Case Report

Cusp expression of protostylid in deciduous and permanent molars

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Abstract

The present article is a case report on the cusp expression of protostylid in the deciduous inferior molars and in the first permanent inferior molar, in which the correspondence and bilateral symmetry of the mentioned expression can be evidenced, as well as the their relation with the foramen cecum of the mesiobuccal furrows of the deciduous and of the permanent inferior molars.

Key words: Deciduous and permanent mandibular molars, dental anthropology, dental morphology, nonmetric dental traits, protostylid

Introduction

The dental anthropology is an interdisciplinary area of knowledge that integrates anthropology, odontology, biology, palaeontology, and paleopathology with the purpose of studying all the information that the human dentition provides, as are the anatomic, evolutionary, pathologic, cultural, and therapeutic variations in relation with living conditions, culture, diet, and the adaptation process of the present and past human populations, through the morphology, the dimensions, the diseases, and the modifications of the teeth.[1-5]

One of the most studied components of the dental anthropology is the dental morphology, which is based on the objective of understanding the behavior of the expression (in terms of frequency and variability) of the coronal and radicular morphology of the human teeth. This process is achieved through observation, registration, and analysis of the coronal and radicular dental morphologic traits, which are constituted by phenotypic shapes of the dental enamel that are expressed and regulated by the genome of an individual and of a population during the odontogenesis. These structures may be positive (tubercular and radicular) or negative (intertubercular and phosomorphous), with the potential of being or not present at a specific place (frequency) in a different expression (variability) in one or more members of a population. So far, there exist over hundred coronal and radicular dental morphologic traits that have been recognized among the human dentition but in most of the investigations globally, only a few more than 17 of these traits have been used, mainly the ones that are placed on the incisor crown and on the molars of both dentitions. One of the nonmetric dental traits (NMDT) that have been studied the most is the protostylid, given the great value of its expression as an ethnic marker among populations.[3,6]

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The tribosphenic molar

Cope[7] proposed a model for the possible evolutionary mechanisms that guided the shape and position of the cups of the posterior teeth, specifically of the molars of mammals. Later, Osborn[8] designed the nomenclature of the cusps according to their origin and position, which is why the mentioned model is actually recognized as Cope-Osborn's tritubercular theory. Finally, Kraus[9] gave a greater scientific support to the theory, through compared embryology studies, by demonstrating that "if a cusp appears earlier during evolution, it must also appear earlier in embryology," at least this is true in the case of the low molars. At present, genetic studies of murine models have been able to show the morphogenetic development of the teeth from mesenchymal-epithelial interactions, corroborating the tritubercular theory.[9-13]

In summary, the tritubercular theory explains the phylogenetic evolution of the molar cusps by setting four stages of development: (1) a reptilian or haplodont first stage in which the teeth consist of protodonte-type cones with one cusp (a single cone is named protocone, from the Greek word proto, the most antique). (2) A second stage: triconodont or primitive mammaloid stage, in which the posterior teeth show the development of three in-line cusps in an anteroposterior direction. From the evolutionary original cusp, or protocone, two smaller cusps arise in mesial (paracone = next to) and in distal (metacone, meta = in between or behind). These three cusps form the oldest dental structure, which is altogether named a "trigon" when the maxillary molars are involved and a "trigonid" when the mandibular molars are involved. (3) A third, "Tritubercular," stage, or triangular stage, in which the tooth's size increases and the cusps rotate to allow the emergence of a series of crests or "lofos" that connect the three original cusps between them. On the upper molars, the paracone and metacone cusps were displaced to buccal, so the protocone stayed in lingual; and on the lower molars, the paracone and the metacone moved to lingual, thus, protocone was stayed in vestibular. This arrangement of inverted triangles allowed the molars to become interdigitated with each other and also allowed them the ability of cutting and grinding, the latter thanks to the sliding of the proximal surfaces (mesial and distal edges of the trigons and the trigonids) during the closure of the mandible, to what the term "tribosphenic" is due (Triben = friction and sphen = wedge). (4) A fourth and last "quadritubercular" or "mammal" stage, in which the trigon of the low molars was complemented by an additional cusp, derived from the lingual cingulate and positioned distal-lingual from the protocone; this additional cusp was named "Hypocone" and at present it constituted the newest part of the molars or talon. In the low molars, the paracone was lost, so the trigonid remained structured by two cusps (protoconid and metaconid) located in vestibular and lingual, respectively. Posteriorly, the talonid arose originally from under the occlusal plane, formed by the hypoconid in vestibular and the entoconid in lingual, both of which entered in occlusion with structures from the antagonist.[8,14,15]

The employed nomenclature shows the Greek name of the main cusps with a position prefix (meta, para, hypo, and ento) and a suffix, which is "yle" for the upper molars, and "ylid" for the lower molars. For example, protocone if it is upper, or protoconid if it is low. With regards to the paramolar cusps of the molar teeth, these are named with the prefix according to the cusp where these allocated, plus the suffix style if they are upper, or stylid if they are low [Figure 1]. An example of this nomenclature is the protostyle or "Carabelli cusp," which is a style developed from the protocone, or the protostylid when it is a protoconid.[14]

Protostylid

According to the tritubercular theory, there exists an enamel collar called cingulum that circumscribes at the level of the gingival third, the crown of all teeth, just as a stylar shelf, from which, during odontogenesis, various NMDT develop, such as the dental tubercle and the lobes that make up the mentioned cingulate in the anterior teeth, and the so-called tubercles or paramolar cusps (parastyles on upper molars and parastylids on low molars), present in the vestibular, palatal, or lingual surfaces of the posterior teeth, as is the case of the protostyle, the parastyle, and the protostylid.[8,14]

Probably, the first approach to the definition of the protostylid was made by Bolk in 1914, when he described a "tubercle or supernumerary cusp" on the vestibular surface

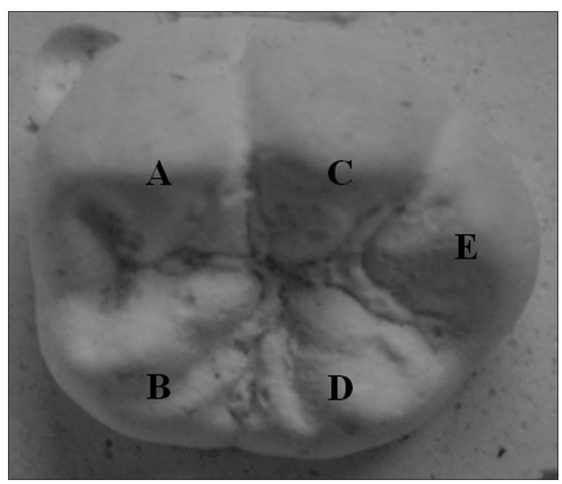

Figure 1: Identification of the cusps, seen from the occlusal surface of a first low molar, according to the nomenclature of the tribosphenic molar. (A) Cusp 1, mesial vestibular, protoconid (from which the protostylid develops); (B) Cusp 2, mesial lingual, metaconid; (C) Cusp 3, distal vestibular, hypoconid; (D) Cusp 4, distal lingual, entoconid; (E) Cusp 5, distal, hypoconulid or distostylid. Between the protoconid and the hypoconid is the mesial vestibular development furrow, which directly relates to the fossa or point P expression (Grade 1 Arizona State University Dental Anthropology System) and to the furrow expressions (Grades 2–6 Arizona State University Dental Anthropology System)

of the second and third low molars, and less frequently on the first low molars, caused by a supernumerary conic, fused tooth.[16]

Dahlberg termed "Bolk's tubercle" as "protostylid" (stylid of the protoconid) defining the latter as an elevation or crest of enamel in the anterior part of the vestibular surface of the low deciduous and permanent molars that ascends from the cingulate in a gingivo-occlusal direction, strongly associated to the mesial-vestibular development fissure or furrow, that separates the protoconid from the hypoconid. The first population study was achieved in a group of "Pima" indigenous people; it demonstrated that the protostylid is very common in some human populations and that its frequency varies in different populations, what means that its study may provide a more complete comprehension of the dental morphology variation of human populations.[17] Later, in 1956 Robinson described the development of "protoconid's cingulum" in his studies on prehominids, showing that the hominid protostylid could probably be a dental remainder of the ancient australopithecine although with variations in its expression.[18]

Nevertheless, nowadays it is very common in odontology, and even in anthropology, to denominate altogether the parastyle–of the upper molars – and the protostylid as Bolk's tubercles.[19]

The protostylid is, then, a paramolar cusp (that does not make part of the functional occlusal table) that varies in shape from a furrow to a free-apex cusp on the vestibular surface of the mesial vestibular cusp of the second low deciduous molars and of the first and second low permanent molars. It can also be expressed as a vestibular fossa or fovea on a furrow of vestibular development, named point P. The reference plaque was developed by Dahlberg in 1956 at the University of Chicago's Zollar Laboratory of Dental Anthropology and was posteriorly incorporated in the Dental Morphology observation and analysis Universal system named Arizona State University Dental Anthropology System (ASUDAS).[20]

The mentioned plaque proposes eight categories or expression degrees for the low molars, in which the expressions zero and one consider that the protostylid is absent, and the expressions two to seven consider it is present [Figure 2].

As with all the paramolar cusps–cusp of Carabelli, parastyle, mesostyle, interconule, and interconulid – the protostylid, in all of its morphologic expressions, has a common origin in the vestibular cingulate's amelodentinary union in the region between the protoconid and the hypoconid during the dental morphogenesis of the hominids and the prehominids.[21,22]

The cingulum is an evolutive structure that makes part of the first mammals' tribosphenic molars that surrounds all of the teeth's whole crown at the level of the cervical third. In primates, this structure has suffered a reduction that has left as a remainder a series of structures, mostly on the vestibular and lingual surfaces of the low molars and on the palatal surface of the upper molars; therefore, the protostylid, as a cuspid or tubercular expression of the *Hominidae* superfamily, corresponds to variations of the primitive cingulate, while the fissure, furrow, and fossa expressions are a residual evidence of the protostylid's variation in the hominid primates. These phenotypic variants were initially described by Miller in 1889 as "foramen cecum Milleri" and were linked to the protostylid's expression by Jorgensen in 1954. Although Dahlberg included the vestibular fossa or point P as the first of the seven degrees of the protostylid's expression, there still exists controversy with regards to accepting the fact that this vestibular fossa corresponds to the same foramen cecum or cecum described by Miller, according to Axelson.[23]

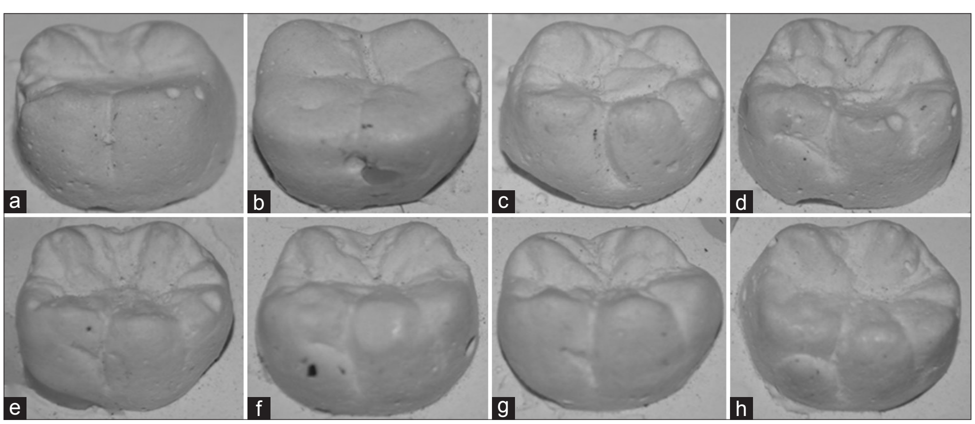

Figure 2: The Arizona State University Dental Anthropology System plaque of the protostylid. (a) Absent, smooth buccal surface. (b) Pit in a buccal fissure (point P or foramen cecum); (c) Buccal fissure curved to distal. (d) Distal furrow from the vestibular furrow; (e) secondary groove more pronounced; (f) secondary groove stronger; (g) secondary groove extends across most of the buccal side of the mesiobuccal cusp (a weak or small cusp); (h) Cusp with a free apex. The dichotomic absence/presence expression is 0–2/3–7

Longitudinal studies of teeth observed in scanning electron microscopy have demonstrated that the cuspid expression of protostylid's has an origin in the dentino-enamel junction during the dental morphogenesis, which explains that dentin and enamel in this zone have developed from the transient basement membrane during dentinogenesis and amelogenesis, from a growth center, enamel knot that will originate the future cuspid vertices[9-13,24] such that the furrow that separates the protostylid from the protoconid will be as deep as the distance between both growth centers.[25] As a consequence, a concave dentin-enamel junction that confronts the enamel of both cuspid formations until the end of the amelogenesis is created, leaving as a remainder a fossa in which very thin and irregularly mineralized enamel prisms converge, these are known as calcoglobules, which confer a rough aspect to the walls of the fossa. This process explains the origin of the furrows from the cusps' morphogenetic development, therefore, from the perspective of odontogenesis, it is possible to associate the vestibular fossa, the transverse furrow and the cusp with the protostylid's expression, at least in modern humans,[26,27] given the fact that in evolutionary terms, there is no evidence that correlates the fissures, furrows, and the vestibular surface fossae of the low molars with the hominids' fossils' protostylid.[18,21,28,29]

Case Report

A 7-year-old masculine patient, from the indigenous community named Nasa or Paeces (Morales, Colombia), who assist to a dental health brigade for a diagnostic examination and promotion and prevention treatment. The intraoral examination exposes a series of accessory paramoral cusps in the vestibular surface of the low molars, which become the perfect place for the accumulation of bacterial plaque and for the development of caries. Because of how striking the dental morphology is usually ignored within the context of odontology, a low dental arch impression was taken by using a totally sterilized Coe ID® type plastic bucket, the latter was charged with Hydrogum® Zhermack® alginate as a registration material. The immediate next step was the moulding on Whipmix® Type III Gypsum, for later proceeding to do the dental morphological analysis of the study model obtained, based on the ASUDAS system. This way, it was seen on the first low deciduous molars' vestibular surface, the bilateral expression of a paramolar cusp that seemed compatible with the cusp with a free apex (Grade 7 ASUDAS). Similarly, the bilateral expression of paramolar cusps compatible with a secondary groove extends across most of the buccal side of the mesiobuccal cusp (a weak or small cusp) (Grade 6 ASUDAS) was observed in the second low deciduous molars and in the first permanent low molars. In the same way, the presence of the foramen cecum is observed in the second deciduous low molars, this one associated with the pit in buccal fissure (point P or foramen cecum) expression (Grade 1 ASUDAS) [Figures 3-6].

Discussion

Prevalence and variability

Just as literature references it, the protostylid in an NMDT that has a higher prevalence in the second deciduous low molars,[30,31] followed by the first permanent low molars;[4] different studies have shown a significant correlation in prevalence and variability of protostylid between temporal and permanent dentition,[32-35] situation that was associated with what Butler manifested in his morphogenetic fields theory, in which every class of tooth (incisors, canines, premolars, and molars) has a variation gradient that consists on a tooth of which the morphogenetic process in very conserved and has a poor probability of being affected by the environment; in this way, the second deciduous low molar is the gradient tooth of the low molar field, in deciduous as in permanent teeth. Therefore, there exists a high probability–just as it can be appreciated in this case report – that if the protostylid is expressed in the deciduous dentition, it will be expressed in the permanent dentition.[35]

This correlation applies in the same way for the fossa or point P expression, however, there is a great difficulty when it comes to studying the fossa expression, as it is a site that is highly prone to develop caries lesions due to its high capacity of retaining bacterial bio-film, which is why it is very common to find preventive and surgical, dental treatments in this region that end up impeding the observation of the morphological trait.[23,36]

Sexual dimorphism

Human populations vary according to their phylogenetic (macro- and micro-evolutionary), ethnic patterns, sexual characteristics (gender), ontogenically by their age-characteristics that in the context of forensic odontology make of the basic identification quartet. Added to all of this, individual variations of each human being as a member of a species are included. This is why within the anthropological context; the population analysis is done through scales or levels that go from what is general to what is particular and with regards to the individuals, from the individual to the intragroup and the intergroup. The contemporary human beings are dimorphic, but in lesser extent that the rest of the hominids, being their corporal sexual dimorphism of barely 4–7%. Nevertheless, taking into account the postcranial skeleton's morphological traits, the sexual dimorphism increases between 8% and 20%, and taking the teeth into account, it increases approximately 8–9%, mainly in the canine teeth, which are considered the actual human beings' most dimorphic teeth.[3]

Figure 3: Occlusal plane of the study model

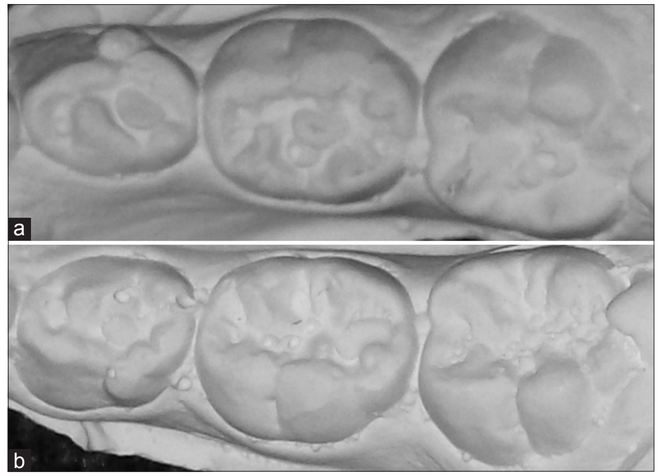

Figure 4: (a) (left side) and (b) (right side). Occlusal plane of the study model in which the bilateral symmetry of the protostylid's expression in the first deciduous low molar, in the second deciduous low molar and in the first permanent low molar can be observed

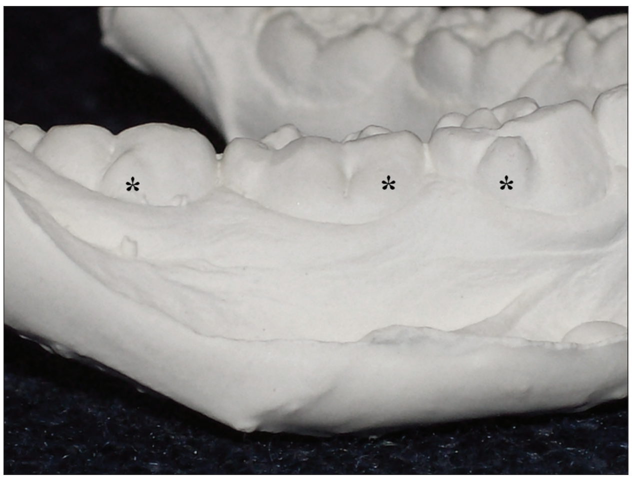

Figure 5: Right lateral plane of the study model in which the protostylid of cusp with a free apex (Grade 7 Arizona State University Dental Anthropology System) expression can be observed on the first deciduous low molar's vestibular surface, the protostylid of cusp with a free apex (Grade 7 Arizona State University Dental Anthropology System) expression, the second deciduous low molar and the first permanent low molar. The foramen cecum's presence at the end of the mesiolingual development furrow in the second deciduous low molar and in the first permanent low molar

Figure 6: Left lateral plane of the study model in which the protostylid of cusp with a free apex (Grade 7 Arizona State University Dental Anthropology System) expression can be observed on the first deciduous low molar's vestibular surface, the protostylid cusp with a free apex (Grade 7 Arizona State University Dental Anthropology System) expression, the second deciduous low molar, and the first permanent low molar. The foramen cecum's presence at the end of the mesiolingual development furrow in the second deciduous low molar and in the first permanent low molar

With regards to the protostylid, different studies have demonstrated that there is no statistical significance ($P < 0.05$) in the sexual dimorphism of its frequency and variability, therefore, there exists the same chance that the trait is expressed in women or in men.[37-41]

Bilateralism

The human dentition counts with bilateral symmetry, that is, two teeth of the same class but from a different hemiarch (right and left) are practically identical. Hence, it is evident that teeth count with bilateral symmetry or bilateralism, until the point that the ASUDAS system does not discriminate teeth by the hemiarch on which they are located. However, different studies have shown with statistical significance ($P < 0.05$) that the protostylid's expression between the right and the left second deciduous low molars is bilateral,[37,41] what is evidenced in the case report, in which the presence and the variability are symmetrical between the second temporal low molars and the first permanent low molars.

Foramen cecum

The protostylid expressions world tendency in different sinodont-originated world populations (Mongoloid dental complex) is directed toward Grades 3 and 4, in which the transverse furrows that are originated mesially from the vestibular development furrow can be observed, associated with blunt apex cusps on the second deciduous low molars and on the first permanent low molars' mesiovestibular cusp's vestibular surface, just as it can be seen in this case report. Nonetheless, the simultaneous expression of a fossa on the most cervical extreme of the mentioned development furrow is striking, as it is compatible with the foramen cecum, which would be the equivalent to the Grade 1 ASUDAS that is described as the point P; therefore, it is possible that in a same tooth one can find the Grade 1 expression, together with another gradation level. Among the contemporary populations of the Colombian Southwest (mainly coast Caucasoid mestizos, indigenous people, and Afro-descendants) the prevalence of the protostylid has been practically absent according to the dichotomous expression defined by the ASUDAS system but the high prevalence of Grade 1 stands out of which its expression in fossa or point P is present when the protostylid's presence cannot be observed (Grade 0), and when the presence of protostylid (Grades 3–7) is observed even in the scarce blunt vertex and free vertex cusps' expressions.[37,41]

Biological distances

Due to the fact that the frequency and the variability of the NMDT allow the association of the different human populations with the geographical distribution, several investigators have classified the human beings ethnographically in population complexes or dental complexes according to the dental morphology. The first of these complexes was defined by Hanihara as the "Mongoloid dental complex,"[30] which groups different populations from South Eastern Asia that are characterized by presenting a complex dental morphology represented by a high frequency of protostylid's furrow and blunt cusp expressions and furrow and free vertex cusps' expressions. Later, Turner II divided the Mongoloid dental complex in two groups.[24] The first division or Sinodont, integrated by Northeast Asian populations, is characterized by the addition and intensification of some NMDT's as the protostylid, in which numerous furrow and blunt vertex expressions and furrow and free vertex cusps expressions are seen. The second subdivision or sundadont comprises South Eastern Asian populations that have withheld an ancestral condition and have simplified some NMDT's expression, including the protostylid's furrow expression and the furrow and blunt vertex expression. On the other hand, Zoubov proposed the world's population's dental delimitation in two complexes, the Eastern dental complex, which would be the equivalent to the Mongoloid dental complex proposed by Hanihara, and the Western dental complex, constituted by negroid and Northern Caucasoid populations characterized by a low frequency of the furrow expression-represented protostylid.[42] Irish would subdivide the African Southern negroid populations (Western dental complex) in a North African dental complex (same Caucasoid) and a sub-Saharan dental complex characterized by furrow expressions.[43] Edgar grouped human beings in five clusters, the Mongoloid dental complex conformed by the Sinodonts and the sundadonts, the Caucasoid dental complex, made up by the Western European and Asian groups (Europe, Northern Africa, Middle East, and India), the Saharan African dental complex (conformed by the Western African and the Southern African subgroups, much closer to the South-Pacific sundadont populations), various groups from Oceania and American Paleoindians that exhibit frequencies and morphological variations that exclude them from the first three complexes.[34]

In regards with the American populations, the model proposed by Turner II[24] is the one accepted at present. This model suggests that the settlement of the American continent was achieved initially by Sinodont human groups that migrated from Northern China and crossed Beringia; with this, it has been possible to affirm that all of the (past and present) American Indians exhibit a Sinodont dental morphology; therefore, they must be included in the Mongoloid dental complex according to the miscegenation that they present with other ethnical groups.

It would be then the high frequencies of the protostylid's furrow and blunt cusp expressions and furrow and free vertex cusps' expressions, what would sustain the thesis that proposes that the first settlers of the American continent proceeded from Northeastern Asia. For Zoubov,[42] the high frequency of the protostylid in its fossa or point P expression as a unique trait of the American populations allows him to propose the existence of the Americanoid dental complex, conformed by all the American Paleoindians and contemporary populations derived from them.

In what the Colombian population is concerned, the study of the dental morphology and the association with the reviewed dental complexes is hampered in a certain way because of the ethnohistorical processes that have occurred in the country. Rodríguez suggests that the past indigenous populations are characterized by presenting a high frequency of the protostylid represented by furrow and blunt cusp expressions and furrow and free vertex cusps' expressions, together with the fossa or point P expression, what makes them closer to the Paleoindians derived from the Mongoloid dental complex Sinodonts.[3] However, in the case of the contemporary indigenous populations, the situation varies in association fundamentally with the miscegenation that occurred with the arrival of Northern Caucasoid human groups that came from Western Europe (Western dental complex), who populated the American territory in three consecutive historical processes recognized as "the discovery", "the conquest," and "the colony". These groups were characterized by having a very simplified dental morphology that includes high fossa or point P expression, few furrow expressions; and minimum furrow and blunt vertex cusp expressions. In the same way, various current Colombian indigenous populations obtained by the Pontificia Universidad Javeriana Bogotá's Human Expedition have been analyzed. The results indicate high frequencies of the furrow expression protostylid, and furrow and blunt vertex cusp expression protostylid. Similarly, during this historical process, negroid human groups (Southern Caucasoides that make part of the Western dental complex) were brought to the American continent as slaves and were distributed in different regions of Colombia; for that reason and thanks to the macroevolutionary process that was represented by numerous migrations, contacts and isolation, the Colombian population's multiethnic, pluricultural, and polygenic character were established.[3]

For the case of the Colombian Southwest and in relation with the individual taken into account in the present case report, this macroevolutionary processes turned out to be quite pronounced; also, in this same population have the largest amount of studies been done on Caucasoid mestizos, Colombian indigenous and Afro-Colombian populations. With regards to the study of the Nasa indigenous population,[41] it can be affirmed that this one shows high frequencies of Mongoloid dental complex NMDT's, as for the protostylid, high fossa or point P expressions and minimal furrow and blunt vertex cusps expressions are observed; what relates this population with the Sinodonts, just as the rest of the Colombian and American indigenous groups, findings which are compatible with the ones mentioned by Turner II,[24] Hanihara,[31] Zoubov[42] and Rodríguez,[3] and which coincide equally with the theory on the South American Paleoindians Mongoloid origin. Nevertheless, the low frequencies of the cusps with a free apex protostylid's expressions suggest an influence of the Caucasoid and the contemporary negroid human groups.

Correlation between molars teeth

Investigating about the correspondence of the dental morphological traits on teeth of the same class but different dentition is a very important source of information on the past and present human populations' historical processes in order to understand the genetic behavior of the dental morphology and its application to the macroevolutionary process, which is applicable within the anthropological, dental, and forensic contexts. Generally, these correlations have been achieved by using different NMDT's, including the protostylid, through its frequency, and variability, as at some point in a human being's life according to the dental eruption and development processes, the second upper and low deciduous molars and the first upper and low permanent molars coexist with the second upper and low permanent molars. In the anthropological context, the deciduous and permanent teeth's morphological variability has been used to estimate the biological relationship between the past and the present human populations, mainly because the expression of the dental morphological traits is genetically regulated. In accordance with the morphogenetic fields theory, the tooth gradient is the second deciduous molar in the molar field, due to the pronounced morphological similarity of the second deciduous molars and the first and second permanent molars, the common origin within the same morphogenetic field and the retention of contact pattern's basic configuration and of the number of cusps, named driopitecino, which is typical in the earliest hominids.[4]

After Butler's observations, the deciduous and permanent molars' odontogenesis (calcification and morphogenesis) have allowed to determine that the protostylid's frequency (absence or presence) and variability (gradation) are the result of the ontogenic development of the teeth in which it is expressed. In this way, Scott and Turner[4] indicate that if the trait expressions in a deciduous molar and in a permanent molar share the same genetic basis for growth and development, then the NMDT's frequency and expression, including the protostylid, should be similar for both types of teeth in the same individual.[44]

Alberch affirmed that the traits that confirm a tooth's crown morphology and that had an early ontogenic development, as phylogenetically older. This happens because the nature of the teeth's morphological variations is determined by the epigenetic properties during the vertebrates' dentition evolutionary process, which includes genetic mutations, parallelisms, and convergences.[45] Notwithstanding, it is possible that environmental factors may affect the variation of the mentioned traits, which are much more evident in the permanent dentition than in the deciduous dentition, as the latter is much more conserved.[4]

Thus, different authors have reported that there exists correlation when the protostylid is absent (Grade 0 ASUDAS) or when it is present (Grade 2 ASUDAS) between the second low deciduous molars and the first low permanent molars just as can be appreciated in this case report.[32,35,46] However, it is important to have the dichotomous expression of the morphological trait according to the ASUDAS system in mind, as for instance, in the American populations, it has been evidenced that when the protostylid is present (Grade 0 ASUDAS) it can be in furrow expressions (Grade 2 and 3 ASUDAS), in furrow and blunt vertex expressions (Grades 4, 5, and 6 ASUDAS), and in cusps with a free apex expressions (Grade 7 ASUDAS); Thereupon, regardless of the furrow or cusp expression, the correlation is high. Likewise, a very peculiar situation occurs with the fossa or point P expression (Grade 1 ASUDAS), associated with the cervical fossa or foramen cecum of the permanent low molars'. Exactly the way it was mentioned, this expression, which is almost typical from the American populations, is highly frequent in the second deciduous molars as in the first permanent molars, reason why their correlations if relatively high what stands out in this case report.[35]

These positive correlations can be demonstrated in what Jordan *et al.* manifested in 1972, when they suggested that the cuspid traits are formed at early stages of the dental morphogenesis, aside from counting with a dentinal component, what increases the probability of expression in deciduous as in permanent molars.[47] In addition, the morphological traits that imply enamel expressions supported on dentin that makes up the same shape had an early development in the human beings' phylogeny and therefore, a much more conserved variation owing to their morphofunctional implications. In contrast, enamel-only morphological traits, such as the fossa or point P expression (Grade 1 ASUDAS), have a higher probability of being expressed in the permanent dentition due to their late development within the odontogenesis process.[33]

Conclusions

The described NMDT corresponds to a bilateral paramolar cusp that is compatible with the protostylid in expressions of cusps with a free apex (Grade 7 ASUDAS) on the first low deciduous molars' vestibular surface, and with the protostylid of furrow and blunt vertex cusp expressions (Grade 6 ASUDAS) on the second low deciduous molars and on the first permanent low molars. In the same way, the bilateral symmetry is evident, as is the correlation of the protostylid's expression between the low deciduous molars and between these with the two first permanent low molars.

In regards with the second low deciduous molars and the first permanent low molars' foramen cecum, it is evident that its bilateral presence is independent of the protostylid's expression, which is why a correlation between the deciduous low molars and the first permanent low molars is not observed.

In the dental anthropological context, due to the high grade protostylid's expression, it becomes possible to associate the contemporary indigenous groups' individual, who in accordance with all of the macroevolutionary processes that occurred in the Colombian Southwest, derive from the Sinodonts, as well as all the Paleoindian and Sinodont-descendent populations; hence, that it can be included within the Mongoloid dental complex. Moreover, in the forensic dental sciences' context, the expression of this NMDT allows to guide the basic quartet in order to estimate the individual's ethnic pattern, which in this case report, corresponds to a South Western Colombian indigenous.

Recommendations

The authors of this manuscript exhort the dentists to report the cases of unusual morphological characteristics and to design the prevalence population studies in order to determine the NMDT's frequency and variability among different populations, to finally contribute to the construction of world dental complexes that have been reported in literature.

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Conflicts of interest

There are no conflicts of interest.

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