. Int J Oral Surg 1981;10:145-7.
16. Chauhan P, Dixit SG. Bilateral elongated coronoid processes of mandible. Int J Anat Var 2011;4:25-7.
17. El-Labban NG, Harris M, Hopper C, Barber P. Amianthoid fibres in muscle tissue associated with temporomandibular joint ankylosis. Ultrastruct Pathol 1986;10:571-6.
18. Charrier JB, Creuzet S. Embryology of the face and oto-mandibular dysplasia. Orthod Fr 2007;78:7-24.
19. Lee SK, Kim YS, Oh HS, Yang KH, Kim EC, Chi JG. Prenatal development of the human mandible. Anat Rec 2001;263:314-25.
20. Bareggi R, Sandrucci MA, Baldini G, Grill V, Zweyer M, Narducci P. Mandibular growth rates in human fetal development. Arch Oral Biol 1995;40:119-25.
21. Atchley WR, Hall BK. A model for development and evolution of complex morphological structures. Biol Rev Camb Philos Soc 1991;66:101-57.
22. Fernández Ferro M, Fernández Sanromán J, Sandoval Gutierrez J, Costas López A, López de Sánchez A, Etayo Pérez A. Treatment of bilateral hyperplasia of the coronoid process of the mandible. Presentation of a case and review of the literature. Med Oral Patol Oral Cir Bucal 2008;13:E595-8.
23. Isberg A, Isacsson G, Nah KS. Mandibular coronoid process locking: a prospective study of frequency and association with internal derangement of the temporomandibular joint. Oral Surg Oral Med Oral Pathol 1987;63:275-9.