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Developmental dental anomalies: Some case reports and their potential role in forensic investigations

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Abstract
There are the various modalities of identification in forensic investigations that include fingerprints, DNA typing, biometrics etc. but some times the anomalies in the dental structures play an important role in identification of unknown remains where the soft tissues are destroyed beyond the visual recognition. This can be attributed to the resistance, stability and uniqueness of the human dentition. This paper shows few cases of dental anomalies with their clinical and radiographic characteristics. Recording of these conditions in patient's dental records is not only important from ethical but forensic point of view.

Keywords: forensic, personal identification, dental anomalies

1. Introduction
Dental Anomalies can be defined as craniofacial abnormalities of form, function, or position of the teeth, bones, and tissues of the jaw and mouth [1]. These abnormalities may present as the inconsistencies in the normal color, shape, size, number, and degree of development of teeth. [2].These may be localized to single tooth or involving systemic conditions. The etiology may be attributed to genetic factors (inherited or mutagenic), environmental factors (infections, physical injuries, drugs and chemicals like ante metabolites, thiadiazole etc.) [3,4].It has been reported that around 7% of children are born with some of the disturbances in the orofacial system and most commonly are supernumerary teeth, missing teeth, fused teeth and peg lateral incisors [5]. Apart from affecting the esthetic appearance of teeth, the anomalies sometimes pose discomfort and dental problems. Due to the low frequency of occurrence and prevalence levels in the different populations these anomalies can assist in cases of human identification. [6]. These may be particularly helpful in cases when dental structures are the only source of information for the identification of human remains like carbonization, advanced decomposition etc. [7]

Materials and Methods:
This paper presents some cases of developmental dental anomalies. The informed consent was taken from the subjects.

Case Report -1:
A 18 years old male reported to the dental clinic with the chief complaint of food lodgment in lower right first molar (46).The oral examination revealed a carious lesion in that particular tooth. There was no complain of sensitivity to hot or cold and the tenderness on percussion was found to be negative. Further, on complete oral examination it was found that the upper right lateral incisor had an anomalous cusp that protruded from the cemento-enamel junction (CEJ) of the palatal surface (fig.1) and bifid cingulum on right central incisor. . The tooth was fully erupted with the crown height measuring7.5 mm but with slight labial displacement. The accessory cusp measured 6 mm in length (incisocervically), 4mm in width (mesiodistally) and 2.5 mm in thickness (labiolingually). The contra lateral incisor appeared normal. The patient also exhibited a large Carabelli's cusp on both maxillary first molars and on taking past dental and family history it was found that there was no history of any kind of oro- facial trauma and his mother had similar anomalous structure in her dentition. The tooth responded positively to vitality test. The remaining maxillary and mandibular teeth were absolutely normal in shape.

The periapical radiograph revealed a V shaped radioopaque structure that arose from the cemento-enamel junction (fig.2). A diagnosis of talon cusp was made based on its characteristic clinical, morphological and radiographic features. The accessory cusp is named as talon cusp because of its similarity in shape to an eagle's talon.or beak. It was graded as Type 1 talon cusp as per Hattab et al criterion. [8]. No treatment was initiated because the talon cusp did not pose any clinical problems to the patient. However, the patient was treated for the chief complaint presented.

Mitchell first defined talon cusp in 1892 as a tubercle that projects lingually and incisally from the cingulum area of anterior teeth [9]. It was named as the talon cusp by Mellor and Ripa in 1970 [10]. The treatment for Talon's cusp is indicated when it is poses some serious problems like occlusal interference, compromised aesthetics, caries control due to the presence of a deep developmental groove between the accessory cusp and the tooth, irritation of tongue during speech and mastication and periodontal problems [11].

The patient reported in this case had no problems with the anomalous structure on tooth. Hence, it was decided to leave the talon cusp as such but with periodic review.

Fig 1: Clinical appearance of crown with Talon Cusp.

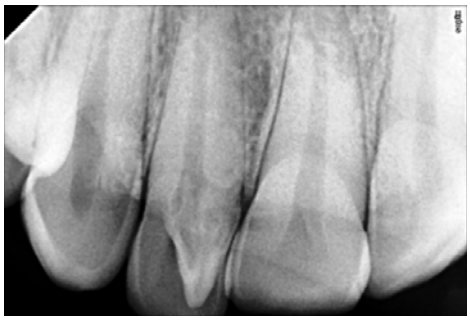

Fig 2: Radiographic appearance of Anomalous Cusp

Case Report -2:

A 22 years old male reported with the chief complaint of bleeding gums and halitosis .The oral examination revealed chronic generalized periodontitis. Further, on complete oral examination it was found that the mandibular left central and lateral incisor had an anomalous appearance (fig 3).The contra lateral incisors appeared absolutely normal. The number of teeth present in the mandibular arch was one less than normal when that large tooth was counted as one. On taking complete past dental and family history it was found that there was no history of any kind of oro- facial trauma and none of his family members had similar anomalous structure. The tooth responded positively to vitality test. The remaining maxillary and mandibular teeth were absolutely normal in shape. The periapical radiograph revealed the union of central and lateral incisors with a small groove separating the coronal pulp and a single completely developed root (fig.4). A diagnosis of fusion of teeth was made based on its characteristic clinical, morphological and radiographic features. The treatment is indicated when anomaly causes unpleasant esthetic appearance due to irregular morphology or when deep grooves are present, these teeth may be susceptible to caries and periodontal disease. [12, 13].

No treatment was initiated because the fused teeth did not pose any clinical problems to the patient. However, the patient was treated for the chief complaint presented.

Fig 3: Photograph of clinical appearance of Fused teeth

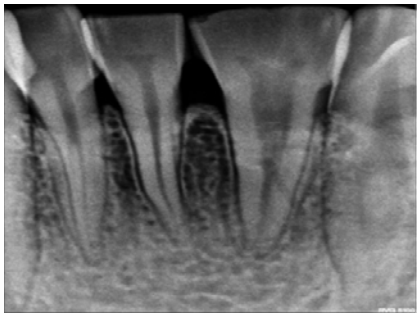

Fig 4: Radiographic appearance of Anomalous Teeth.

Role of Dental Anomalies in Forensic Investigations:

Establishing the identity of unknown is important both from legal and humanitarian point of view. But in the cases like burnt bodies, putrefactive changes, animal predations or in mass disasters where the bodies are destroyed beyond the scope of visual recognition, these dental anomalies or traits may prove useful in the cases of personal identification.Under the most of the severe environmental conditions the teeth are the least destructible part of the body and they readily survive all these changes and their uses in such cases has been documented.

In one such case, the remains of a caucasoid female, with an age estimated age between 18 and 30 years, was found in an advanced stage of decomposition, on the banks of a river, in São Paulo, SP - BRAZIL. The forensic odontology team noticed that there were five teeth lost postmortem, and no restorations or carious lesions present in any of the remaining dentition, but there was a positional anomaly: the upper left canine (23).When enquired,the family informed about the displaced canine tooth. This information drew the attention of the experts, who then compared the ante mortem information to identify the same dental anomaly (23), in the exact position as

observed on the skull . Thus forensic dental identification involves comparison of postmortem data with the available in record antemortem data which requires extensive database about different dental characteristics which in turn relies on the availability of good quality of ante mortem records [14].In an observational study on the quality of dental records, Swedish researchers found a large discrepancy in the quality of examined records. In the study they examined ten years worth of patient records which had been submitted for the purposes of forensic identification. A startling statistic is that 10% of the patients were identified incorrectly on their records [15]**.**

Also these anomalies may vary from population to population and have been subjected to extensive research in the literature. If a skull or body is found with such a trait it is useful criterion for personal identification, and also may provide a way to trace the family lines in a population i.e. the trait if present in some family members should be looked for in persons possibly related to unknown represented by skull or body.

Conclusions

From the above case reports, the authors conclude that a thorough clinical oral examination is of prime importance and proper dental records of such anomalies should be maintained even if these don't form the part of patient's chief complaint. The maintenance of complete and well documented patient records is not only integral part of the dentist's professional responsibility but can also help the law enforcement agencies in correct identification of individuals as and when required**.**

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