e-GiGi 2027; Volume 15, Nomor 1: 53-58
DOI: https://doi.org/10.35790/88dre225
URL Homepage: https://ejournal.unsrat.ac.id/index.php/egigi

Rare Bilateral Maxillary Buccal Exostosis in Postmortem Forensic Odontology Examination: A Case Report

Nadilla I. Wahyu,[1] Elza I. Auerkari,[1] Valentinus Yudy[2]

[1]Division of Forensic Odontology, Department of Oral Biology, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia
[2]Department of Forensic Medicine and Medicolegal Studies, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
Email: eiauerkari@yahoo.com
Received: June 19, 2026; Accepted: August 10, 2026; Published online: August 15, 2026

Abstract: In forensic odontology the intraoral examination is usually conducted for the purpose of identification and the coincidental oral findings that can give information into the systemic health history of the deceased are easily missed out. Oral exostoses are benign alveolar bony outgrowths, but the maxillary buccal variant is uncommon, and a bilateral presentation reaching the anterior region is rarely documented. These outgrowths occur more frequently in end-stage renal disease, suggesting a link to disordered bone metabolism. We reported a 65-year-old male with a history of kidney disease received for forensic examination after being found deceased. Intraoral examination revealed bilateral hard bony protrusions on the buccal alveolar bone of the maxillary anterior to premolar region, consistent with maxillary buccal exostosis, together with porcelain-fused-to-metal restorations, generalized calculus, and poor oral hygiene. In conclusion, this case shows that a comprehensive intraoral examination can turn an easily missed finding into information about the victim's biological profile and health history. The coexisting renal disease points to a possible contribution from the mineral and bone disorder of chronic kidney disease (CKD-MBD), although confirmation was limited by the absence of laboratory, radiographic, and histopathological data.
Keywords: forensic odontology; maxillary buccal exostosis; oral exostoses; renal osteodystrophy

INTRODUCTION

The role of forensic odontology in victim identification includes age estimation, determination of sex, and determination of race thru the analysis of dental characteristics. However, a thorough intraoral examination is not limited to those identification parameters. Other clinical findings in the oral cavity, whether pathological, traumatic, or incidental, can provide information about the health history, systemic conditions, and habits of the victim during their lifetime.[1] International Organization for Forensic Odonto-Stomatology (IOFOS) (2018) designed Standard Operating Procedures (SOPs) regarding quality assurance in forensic odontology reports, stating that clinical findings discovered outside the primary examination request must still be reported if deemed significant to the case, emphasizing that a comprehensive intraoral examination is an internationally recognized standard in forensic odontology practice.[2]

Oral exostoses are one of the incidental findings that can be encountered during an intraoral examination. Oral exostosis is a benign non-pathological and generally asymptomatic bone growth produced by the cortical bone of the maxillary or mandibular alveolar [3]. Oral exostoses are classified in several variants based on their anatomic location. The most commonly reported variants are torus palatinus on the midline of the palate and torus mandibularis on the lingual aspect of the mandible.[4] On the other hand, the exostosis on the buccal of the maxilla, called the maxillary buccal exostoses, is a relatively rare entity.[3] Buccal exostosis was described as "a rare entity" by Medsinge et al (2015),[3] and Aljalali et al (2019)[5] reported that exostosis in the anterior maxilla was a rarer variant than the more common posterior premolar-molar location.

Epidemiological studies report the prevalence of oral exostosis in general population to be between 8% and 51% in maxilla and between 6% and 32% in mandible. Maxillary buccal exostosis is the rarest variant among all the anatomical locations.[3] Meanwhile, the prevalence of exostosis in hemodialysis patients is 28.9% to 33.6% in the chronic kidney disease population, a higher figure than the general population. [6,7]

In a male cadaver with a history of kidney disease, bilateral maxillary buccal exostoses were discovered in the anterior premolar region of the maxilla during an intraoral forensic examination, as described in this case report. The aim of this report is to discuss the significance of the findings in the context of forensic examination, and to address the relationship between the underlying systemic condition and the observed clinical features.

CASE REPORT

On Wednesday, January 14, 2026, Dr. Cipto Mangunkusumo National Referral Hospital received the body of a 65-year-old Chinese male. The body was found deceased in his apartment room by the victim's son. Based on the statement from the victim's son, the victim had a history of kidney disease and heart complications and had undergone surgery. The body was then subjected to an external examination by a team of forensic pathologists and forensic odontologists.

Based on the extraoral examination, rigor mortis was found throughout the entire body, easily reversible. Bruises on the corpse are found on the entire back of the body, purple in color, disappearing upon pressure. Wounds were found on the lips, bruises on the face, chest, and the right upper and lower limbs due to recent blunt force trauma. Additionally, old blunt force trauma bruises were found on all four limbs.

Based on the intraoral examination, on the right buccal mucosa, there are two bruises with a reddish-purple color, each measuring 1x0.5 cm and 0.8x0.8 cm. On the right side of the tongue, there are two bruises, each measuring 0.5x0.8 cm and 0.8x0.8 cm, with a reddish-purple color (Fig.1a). On teeth 11, 21, and 22, porcelain fused to metal (PFM) dentures are visible, as well as stains and calculus on all teeth, indicating poor oral hygiene (Fig. 1b). A round protrusion with a hard consistency is observed on the alveolar bone of teeth 14, 13, 12, 22, and 23. (Fig.1c). The cause of death for the victim could not be determined because an autopsy was not performed.

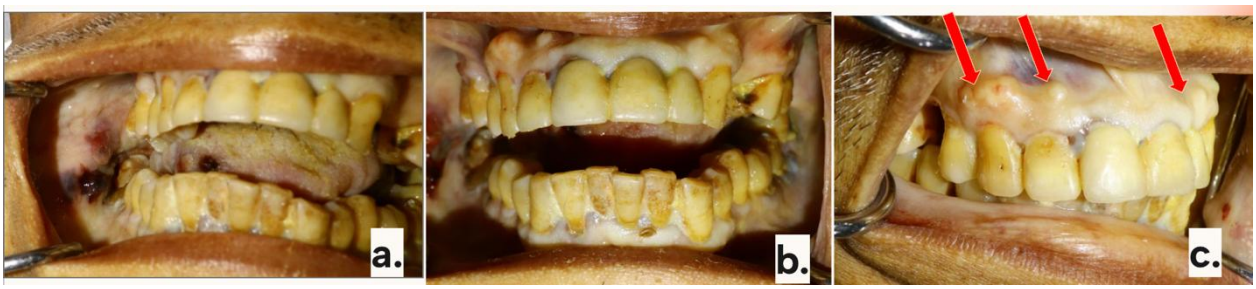

Figure 1. Intraoral examination findings: (a) contusions on the right buccal mucosa and right lateral tongue with reddish-purple discoloration; (b) porcelain fused to metal (PFM) restorations on teeth 11, 21, and 22, with generalized staining and calculus deposits; (c) hard bony protrusions on the alveolar ridge in the region of teeth 12, 13, 14, 22, and 23.

DISCUSSION

Incidental findings such as oral bony outgrowths carry forensic value in several ways. In forensic odontology they are recognized as supplementary markers that may aid human identification when primary identifiers are unavailable, owing to their rarity and their documentation in dental records.[8] In the present case, their main contribution lies in reconstructing the victim's biological profile and health history. Together with the poor oral hygiene, calculus deposits, and porcelain-fused-to-metal restorations recorded on examination, the bilateral buccal exostosis adds to a picture of the victim's antemortem oral condition, while its possible link to a history of renal disease connects an oral finding to an underlying systemic one. Documenting such findings, even when unrelated to the cause of death, follows the IOFOS standard that significant.

The reported contusions on the buccal mucosa and tongue, which are also present externally, exhibit a variation of colour changes from reddish purple to more subtle colours. This feature can be used to approximate the timing of the trauma. Estimating a bruise's duration based only by its colour has been recognised as inaccurate, dependent on aspects such bruise depth, and unique tissue characteristics that determine the rate and pattern of colour changes.[9]

In addition to the determination of the age of the injury the contusion also has forensic value as a sign of vital reaction. Hemorrhagic infiltration is usually considered in physical examination as a sign of vitality of the person at the moment of the injury, but it is not a fully reliable sign, because extravasation of red blood cells may also occur after death and requires additional histological or molecular markers for definitive evidence of vitality.[10]

The bruises on the right buccal mucosa and the right side of the tongue in this case are consistent with the distribution of the new extraoral blunt trauma, which is also localised in the right side of the face and the right upper and lower limbs. The tongue injury is also consistent with a bite injury due to the fast and forceful closure of the jaw at the time of contact and the tongue injury is opposite adjacent teeth. This further supports the possibility of a single traumatic incident to the right side of the body.

The features of present case i.e., bilateral exostoses, anterior maxillary location and only buccal side involvement, represent an unusual situation as compared to other reported cases of oral exostoses. In a retrospective study of 1,242 individuals from the Mississippi population, Wilson et al[4] reported that 303 individuals (24.4%) had been documented with maxillary and/or mandibular exostoses. Exostosis localized only to the mandible was the most common among all diagnosed cases (64.4%), followed by involvement of both the jaws (25.7%), and exostosis limited to the maxilla was only seen in 9.9% of cases. Exostosis was more common in females (57.4%) than in males (42.6%). Highest distribution was found in Caucasian population (71.3%) followed by African-Americans (23.8%) and Asians (5%). This data supports that the bilateral distribution of maxillary buccal exostosis in the anterior to premolar region found in this case as reported by Aljalali et al[5] is a very rare presentation in terms of both anatomical location and the distribution of involved jaw.[4,5]

There are several features of this case which further support its rarity. Bilateral exostosis in the posterior maxilla region was described as a "uncommon" finding by Costa et al.[11] The anterior maxilla region is even a rarer variant than the more common posterior.[5] Thus, bilateral location, involvement of the anterior region up to the premolars, and systemic context of a history of renal disease make this a very rare presentation in the forensic odontology literature.

At this time, the exact cause of oral exostosis is not known. However, evidence from several studies has pointed out that the condition is multifactorial, involving genetic factors, environmental exposure as well as systemic conditions or comorbid diseases.[4,7,12] Exostosis is highly heritable with genetic predisposition. Auškalnis et al[13] have shown the prevailing influence of this factor in a study of twins, where the genetic predisposition to exostosis was associated with an autosomal dominant pattern of inheritance. Moreover, molecular studies have defined particular genes involved in this genetic susceptibility. Buccal exostoses and tori are oral exostoses that have been associated with variants in the DVL3 gene, possibly by interfering with signal pathways important for the development of dentoalveolar structures.[14]

Although genetic factors play a major role, this condition cannot manifest on its own without external triggers. The relationship between genetic factors and external triggers is explained through the quasi-continuous genetic theory or threshold theory. Environmental factors must first reach a certain threshold level before the gene carrying this exostosis can be expressed in the individual.[12] One of the environmental factors believed to trigger this excessive bone growth is the functional response to an abnormally increased masticatory force on the teeth. High occlusal pressure, such as bruxism, causes the body to attempt to strengthen the bone trabeculae to adapt to that pressure.[3,4,15]

Beyond mechanical factors, systemic conditions such as chronic kidney disease (CKD) may also influence alveolar bone formation through a spectrum of mineral and skeletal disturbances collectively termed CKD–Mineral and Bone Disorder (CKD-MBD), of which renal osteodystrophy (ROD) is the bony component.[6,16,17] In this process, declining renal function disrupts mineral homeostasis, mainly through phosphate retention and reduced conversion of vitamin D to its active form, which promotes hypocalcemia. Persistent hypocalcemia continuously stimulates the parathyroid glands to secrete excessive parathyroid hormone, a state known as secondary hyperparathyroidism. Elevated parathyroid hormone levels increase osteoclastic and osteoblastic activity, which leads to changes in bone remodeling and may result in changes in the skeleton including the maxillofacial region. CKD-MBD develops along a continuum that begins in the intermediate stages of kidney disease, well before dialysis, so its relevance is not limited to dialysis populations.[6,16,18]

It has been proposed that the development of oral exostoses in patients with renal failure may be a clinical manifestation of disordered jawbone mineral metabolism.[19] This association, however, should be taken with caution because the relationship between hyperparathyroidism and exostosis formation is still debated. Chao et al[6] and Hsu et al[20] did not find any statistically significant difference of intact parathyroid hormone levels in dialysis patients with and without oral tori. This suggests that secondary hyperparathyroidism is unlikely to act as a sole trigger but rather indicates a more complex interplay within the uremic milieu More specific biochemical predictors to support this view were also provided by Tai et al[7] who reported that the occurrence of torus palatinus was significantly associated with increased serum phosphate and decreased bicarbonate. These findings suggest that the formation of exostosis in patients with advanced renal impairment probably is due to the combined effect of systemic mineral imbalance and mechanical occlusal stress, rather than any one hormonal factor.[6,7,19]

In the present case, the victim was reported by his son to have a history of kidney disease. Because the stage of the disease, dialysis status, and biochemical parameters could not be objectively confirmed, the contribution of a mineral metabolism disorder to the observed maxillary buccal exostosis remains a hypothesis rather than an established cause. Nevertheless, the reported renal history makes it plausible that disturbances along the CKD-MBD spectrum were present and

may have lowered the threshold of alveolar bone adaptation to routine functional loading.

The strength of this association is illustrated by the high prevalence of oral exostoses reported in patients with end-stage renal disease compared with the general population. It should be noted that these data derive from studies of torus palatinus and torus mandibularis, which belong to the same family of oral exostoses as buccal exostosis but differ in anatomical location, so the figures are not direct measures of buccal exostosis prevalence. Sisman et al[19] reported a torus palatinus prevalence of 41.7% among end-stage renal disease patients receiving peritoneal dialysis, markedly higher than the 4.1% reported for the general population in the same region,[21] and found that longer dialysis duration was significantly associated with larger lesions (P=0.009). Comparable findings were reported for combined oral tori by Hsu et al[20] at 42.5% in peritoneal dialysis patients and by Chao et al[6] at 33.6% in hemodialysis patients, while the larger cohort of Tai et al[7] showed a torus palatinus prevalence of 28.9%. These figures describe a consistent association within advanced uremic conditions. They cannot be directly generalized to the present case, in which dialysis status was not confirmed and the lesion was a buccal rather than a palatal or lingual exostosis, but they do illustrate the biological plausibility of a renal contribution to excessive alveolar bone growth.

CONCLUSION

A comprehensive intraoral examination allows incidental findings such as buccal exostosis to be captured and reported, contributing to the reconstruction of the victim's biological profile and health history. Because exostoses are clinically similar to other bony conditions such as osteoma, careful evaluation is needed, and definitive confirmation would require radiographic or computed tomography assessment and, where possible, histopathological examination, none of which were available in this case. The reported history of kidney disease further raises the possibility that disturbances within the CKD-MBD spectrum contributed to this bone growth, although this remains a hypothesis. These limitations underline the need for systematic documentation of oral anatomical variations, supported by autopsy photography and standardized postmortem records, so that significant incidental findings can be reliably reported and correlated with the victim's systemic health history.

Conflict of Interest

The authors declare no conflict of interest regarding this study.

REFERENCES

1. Avon SL. Forensic odontology: the roles and responsibilities of the dentist. Journal of the Canadian Dental Association. 2003;70(7):453-8. Available from: https://pubmed.ncbi.nlm.nih.gov/15245686/
2. IOFOS Recommendations for Quality Assurance: Quality Assurance in Forensic Odonto-Stomatology. ODY identification. Single Case. Available from: https://iofos.eu/quality-assurance/
3. Medsinge SV, Kohad R, Budhiraja H, Singh A, Gurha S, Sharma A. Buccal exostosis: a rare entity. J Int Oral Health. 2015;7(5):62-4. Available from: https://pubmed.ncbi.nlm.nih.gov/26028907/
4. Wilson L, Snyder D, Griggs J, Kurt-Bayrakdar S, Bayrakdar İŞ, Jagtap R. The Prevalence of Maxillary and Mandibular Exostosis in the Mississippi Population: a retrospective study. Surgeries. 2025;6:17. Doi: https://doi.org/10.3390/surgeries6010017
5. Aljalali HM, Elmurtadi AM. Rare case of bilateral maxillary buccal exostosis in the anterior region of Libyan female patient: case report & literature review. Al-Mukhtar Journal of Sciences. 2019;34(3):165-71. Doi: https://doi.org/10.54172/mjsc.v34i3.274
6. Chao PJ, Yang HY, Huang WH, Weng CH, Wang IK, Tsai AI, et al. Oral tori in chronic hemodialysis patients. BioMed Res Int. 2015;2015:1–7. Doi: https://doi.org/10.1155/2015/897674
7. Tai SY, Hsu CL, Tsai AI, Chang CC, Wang IK, Weng CH, et al. Survey of torus palatinus in patients with end-stage renal disease undergoing hemodialysis. BioMed Res Int. 2018;2018:1–8. Doi: https://doi.org/10.1155/2018/1356910
8. Amin AHR, Auerkari EI. Torus palatinus and torus mandibularis as supplementary indicators in forensic human identification: a systematic review. Bulletin of the International Association for Paleodontology.

2025;19(2):137-47. Available from: https://ojs.srce.hr/paleodontology/article/view/37254
9. Stam B, Van Gemert MJC, Van Leeuwen TG, Aalders MCG. How the blood pool properties at onset affect the temporal behavior of simulated bruises. Med Biol Eng Comput. 2012;50:165–71. Doi: https://doi.org/10.1007/s11517-012-0860-5
10. Li N, Du Q, Bai R, Sun J. Vitality and wound-age estimation in forensic pathology: review and future prospects. Forensic Sci Res. 2020;5(1):15–24. Doi: https://doi.org/10.1080/20961790.2018.1445441
11. Costa ALL, Batista ALM, Costa SFDS, Bastos JV, Milagres RMC, Amaral TMP. Uncommon bilateral maxillary exostosis: case report. RGO, Rev Gaúch Odontol. 2020;68:e20200024. Doi: https://doi.org/10.1590/1981-86372020000242018 0026
12. Smitha K, Smitha GP. Alveolar exostosis – revisited: a narrative review of the literature. The Saudi Journal for Dental Research. 2015;6:67–72. Doi: https://doi.org/10.1016/j.sjdr.2014.02.001
13. Auškalnis A, Bernhardt O, Putnienė E, Šidlauskas A, Andriuškevičiūtė I, Basevičienė N. Oral bony outgrowths: Prevalence and genetic factor influence. Study of twins. Medicina (Kaunas). 2015;51(4):228–32. Doi: https://doi.org/10.1016/j.medici.2015.07.001
14. Kantaputra P, Bunpiem N, Guven Y, Tripuwabhrut K, Kalayci T, Imren E, et al. Genetic variants in DVL3 are associated with root maldevelopment, tooth agenesis, mesiodens, and oral exostoses. International Dental Journal. 2026;76(1):104019. Doi: https://doi.org/10.1016/j.identj.2025.104019
15. Rocha LM. Mandibular torus as a potential piece in the human remains identification puzzle. Egyptian Journal of Forensic Sciences. 2025;15(25). doi:10.1186/s41935-025-00442-4
16. Demenech LM, Cepeda IVB, Orcina BDF, Nachtigal CF, Langlois CDO, Torriani MA, et al. Renal osteodystrophy in the oral and maxillofacial region: a case report and literature review. J Oral Diagn. 2025;10:e316. Doi: https://doi.org/10.5327/2525-5711.316
17. Lopes JR, Queiroz SBBDS, Fernandes MM, Paiva LASD, Oliveira RND. Age estimation by teeth periodontosis and transparency: accuracy of Lamendin's method on a Brazilian sample. Braz J Oral Sci. 2014;13(1):17–21. Doi: https://doi.org/10.1590/1677-3225v13n1a04
18. Kaushik A, Kaushik M. Maxillofacial radiographic changes in renal osteodystrophy. Journal of Parathyroid Disease. 2016;4(1):14-6. Available from: https://jparathyroid.com/Article/JPD_20160410104447
19. Sisman Y, Gokce C, Sipahioglu M, Ertas ET, Unal A, Oymak O, et al. Torus palatinus in end-stage renal disease patients receiving peritoneal dialysis: Does renal osteodystrophy play a role? Journal of Dental Sciences. 2012;7(2):154–8. Doi: https://doi.org/10.1016/j.jds.2012.03.012
20. Hsu CL, Hsu CW, Chang PC, Huang WH, Weng CH, Yang HY, et al. Oral tori in chronic peritoneal dialysis patients. PLoS ONE. 2016;11(6):e0156988. Doi: https://doi.org/10.1371/journal.pone.0156988
21. Sisman Y, Ertas ET, Gokce C, Akgunlu F. Prevalence of torus palatinus in Cappadocia region population of Turkey. Eur J Dent. 2008;2(4):269–75. Doi: https://doi.org/10.1055/s-0039-1697391