Title of the article:

**Abstract**

A Supernumerary teeth (ST) is the additional tooth to the normal series and can be found in almost any region of the dental arch. The reason still not clearly known, one of them is dichotomy of tooth bud, but the more accepted reason is the hyperactivity theory. Supernumerary teeth are present more in permanent dentition than in primary dentition. The occurrence of supernumerary teeth could be single or multiple, unilaterally or bilaterally, impacted or erupted, in maxilla or mandible or both. This article discusses the supernumerary teeth in detail with a case discussion of a non-syndromic twenty four year old girl, with six ST and further a meta-analysis is performed regarding the occurrence patterns, in non-syndromic cases. The present case showed supernumery teeth in all the four quadrants and were bicuspids. In the mandible, ST’s showed a classical clustered flower like presentation. The interesting feature in the presented case was the sequential OPG’s taken at various ages of the patient showing continuous development of ST’s in all four quadrants, thus pointing to the theory of hyperactive dental lamina or Atavism.

**Key-words: Supernumerary Teeth, Hyperdontia, Atavism, Meta-analysis**

**Introduction:**

Hyperdontia is a term that is used for supernumerary teeth to describe extra teeth that develop in addition to the 20 deciduous and 32 Permanent teeth.[1] Atavism is one of the theories for the formation of supernumerary teeth. The other theories include tooth bud splitting and an amalgamation of circumstantial and genetics factors.[2,3,4,5,6,7,8,9] However according to Gardiner,[10] the late developing post permanent teeth, develop from the conception of the dental lamina after the permanent dentition is concluded in its formation.

The present case present a 24 years old female patient who reported to the clinic, with two supernumerary teeth in the lower jaw on either side of dental arch. The teeth classically had a presentation of a clustered flower. The OPGs provided by the patient, which had been taken at various ages, revealed that these supernumerary teeth were not present earlier. But had developed recently which showed that the patient might be suffering from hyperactive dental lamina. This may be the cause of continually developing teeth in her jaw and the condition might continue to develop more teeth.

In the present case, though the patient had no clinical symptoms like pain or swelling etc., but the clustered flower like appearance of mandibular premolars on either sides of the dental arch seemed to show that there were two or more supernumerary teeth on either side of the jaw. The patient also noticed that these teeth appeared just few years back and each one in a span of time after the first one. Also the sequential OPGs taken at various ages show no tooth buds at earlier ages and there was sequential appearance of buds in later life of the patient.

Thus, the tooth buds kept appearing and finally teeth appeared and erupted at various stages of the patient’s life. This unique feature prompted us to report the case, as according to authors the treatment of supernumerary teeth is not only extraction of the respective tooth. But it also requires a long term follow up, along with OPGs at various time intervals to rule out the possibility of the hyperactive dental lamina which might cause more supernumerary teeth to appear in the jaw even at the later stages of the patient’s life.

An extensive research was made into the review of literature on supernumerary teeth, selecting only clearly described cases which presented no clinical or radio-graphical signs of any syndrome. Case which reported 2 or more erupted or non-erupted supernumerary teeth were included. Pubmed was searched to locate relevantly presented case histories. Data was recorded under different columns, author, year, age, gender, total number of teeth, teeth present in maxilla and mandible.

The total numbers of teeth were further differentiated in each type: Anterior, Premolar, Molar, Distomolars, Mesiondens. All variables were carefully recorded and statistical analysis was made to achieve the percentages of involvements.

**Case History:**

The patient reported to the clinic with pain in her lower right molar which was diagnosed with periapical abscess and root canal was performed followed with crown placement for the respective tooth. But during the initial examination, multiple supernumerary premolars were notated on either sides of the mandible, which had a classical clustered flower like presentation. (Figure 1) No medical history was found significant and thus any syndrome or systemic condition was ruled out completely. The patient reported no social or any similar familial history. Patient told that due to various dental problems over the years regular OPGs were taken at different ages [OPG at the age of 14 (Figure 2) and 17 years (Figure 3) ]. A new OPG was also taken when the patient first reported to the clinic. On careful examination of all the OPGs (only the latest one being digital at 24 years of age, Figure 4), it was concluded that there was dental lamina formation around the premolar region of maxilla and mandible, which later formed premolars completely. These supplemental teeth cannot be identified as odontomas as they have shape, structure and tissue differentiation similar to premolars and has this much resemblance that it is difficult to differentiate between actual premolars and the supplemental ones on clinical and radiographic examination. Occlusal radiographs revealed that these teeth were not fused, but were separate supplementary teeth. In case of maxilla the supplemental premolars were found to be impacted and was present close to the sinus linning. No association with cyst or any other lesion was found thus maxillary supplemental premolars were decided to left in situ for the time being, with regular radiographic and clinical follow-up. For mandibular supernumerary teeth removal was planned with patient's approval. No new tooth buds were noted anywhere in maxilla or mandible. Regular follow up every year was advocated to see any further changes in the dentition.

**Results of Meta-Analysis**

A Total of 57 cases of non-syndromic multiple supernumerary teeth describing the presence of five or more supernumeraries were recorded, some of the cases with insufficient information for the statistical study were dismissed (Table 1). A total of 39 Male and 18 Female with non-syndromic multiple supernumerary teeth and a percentage occurrence was recorded which stated that mandible had more occurrences with 58.10% and maxillary followed with 41.90% (Table 2).

Regarding the distribution of teeth as supernumerary teeth, premolar had maximum with 70.48%, followed by anterior (Incisors and Canines) 13.90%, molars 10.86%, distomolars 3.24% and mesiodens 1.52%. Analysis of literature was carried out and it was found that distribution showed greater percentage in males (69.71%) as compared to females (30.29%). Distribution of supernumerary teeth in case of males was found to be 71.17% in maxilla and 68.95% in mandible where as in case of females, it was found to be 40.25% in maxilla and 59.75% in mandible (Table 3). The prevalence of supernumerary teeth in anterior region in males was found to be 14.48% and in females was 12.58%, in premolar region was 70.58% in males and in females 67.92% where as in case of molar region, females showed higher occurrence (13.84%) as compare to males (9.56%). The presence of distomolar in males was found to be 3.01% and in females was 3.77% and the occurrence of mesiodens in males was found to be 1.37% and 1.89% in females.

**Discussion:**

Prevalence of the supernumerary in permanent dentition is found to be 0.26% and it has been seen that 70% of all supernumerary cases are premolars.[11] The occurrence of supernumerary teeth is more in case of mandible as compare to maxilla.12 It has been found that prevalence of single supernumerary teeth accounts for 86% cases, for double is 12% cases and for multiple supernumerary teeth it has been found to be less than 1% cases. Also the prevalence of supernumerary teeth was found to be more frequent in males than females, the ratio being 1:2.3.[4,13,11]

Supernumerary teeth may occur with or without more than twenty syndromes and developmental conditions. However non-syndromic multiple supernumeraries are rarely encountered.[7,14,15,16] In the present case patient had insignificant medical history thus possibilities of any syndromes was ruled out. The theories of formation of supernumerary teeth include atavision, splitting of the tooth bud and a combination of genetic and environmental factors. The most accepted theory is hyperactivity of the dental lamina. According to Gardiner, late developing (post permanent) supernumerary teeth develop from the proliferation of the dental lamina after the permanent dentition is completed. The associated syndromes and developmental conditions with supernumerary teeth include cleidocranial dysplasia, Gardner’s syndrome, cleft lip and cleft palate.[13,17,18] Supernumerary teeth are usually asymptomatic and in most cases are diagnosed by chance. Bodin reported only 2% of Supernumerary teeth undergo pathological changes.[14] Nevertheless, the most commonly encountered complications with these teeth are dentigerous cyst and root resorption of the adjacent tooth.[2] However, in the present case such findings were not present.

The compression of supernumerary teeth on the adjacent teeth and their closeness to the mental and inferior dental nerves may lead to pain. According to literature available some authors suggest that removal of these teeth is the only method of treatment. The timing of removal is important. Whenever these teeth are associated with any pathological changes or whenever they hinder eruption of, or cause mal-position of permanent teeth and removal outweighs benefits they should be removed. [21,26,32,59]

The meta-analysis has revealed that the prevalence of supernumerary teeth ranges from 1.30% to 68.02%, with more frequency in males as compared to females. Rajab LD et al carried study and found that males are affected more than female with a sex ratio of 2:1.1[13]. The present meta-analysis showed similar results.

Ratio of supernumerary teeth frequency in mandible was found to be more as compare to maxilla. The ratio varies widely from 11.1% to 1%. [61,62] Yusuf[59] found that supernumerary teeth were more frequent in mandible and Ackigoz[21] showed 56.8% in mandible. These results are seconded by us in our meta-analysis as well. Whereas Nazif[22]showed 14% but all in maxillary region. Many authors proposed the main location of multiple supernumerary teeth is upper anterior region followed by molar zone.[46,50] Yusuf[13] stated that the most common location for multiple supernumerary teeth was the bicuspid area (62.1%). The present analysis also showed similar prevalence pattern showing premolars followed by anterior region, molars, distomolars and mesiodens.

Acikgoz[21] noted another interesting feature of the condition, as bilateralism of non syndromic supernumerary teeth which is also seen in present case.

C**onclusion**

Supernumerary teeth can be discovered at any age. Mandibular region is the most prevalent area for supernumerary teeth. Regular follow-ups, with OPGs should be done even in the cases where supernumerary teeth have been removed, to eliminate the case of hyperactive dental lamina, which may cause more teeth to develop in the jaw.

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**Tables & Charts**

**Table 1: Data Set for Supernumerary Teeth**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author** | **Gender, Age** | **No. of  Teeth** | **Maxilla** | **Mandible** | **Anterior** | **Premolar /  Bicuspids** | **Molar** | **Distomolars** | **Mesiodens** |
| Priya N et al.,2013 | F,24 | 6 | 2 | 4 | 0 | 6 | 0 | 0 | 0 |
| Santosh et al.25,2012 | M,35 | 3 | 0 | 3 | 0 | 3 | 0 | 0 | 0 |
| Ledesma-Montes  et al.23,2012 | F,12 | 12 | 1 | 11 | 4 | 6 | 2 | 0 | 0 |
| Ferriol et al.26,2011 | F,12 | 14 | 5 | 9 | 2 | 8 | 4 | 0 | 0 |
| Ferriol et al.26,2011 | M,20 | 12 | 6 | 6 | 0 | 12 | 0 | 0 | 0 |
| Kaya et al.63,2011 | F,39 | 5 | 1 | 4 | 0 | 5 | 0 | 0 | 0 |
| Inchingolo et al.27,2010 | F,17 | 5 | 3 | 2 | 0 | 0 | 5 | 0 | 0 |
| Hyun et al.11,2008 | M,13 | 6 | 2 | 4 | 0 | 6 | 0 | 0 | 0 |
| Hyun et al.11,2008 | F,20 | 5 | 0 | 5 | 0 | 5 | 0 | 0 | 0 |
| Hyun et al.11,2008 | M,17 | 5 | 0 | 5 | 0 | 5 | 0 | 0 | 0 |
| Sivapathasundharam & Einstein28,2007 | M,20 | 14 | 5 | 9 | 2 | 12 | 0 | 0 | 0 |
| Srivatsan and Aravindha Babu29, 2007 | F,19 | 10 | 2 | 8 | 2 | 6 | 2 | 0 | 0 |
| Wang et al.30,2007 | F,11 | 16 | 8 | 8 | 0 | 14 | 0 | 2 | 0 |
| Acikgoz et al.21, 2006 | M,27 | 8 | 4 | 4 | 1 | 7 | 0 | 0 | 0 |
| Acikgoz et al.21, 2006 | M,20 | 7 | 4 | 3 | 0 | 7 | 0 | 0 | 0 |
| Acikgoz et al.21, 2006 | M,17 | 5 | 2 | 3 | 2 | 3 | 0 | 0 | 0 |
| Acikgoz et al.21, 2006 | M,33 | 6 | 2 | 4 | 1 | 5 | 0 | 0 | 0 |
| Acikgoz et al.21, 2006 | M,20 | 6 | 1 | 5 | 0 | 6 | 0 | 0 | 0 |
| Acikgoz et al.21, 2006 | M,22 | 5 | 3 | 2 | 2 | 3 | 0 | 0 | 0 |
| Nayak & Mathian31, 2006 | M,13 | 13 | 6 | 7 | 1 | 10 | 2 | 0 | 0 |
| Batra et al.32, 2005 | F,17 | 11 | 3 | 8 | 2 | 8 | 0 | 0 | 1 |
| Batra et al.32,2005 | M,20 | 8 | 0 | 8 | 4 | 4 | 0 | 0 | 0 |
| Arathi & Ashwini33, 2005 | M,12 | 12 | 5 | 7 | 3 | 9 | 0 | 0 | 0 |
| Bartleman34, 2005 | M,18 | 12 | 6 | 6 | 2 | 10 | 0 | 0 | 0 |
| Manrique Mora35, 2004 | M,12 | 5 | 1 | 4 | 0 | 5 | 0 | 0 | 0 |
| So36,2003 | M,15 | 11 | 2 | 9 | 2 | 9 | 0 | 0 | 0 |
| Ng'ang'a et al.37, 2002 | M,14 | 8 | 4 | 4 | 0 | 8 | 0 | 0 | 0 |
| Ng'ang'a et al.37, 2002 | F,13 | 7 | 2 | 5 | 0 | 5 | 2 | 0 | 0 |
| Arcuri et al.38,2002 | F,09 | 13 | 8 | 5 | 1 | 7 | 2 | 2 | 1 |
| Duffy39,2001 | M,23 | 13 | 6 | 7 | 1 | 12 | 0 | 0 | 0 |
| Sharma40,2001 | F,12 | 11 | 7 | 4 | 5 | 6 | 0 | 0 | 0 |

**Table 1: Data Set for Supernumerary Teeth .. continued.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author** | **Gender, Age** | | **No. of  Teeth** | **Maxilla** | **Mandible** | **Anterior** | **Premolar /  Bicuspids** | **Molar** | **Disto-molars** | **Mesiodens** |
| Desai & Shah41, 1998 | M,36 | 16 | | 9 | 7 | 2 | 6 | 5 | 2 | 1 |
| Desai & Shah41, 1998 | M,25 | 7 | | 5 | 2 | 0 | 4 | 3 | 0 | 0 |
| Mercury & O'Neil42, 1998 | F,17 | 11 | | 3 | 8 | 0 | 8 | 0 | 2 | 1 |
| Rizzuti & Scotti43, 1997 | M,10 | 22 | | 11 | 11 | 9 | 10 | 0 | 3 | 0 |
| Mason et al.44, 1996 | M,15 | 16 | | 6 | 10 | 2 | 11 | 0 | 3 | 0 |
| Mason et al.44, 1996 | F,12 | 5 | | 3 | 2 | 0 | 4 | 1 | 0 | 0 |
| Mason et al.44, 1996 | M,15 | 5 | | 2 | 3 | 0 | 5 | 0 | 0 | 0 |
| Hopcraft.45,1996 | M,18 | 10 | | 3 | 7 | 0 | 8 | 2 | 0 | 0 |
| King et al.46,1993 | F,13 | 6 | | 3 | 3 | 0 | 6 | 0 | 0 | 0 |
| King et al.46,1993 | M,18 | 6 | | 4 | 2 | 0 | 6 | 0 | 0 | 0 |
| King et al.46,1993 | M,30 | 8 | | 3 | 5 | 0 | 8 | 0 | 0 | 0 |
| Reichart47,1992 | M,18 | 7 | | 4 | 3 | 0 | 7 | 0 | 0 | 0 |
| Yucel48,1992 | M,22 | 6 | | 1 | 5 | 0 | 6 | 0 | 0 | 0 |
| Yusof & Awang59, 1990 | M,24 | 16 | | 5 | 11 | 0 | 11 | 5 | 0 | 0 |
| Yusof & Awang59,1990 | F,22 | 10 | | 3 | 7 | 0 | 8 | 2 | 0 | 0 |
| Fitzgerrald & Zallen49, 1990 | M,20 | 12 | | 5 | 7 | 3 | 8 | 0 | 1 | 0 |
| Acton50,1987 | M,24 | 7 | | 4 | 3 | 0 | 1 | 6 | 0 | 0 |
| Leslie51,1984 | M,25 | 6 | | 2 | 4 | 0 | 3 | 3 | 0 | 0 |
| Rosenthaler & Berdeman52,1983 | F,26 | 6 | | 6 | 0 | 0 | 4 | 2 | 0 | 0 |
| Stevenson & Mckechnie53,1980 | M,10 | 12 | | 6 | 6 | 1 | 7 | 0 | 0 | 4 |
| Shusterman et al.54,1978 | F,07 | 6 | | 4 | 2 | 4 | 2 | 0 | 0 | 0 |
| Foley & del Rio55,1978 | M,22 | 16 | | 10 | 6 | 4 | 8 | 2 | 2 | 0 |
| Stevenson & Mckechnie56,1975 | M,10 | 11 | | 6 | 5 | 5 | 6 | 0 | 0 | 0 |
| Barnett57,1974 | M,12 | 6 | | 2 | 4 | 0 | 2 | 4 | 0 | 0 |
| Finkel et al.58,1974 | M,24 | 9 | | 3 | 6 | 0 | 6 | 3 | 0 | 0 |
| Ruhlman & Neely59,1964 | M,14 | 9 | | 6 | 3 | 6 | 3 | 0 | 0 | 0 |
| Total Numbers |  | 525 | | 220 | 305 | 73 | 370 | 57 | 17 | 8 |

**Table 2: Percentage of Occurrences of Supernumerary in Data Set**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Maxilla** | **Mandible** | **Anterior** | **Premolar** | **Molar** | **Distomolar** | **Mesiodens** |
| 41.90% | 58.10% | 13.90% | 70.48% | 10.86% | 3.24% | 1.52% |

**Chart 1: Percentage of Occurrences of Supernumerary in Men & Women**

**Figure Captions**



**Figure 1 :Intra oral picture showing the lower supplemental teeth and cluster formation at the age of 24 years.**



**Figure 2: OPG of the patient taken at 14 years.**



**Figure 3: OPG of the patient taken at 17 years.**



**Figure 4: OPG of the patient taken at 24 years.**