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'MRN' supernumerary notation for permanent dentition

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Abstract

Introduction: Supernumerary teeth are a clinical dilemma and are difficult to identify and classify. Hence the main aim of this study was to assess the prevalence of supernumeraries in the orthodontic patients of Margalla Institute of Health Sciences, Rawalpindi, Pakistan and present a numbering system for supernumerary teeth which gives specific information in regards to location, morphology and number to assist in easy communication in interdisciplinary dental care.

Material and Methods: Total of 550 patients were assessed for this study. Clinical examination, Intra-oral photographs, dental casts and radiographs of patients were used for assessment of presence or absence of supernumeraries and their types. To assess the effect of gender and upper / lower jaws on prevalence of supernumeraries, Chi Square test was employed. These records were also used to explain the new proposed, 'MRN' supernumerary notation.

Results: Out of 550 patients, 16 had supernumeraries. Prevalence was calculated to be 2.9%. Their prevalence was predominant in males. Conical supernumerary was the most prevailing type followed by supplemental. The prevalence of supernumeraries was higher in maxilla. New proposed, MRN supernumerary notation is explained with examples.

Conclusions: As no accord was seen on the nomenclature of supernumerary teeth, this article not only presents the prevalence of supernumerary teeth but an effective supernumerary notation which gives specific information regarding location, type and number of supernumerary that can be applied to all the three-leading dental nomenclatures in both manual and computed forms.

Keywords: Supernumerary teeth; universal numbering system; palmer/zsigmondy system; FDI numbering system

Introduction

A supernumerary tooth is an extra tooth, which may be erupted or unerupted. They may either resemble the tooth in the series to which it belongs or have a different morphology altogether.[1] Supernumeraries can occur in both deciduous and permanent dentitions, but they are most commonly seen in the permanent dentition. In the permanent dentition, prevalence of supernumerary teeth fluctuates between 0.1% and 3.4% of the different groups studied. In the deciduous dentition prevalence is recorded to be 0.03% to 1.9%.[2] Although no gender difference is stated in deciduous dentition but in the permanent dentition, boys were affected approximately twice as often as girls.[3]

The aetiology of supernumerary teeth is not fully understood. Both environmental and genetic factors have been suggested and a sex-linked inheritance has been implied.[3] Most cases of supernumerary teeth are remote, although familial trends are not

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uncommon.[4] Over proliferation or sustained survival of dental lamina epithelial cells have been proposed by several researchers to cause supernumerary teeth.[5] Tooth germ dichotomy theory has stated that during odontogenesis, dissection of dental lamina occurs which may result in multiple teeth.[6]

Supernumerary teeth are classified according to morphology and location. Morphology of supernumerary teeth is usually normal or conical in the primary dentition. In the permanent dentition, five different morphological types of supernumerary teeth have been defined; conical, supplemental, tuberculate, odontomas and molari-form.[7] According to location supernumerary teeth can be classified into four types: mesiodens, para-premolars, para-molars and distomolars.[8]

Conical shaped supernumerary is the most common type. It can occur as single, midline (mesiodens) or bilateral (mesiodentes) structures. The root formation of these supernumerary teeth is in advance of or at a corresponding stage to that of permanent incisors. It may seldom be found high and inverted into the palate or in a horizontal position.[9] The tuberculate type has a barrel-shaped appearance (width is equal to its length) and a crown anatomy consisting of multiple tubercules. Root formation is delayed compared to that of the permanent incisors. Tuberculate supernumeraries are often paired and commonly located on the palatal aspect of the central incisors. They are frequently associated with delayed eruption of the incisors and rarely erupt. [9] The supplemental type refers to a duplication of tooth in the normal series and is usually located at the end of a tooth sequence. Permanent maxillary lateral incisor is the most common supplemental tooth found but supplemental premolars and molars also occur.[9] Howard registered odontoma as the fourth class of supernumerary tooth. Most experts, however, accept the view that the odontoma characterizes a hamartomatous malformation rather than a neoplasm. Two separate types have been described: complex odontoma and compound odontoma. Complex composite odontoma is a disorganized diffuse mass of dental tissue whereas compound odontoma is the malformation which bears some superficial anatomical resemblance to a normal tooth.[7,10] The molariform type has been only rarely reported. This type derived its name because the crown closely resembles the morphology of a premolar. The crown of this supernumerary had 3 separate well-developed lobes which results in an unusual crown morphology and completely formed root.[10]

There are three main dental numbering systems which have received worldwide recognition. These three numbering systems include Universal system, Federation Dentaire Internationale (FDI) and Palmer/Zsigmondy system.[11] However, in regards to designating permanent and deciduous supernumerary teeth, no accord is seen among the systems. Due to this lack of agreement, there exists a great deal of confusion while communicating with fellow dentists regarding patient's care. When designating supernumerary teeth, some of the essential principles must be considered. It should be easily understandable easy to teach, easy to interpret into computer input, readily communicable in print, and easily incorporated into standard charts used in the dental institutes and clinics.[10]

Many dentists have devised their own methods of identifying supernumerary teeth for example adding a letter a, A or S to the parent tooth number. The problem with this method is that the letters can be confused for deciduous teeth.[5] American Dental Association proposed a method of designating supernumeraries in the Universal notation. They represented supernumeraries in the permanent dentition by adding 50 to the tooth number that is closest to the supernumerary tooth. In case of deciduous dentition letter S is added to the tooth that is closest to the supernumerary tooth.[12] The

problem with these systems is that they lack specificity in location, morphology and number of supernumeraries. There is no notation present which communicates information about these three factors. Therefore, the objectives of this study were to assess the prevalence of supernumeraries in the orthodontic patients and present a numbering system for supernumerary teeth which is not only easily understandable and allows quick communication in interdisciplinary dental care but also gives specific information regarding location, morphology and number of supernumerary tooth / teeth. As supernumerary teeth are predominantly seen in association with permanent teeth, the study focuses on supernumerary teeth in permanent dentition. We have named it MRN supernumerary notation (M, R and N being the initials of surnames of the authors).

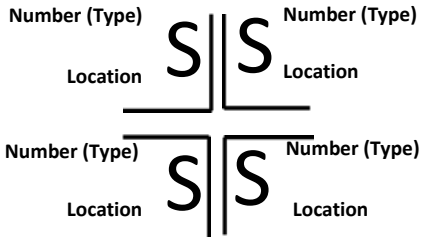
Material and Methods

This descriptive cross-sectional study was conducted in the Department of Orthodontics at Margalla Institute of Health Sciences, Rawalpindi, Pakistan. The study was approved by the Ethical Review Board of the hospital.

All records from March 2010 to February 2017 were assessed from the archives. Convenience sampling technique was employed. Patients records having good quality radiographs, photographs and dental casts were included in the study. Exclusion criteria comprised of patients with history of previous orthodontic treatment, extraction of permanent teeth and any trauma to the maxilla or mandible. Out of them, 550 patients comprising both genders (190 males, 360 females) fulfilled the inclusion criteria. Age range was from 6 years to 30 years. In literature age of patients with supernumerary teeth ranges from 5 to 70 years[2,13,14]. The age range of 6 to 30 years was selected as most patients who visit for orthodontic treatment fall in this age range. For data collection, patient's history proforma (for clinical examination), Intra-oral photographs, dental casts and radiographs were used. The data was used to determine the presence of supernumeraries and their types. Irrespective of the number of supernumeraries present, the incidence was recorded as one.

To test the effect of gender and upper/lower jaw on prevalence of supernumeraries, Chi square test was used. p value was set at ≤ 0.05. Statistical analyses were done using SPSS version 21 (IBM SPSS Version 21, Armonk, NY).

In order to represent a supernumerary tooth, three main dental numbering systems, the Universal (Uni), Federation Dentaire Internationale (FDI) and Palmer/Zsigmondy are used and represented by their specific abbreviation or symbol followed by a dash and an *alphabetical character* for supernumerary (capital S). The *superscript* would consist of two characters, a numerical character denoting the number of supernumeraries followed by alphabetical character (in bracket) showing their type/types. The *subscript* would denote the location. General representation is given as below:



Results

After the assessment of 550 patients, supernumeraries were found in 16 patients. Out of them 10 were males and 6 were females. Overall prevalence of supernumeraries was calculated to be 2.9%.

Prevalence in male/female and maxilla/mandible is shown in Table I. Thirteen patients had a single supernumerary tooth while three had two supernumerary teeth each. No patients had more than two supernumeraries in this study. In regards to type wise distribution, conical supernumerary was the most dominant type (9 teeth, 56.3%) followed by supplemental (4 teeth, 25%). Tuberculate, odontome and molariform showed equal prevalence (1 tooth each, 6.3%). Majority of supernumeraries were found in the maxilla (15) while only one was seen in the mandible. Table II shows distribution of supernumeraries according to their types in respect to gender, jaw and occurrence.

The comparison in prevalence between genders (males = 5.26%, females = 1.67%) showed a statistically significant result (p = 0.017). A similar comparison between jaws (maxilla = 2.73%, mandible = 0.17%) was also significant (p = 0.00).

The three main dental numbering systems, Universal, FDI and Palmer/Zsigmondy would be represented by "Uni", "FDI" and a quadrant respectively. In order to represent a supernumerary, it is proposed to use a combination of an abbreviation denoting the numbering system of choice and capital 'S' with superscripts and subscript.

The *superscript* would consist of two characters. The numerical character denoting the number of supernumeraries followed by alphabetical character (in brackets) denoting their type/types. The alphabetical character will be the first letter of the type/types of supernumeraries present (conical = c, tuberculate = t, molariform = m, supplemental = s, and odontomas = o). The *subscript* would be a tooth number distal to which the supernumerary is located and if it is located in the midline it would be denoted by 'md' followed by abbreviation of upper or lower arch (md-u/ md-l). Abbreviation denoting the upper and lower arch will only be used in Universal and FDI systems as the arches are already represented by quadrants in Palmer system.

In Figure 1, the supernumerary is denoted as:

Universal System; $\text{Uni-S}^{1(s)}_{7}$

FDI notation; $\text{FDI-S}^{1(s)}_{12}$

Palmer/Zsigmondy Notation; $\overline{\lfloor {}^{1(s)}_{2}\text{S}}$

These notations represent that the supernumerary tooth is single in number, supplemental in type and distal to upper right lateral incisor.

In Figure 2, the supernumerary is denoted as:

Universal System; $\text{Uni-S}^{1(t)}_{\text{md-u}}$

FDI notation; $\text{FDI-S}^{1(t)}_{\text{md-u}}$

Palmer/Zsigmondy Notation; or $\overline{{}^{1(t)}_{\text{md}}\text{S}\rfloor}$ $\overline{\lfloor \text{S}^{1(t)}_{\text{md}}}$

In these notations, the superscript denotes supernumerary is single in number and tuberculate in type. The subscript 'md-u' in Universal and FDI systems represent that the supernumerary tooth is present in the midline in upper arch. Similarly, in case of lower arch it will be denoted by md-l. However, this u and l are not necessary in Palmer system due to the presence of a quadrant. If the supernumerary is present in the midline it can be shown (in Palmer Notation) by right or left quadrant alike.

In Figure 3, the supernumeraries are denoted as:

Universal System; $\text{Uni-S}^{2(c,c)}_{md\text{-}u}$

FDI notation; $\text{FDI-S}^{2(c,c)}_{md\text{-}u}$

Palmer/Zsigmondy Notation; $\overset{2(c,c)}{md}\lfloor S \rfloor$ or $\lfloor S \rfloor^{2(c,c)}_{md}$

In these notations, the superscript denotes supernumeraries are two in number and both are conical in type. The subscript 'md-u' represents that the supernumerary teeth are present in the midline in the upper arch in Universal and FDI system. In Palmer system, upper arch is represented by a quadrant.

In Figure 4 an odontome type of supernumerary is denoted as:

Universal numbering system; $\text{Uni-S}^{1(o)}_{9}$

FDI Notation; $\text{FDI-S}^{1(o)}_{21}$

Palmer/Zsigmondy Notation; $\lfloor S^{1(o)}_{1} \rfloor$

Figure 1: Supplemental supernumerary distal to upper right lateral Incisor

Figure 2: Tuberculate form of supernumerary situated in maxillary midline

Figure 3: Two conical supernumeraries present in the maxillary midline

Figure 4: Odontome present distal to upper left central incisor

Table I Prevalence of Supernumeraries

Prevalence of supernumeraries	
Overall	2.9% (16/550)
Male	5.26% (10/190)
Female	1.67% (6/360)
Maxilla	2.73% (15/550)
Mandible	0.17% (1/550)

Table II Distribution of Supernumerary Types in Relation to Gender, Jaws & Occurrence

Type	Total no. of patients with supernumeraries	Gender		Jaw		Occurrence	
		Male	Female	Maxilla	Mandible	Single	Multiple
Conical	9 (56.3%)	6 (66.7%)	3 (33.3%)	9 (100%)	0 (0.0%)	7 (77.8%)	2 (22.2%)
Supplemental	4 (25%)	1 (25%)	3 (75%)	3 (75%)	1 (25%)	3 (75%)	1 (25%)
Tuberculate	1	1	0	1	0	1	0

	(6.3%)	(100%)	(0.0%)	(100%)	(0.0%)	100.0%	(0.0%)
Odontome	1 (6.3%)	1 (100%)	0 (0.0%)	1 (100%)	0 (0.0%)	1 (100%)	0 (0.0%)
Molariform	1 (6.3%)	1 (100%)	0 (0.0%)	1 (100%)	0 (0.0%)	1 (100%)	0 (0.0%)
Total	16 (100%)	10 (62.5%)	6 (37.5%)	15 (93.8%)	1 (6.2%)	13 (81.3%)	3 (18.7%)

Discussion

Supernumerary teeth are a regular occurrence in dental practice but previous studies have shown a varied range of prevalence. The prevalence in this study was calculated to be 2.9% which was comparable to the prevalence (2.7%) reported by Esenlik et al in a study on Turkish children.[2] However, Salem reported it to be only 0.5% in a study conducted on Saudi Arabian children from Gizan region.[15] Similar is the comparison with local studies. Zahara et al reported the prevalence of supernumerary teeth at Khyber College of Dentistry, Peshawar, Pakistan to be 4.1%[16], while at Dr Ishrat Ul Ebad Khan Institute of Oral Health Sciences, Karachi, Pakistan, Mansoor et al reported prevalence of only 0.96%.[17] These differences may be attributed to difference in sample size, methodology or population type.

In literature age ranges of patients with supernumerary teeth are from 5 to 70 years. However, most cases are observed to be between 7 and 10 years of age[13]. In study done by Demiriz et al. supernumeraries were found in ages from 19 to 61 years[14] whereas Esenlik *et al* reported age ranging from 6 to 16 years[2]. This displays that a similar incidence of supernumerary teeth may be detected in both children and young adolescents.

In this study, supernumerary teeth were found to be more prevalent in males than in females (3.5:1) which was in concordance with another local study by Mansoor et al[17] (2.56:1) but in contrast to a Nigerian study by Anibor et al[18] (1.4:1). However, a similar comparison could not be made with some other studies on prevalence as example, Arikan et al[19], Bereket et al[20] and Najmuddin et al[21], because of the reason that rather than comparing the prevalence of male to female, they have just compared the presence of supernumeraries in both the genders.

In this study, maximum number of supernumerary teeth were located in the maxilla (15) as compared to mandible (1) which corresponds to studies done by Patil et al[22] and Saha et al.[23]

Conical type was the most common type (56.3%) in this study which is similar to a study by Schmuckli et al[24] done in Swiss community. Schmuckli et al reported conical supernumerary as the most frequent type, however in their study it was 70% of the total supernumeraries. The percentage of conical type in this study was more near to that (47.98%) of a Taiwanese study by Chou et al.[25] Patil et al[22] have not mentioned the percentages of different types. They have only reported a 0.2 % prevalence of conical supernumerary in their study.

Ideally a notation system should cater for number of supernumeraries, their type & location and ease of communication in written and computed form. Some dental professionals have proposed a very vague numbering sequence for permanent teeth titled the Universal Supernumerary Tooth Numbering System from number 51 to number 82 to match the Universal Tooth Numbering System.[26] American Dental Association represented supernumeraries in the permanent dentition by adding 50 to the tooth number that is closest to the supernumerary tooth. Nevertheless, this

method lacks information regarding the exact location, type and numbers of supernumerary present.[12] Same issues were seen in notations presented by Yusof[27], Acton[28] and Anthonappa et al.[29] Yusof designated location of supernumeraries by labelling anterior as A, premolar as PM and molar as M in Palmer/ Zsigmondy system[27] but there is no mention of type of supernumerary. Acton[28] denoted fourth, fifth and sixth distomolars as numbers 9, 10 and 11 in the Palmer notation system. He disregarded all other types of supernumeraries. Anthonappa et al.[29] designated the location of supernumerary teeth in FDI system by using "ST" (supernumerary tooth) after the parent tooth number, hence ignoring exact number and type of it. Inchingolo et al.[30] documented supernumerary fourth and fifth disto-molars in the left quadrant in maxilla as in FDI numbering system "2.9" and "2.10" respectively. This numbering system only provided information on distomolars and not on any other morphological types. Toureno et al[5] devised a notation system which can be adapted to all the three major numbering systems. They recommended to pinpoint the supernumerary tooth by addition of a letter or a digit to the tooth numbering systems. For example, In Universal Numbering System, a upper left para-molar in maxillary arch at the #15 position would be designated #15.1 (read as "fifteen-one") or alternatively, #15. A (read as "fifteen-A"). For multiple supernumerary teeth, extra letter or digit will be labelled in a progressive manner. For example, three supernumeraries in proximity of lower right first premolar would be represented by #28.A, #28.B and #28.C respectively.[5] It is the only system present which can be applied to three main numbering systems. It also tells the exact location and number of supernumeraries present. But this system poses a risk of confusion regarding letters being mistaken as deciduous teeth and there is no mention of type of supernumerary.

The proposed 'MRN' notation system designates the exact location of the supernumerary, its number and type. An added advantage is that it can be used with all the three numbering systems and is easy to communicate in both written and computed forms.

Conclusions

According to the review of the literature, no accord is seen on the nomenclature of supernumerary teeth. This lack of agreement leads to a serious miscommunication between dentists regarding patient care. An effective supernumerary notation system is presented which gives specific information about exact location, type and number of supernumerary that can be applied to all the three leading dental nomenclatures.

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