Impacted canine in a prehistoric skull

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Maxillary permanent canine impaction is a common condition. Moyers[1] believes that all teeth can be impacted. However, third molars, maxillary canines, maxillary and mandibular premolars, and maxillary central incisors are the teeth most frequently involved. Dachi and Howell[2] recorded the impaction of maxillary canines in 0.92% of subjects studied, and Ericson and Kurol[3] found twice as many impactions, 1.7%, in females.

The relatively common impaction of the maxillary canines is due to their prolonged development and meadering pathway from the point of formation (laterally to fossa piriformis) through the final position in the occlusion.[4] Around the age of 3, the canine is located high in the maxilla, with its crown directed mesially and slightly lingually. It descends gradually, becoming erect as it moves, until it reaches the level of the lateral incisor root where it assumes an almost vertical position.[1] Quite frequently, however, it erupts with considerable mesial inclination. During such a developmental course, various factors may lead to its impaction.

According to Bishara[5] primary factors include: inadequate resorption of the predecessor, traumatized germ, disturbance in the sequence of tooth eruption, available space within the dental arch, germ rotation, and premature closure of the apical foramen and cleft. He also suggested that secondary factors, such as abnormal tension of the involved malocclusion, febrile states, endocrine disorders, and vitamin D deficiency might contribute to impaction. The occurrence of an impacted canine is frequently accompanied by persistency of its predecessor.[6-8]

McBride[9] considers impaction to be due to a disproportion in size between the teeth and jaws.

Abstract

Impacted teeth are frequently found in humans today, but current data suggest their existance in skulls originating from the prehistoric age. This report describes the skull of an adult female that was found during excavation in the Croation enolithic site of Vucedol (2700-24— BC). The skull is well preserved and, according to cranial and facial index calculation, is classified as dolichocephalic and mesoprospic. Cephalometric analysis revealed bimaxillary prognathism. The maxillary left canine is impacted and its crown peak is visible through the alveolar maxillary bone fenestration. The position of the canine was verified using x-rays, and is described in this study as an isolated finding. The reported occurrence of impacted teeth in prehistoric material appears to confirm the multifactorial etiology of this anomaly.

Key Words

Impacted canine • Paleopathology

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Figure 1
Anterior view of skull.
Figure 2
Left lateral view of skull.

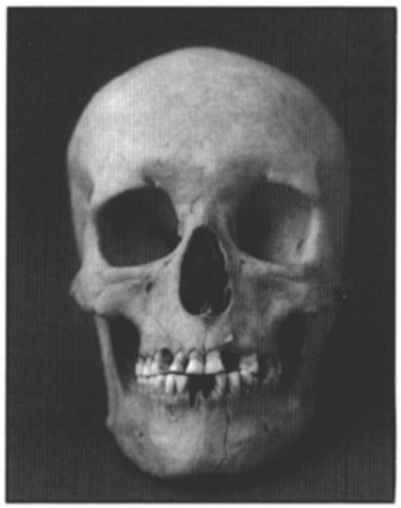

Figure 1

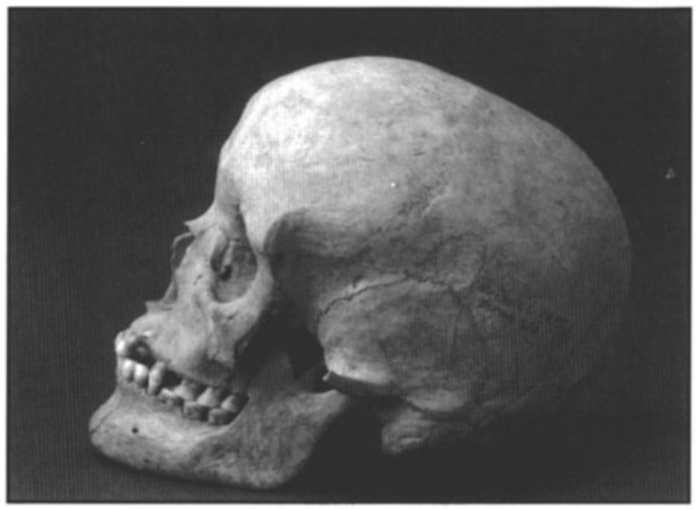

Figure 2

Table 1
Results of roentgenocephalometric analysis

n - ss : ss - pg	3 + -5.5	3.5
n - s : sp - pm	9.5 + -3.5	10
s - n - ss (SNA)	81 + -3.5	86
ss - n - sm (SNB)	78.5 + -3	82.5
ss - n - sm (ANB)	2.5 + -2	3.5
n - s - gn	66.5 + -3.5	65.5
sp - pm : m - go	25 + -5	26
n - s - ar	123 + -5	120.5
s - ar - go	139.5 + -6.5	148.5
m - go - ar	127.5 + -5	127
9 + 10 + 11	390 + -5.5	399
n - go - m	73.4 + -3.5	77
n - go - ar	54.5 + -4	50
+1 : sp - pm	111.5 + -5.5	119
-1 : m - go	92 + -6	96
+1 : -1	131.5 + -7.5	118
+1 : n - ss	4.5 + -1.5	5
-1 : n - sm	4.5 + -1.5	8

The impacted canine may be labially or palatinally located.[5] In cases of palatinal impaction, the tooth does not erupt even though there is enough space for its incorporation into the dental arch.

Materials and methods

The skull described in this study was found in Vucedol, a prehistoric settlement on the right bank of the Danube River, approximately 5 km southeast of Vukovar (Croatia). The excavation was performed during a 1984-1990 project carried our by the City Museum of Vukovar, together with the Archeologic Department of the Zagreb University of Fine Arts.[10] The specimen belonged to a female subject, 35 to 45 years old, according to its postcranial skeleton.[11] It was found together with seven other skeletons in grave pit 6.[10]

Radiocarbon dating performed on the collagen from human bones found in the same pit indicated the absolute age of the material to be 4030 to 140 BP, or 2700 to 2400 BC.[10,12]

For a morphological description, conventional anthropometric instruments were used. Variable nasion-gnathion (N-Gn), euryon-euryon (Eu-Eu), zygion-zygion (Zy-Zy), and glabella-opistocranion (G-Op) served as the basis for the calculation of cranial and facial indices. Roentgenocephalometric analysis according the "Zagreb 82 mod" method was also performed.[13] The position of the impacted left maxillary canine was diagnosed using a conventional x-ray.

Results

The skull was relatively well preserved. There were no visible signs of damage, with the exception of a total sagittal fracture fissue of the lower jaw in the region of the symphysis. The denti-

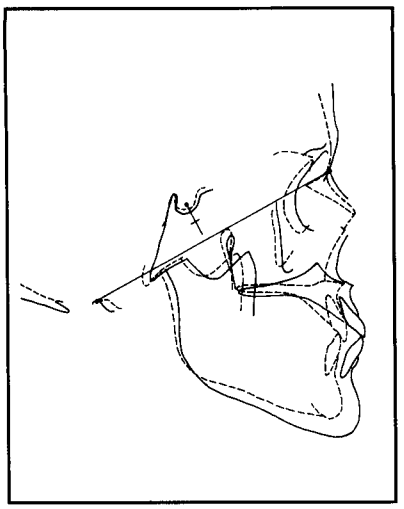

Figure 3

Figure 4

Figure 3
Cephalometric tracing and superimposition with Bolton standards (full line = skull)

Figure 4
Lateral view of skull showing impacted maxillary canine

Figure 5
Radiograph showing impacted maxillary canine

tion showed visible signs of abrasion of all existing teeth (Figures 1 and 2). The following teeth were missing: 13, 16, 22, 25, 31, 41. Alveoles at the sites of all missing teeth were preserved, except where the alveolar socked was closed. This suggests that all teeth had been lost post mortem except tooth 22, which either did not exist at all or was lost during the subject's life. No carious teeth were found. The dentition sagittal relationship corresponded to Class I.

From anthropological measurements, cranial and facial indices were calculated. According to classical anthropometric criteria,[14] the skull belonged to the dolichocephalic head type (HI=76.29) and leptoprosopic face type (FI=86.82).

Roentgenocephalometric analysis revealed bimaxillary prognathism with protrusion of the maxillary and mandibular incisors, diminished flexion of the cranial base, and posterior rotation of the mandible (Table 1) Superimposition of the skull outlines over the Bolton standard of an adult, according to the Broadbent method,[15] confirmed the finding obtained by cephalometric analysis (Figure 3).

In the maxilla, the left canine was impacted and slightly mesially inclined. Its crown peak is visible through bone fenestration, as the midroot level of the adjacent central incisor (Figure 4 to 6). The right maxillary canine was found in its normal position.

Discussion

Hypodontia and impacted teeth are considered evolutionary alterations, and these problem are present in people today. However, the findings described here indicate that impaction also occurred in prehistoric man.

A similar finding of an impacted canine in a skull excavated in Cayon and belonging to a civilization dating from 7250 to 6700 BC was reported by Iseri and Uzel.[16] In that case, the retained maxillary canine was bilateral. Weinberger[17] described a case of impaction of the permanent left maxillary canine with persistent deciduous canine in Homo mousteriensis from the Old Stone Age (100,000 to 40,000 BC). Sullivan and Hellman[16] reported finding an impacted left maxillary canine, with its apex adjacent to the root of the maxillary first premolar and its crown under the very margin of the orbit in a Punim Calvarium skull, aged about 10,000 years.

Figure 5

These paleopathological observations and the case described in this study show that impacted teeth are fairly common in archeological specimens. The impacted canine in the Vucedol skull confirms that this anomaly has been with man for thousands of years. Therefore, it seems likely that this abnormality in the eruption of human

teeth is not caused by modified conditions brought about by modern civilization.

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References

1. Moyers RE. Handbook of orthodontics, 2nd ed. Chicago: Year Book, 1963.
2. Dachi SF, Howell FV. A survey of 3847 routine full mouth radiographs. Oral Surg Oral Med Oral Path 1961; 14;1165-9.
3. Ericson S, Kurol J. Radiographic assessment of maxillary canine eruptin in children with clinical signs of eruption disturbances. Eur J Orthod 1986; 8:133-40.
4. Dewell BF. The upper cuspid: its development and impaction. Angle Orthod 1949; 19:79-90.
5. Bishara SE, Kommer DD, McNeil MH, Montagana LN, Oestler LJ, Youngquist HW. Management of impacted canines. Am J Orthod 1976; 69:371-87.
6. Bishara SE. Impacted maxillary canines: A review. Am J Orthod Dentofac Orthop 1992; 101:159-71.
7. Jacoby H. The etiology of maxillary canine impactions. Am J Orthod 1983; 84:125-32.
8. Milicic A. Ucestalost pojedinih skupina perzistentnih mlijencnih zubi s posebnim osvrtom na njihovu etiopatogenezu. Bilten UOJ 1984; 17:5-13.
9. McBride LJ. Traction - A surgical/orthodontic procedure. Am J Orthod 1979; 73:287-99.
10. Horvatincic N, Obelic B, Srdoc D, Benko L, Sliepcevic A. Radiocarbon and T1 dating of the eneolithic site Vucedol in East Croatia, Yugoslavia. Proceedings of the Second International Symposium on 14 C and Archaeology, Groningen 1987; 29:243-250.
11. Perac S. Morphometric characteristics of human lower jaws of the eneolithic population of Vucedol (Croatia). Period Biolog 1993; 95:317-21.
12. Srdoc D, Obelic B, Horvatincic N, Krajcar-Bronic I. Ruder Boskovic institute radiocarbon measurements XI. Radiocarbon 1989; 31(1):85-98.
13. Muretic Z. Computer modification of radiographic analysis "Zagreb 82." Period Biolog 1992; 95:137-40.
14. Martin R, Saler K. Lehrbuch der Antropologie in systematischer Darstellung, Bd. 1, Fischer, Stuttgart, 1957.
15. Broadbent BH. A new x-ray technique and its application to orthodontia. Angle Orthod 1931; 1:45.
16. Iseri H, Uzel I. Impaction of maxillary canines and congenitally missing third molar. Eur J Orthod 1993; 15:1-5.
17. Weinberger BW. History of Dentistry. St. Louis: Mosby, 1948.