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ABSTRACT

The human dentition does not always consist of 32 teeth. At times, extra tooth/teeth may be present. A supernumerary tooth is any tooth or teeth substance in excess of the usual configuration of twenty deciduous teeth and thirty two permanent teeth. Supernumerary teeth are one of the common dental anomalies which are prevalent in all populations, in both dentitions, in all age groups. They may present themselves in multiple locations within the oral cavity. Multiple supernumerary teeth are also associated with certain syndromes. Hence, a clinician must possess a sound knowledge about this developmental anomaly in order to correctly diagnose as well as plan the treatment. This study focuses on the clinical and radiographic findings of supernumerary teeth as well as their associated complaints and effects on surrounding structures.

KEYWORDS: supernumerary tooth, mesiodens, distomolar, hyperdontia

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INTRODUCTION & REVIEW :

A supernumerary tooth (or hyperdontia) is defined as an increase in the number of teeth in a given individual.^{1, 2, 3, 4, 5} It is also defined as any tooth or teeth substance in excess of the usual configuration of twenty deciduous teeth and thirty two permanent teeth.^{6, 7, 8, 9, 10}

The etiology of supernumerary teeth is not fully understood. Both genetic and environmental factors have been proposed.^{5, 6, 8, 11} Sex-linked mode of inheritance has been suggested as supernumerary teeth are twice as common in males as in females in the permanent dentition.^{8, 12, 13} Supernumerary teeth occur due to disturbances during the dental development stage of morphodifferentiation, possibly with alterations during the stage of histodifferentiation. It was originally postulated that supernumerary teeth (mesiodens) represented a phylogenetic relic of extinct ancestors who had 3 central incisors. This theory, known as phylogenetic reversion (atavism),^{6, 8} has now been largely discarded by embryologists. The most widely accepted theory is local and independent hyperactivity of dental lamina,^{6, 11, 14, 15, 16, 17, 18} in which the lingual extension of an additional tooth bud forms a eumorphic tooth, while the rudimentary

form arises from proliferation of the epithelial remnants of the dental lamina induced by dentition pressure. The other proposed theory is dental germ dichotomy theory where the dental lamina is divided into 2 parts of equal or different size, giving rise to two teeth of equal length, or one normal tooth and a dysmorphic one.^{1, 2, 6, 8, 9, 19, 20, 21, 22}

The reported prevalence of single supernumerary tooth in permanent dentition ranges between less than 1% and 4%, whereas the prevalence in the primary dentition is said to be 0.3 to 0.8%.^{4, 9, 10, 14, 18, 20}

The presence of only one supernumerary tooth occurs in 76-86% of cases; two supernumerary teeth in 12-23% and only 1% of individuals have three or more supernumerary teeth. Supernumerary teeth are found more commonly in males than in females.^{3, 6, 9, 14, 16, 17, 21, 22, 23, 24} The male to female ratio has been reported as 9:2.²⁵ The most common site of occurrence of supernumerary teeth is in the maxillary midline,^{21, 26, 27} where they are referred to as mesiodens,^{10, 17} representing 80% of all supernumerary teeth.⁹ This location is followed in decreasing order of frequency by upper fourth molars²⁷ (distal to third molars) also known as distomolars, upper paramolars (supernumerary teeth buccally placed to molars)⁶ and

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proportionately far behind – by lower premolars, upper lateral incisors, lower fourth molars and lower central incisor region. Supernumerary teeth in upper premolars, upper and lower canines and lower lateral incisors are exceptional.¹ The supernumerary teeth happen with smaller frequency in deciduous teeth, being more common in upper incisor area.^{18, 24} However, when multiple supernumerary teeth are present in the absence of any associated systemic condition/ syndrome, the mandibular premolar region is the common site of occurrence.^{14,37}

According to their shape, supernumerary teeth can be classified into four types: (1) tuberculate (barrel-shaped, with more than 1 cusp or tubercle); (2) supplemental (identical to the morphology of teeth in the normal series); and (3) conoid (peg-shaped conical tooth). (4) Odontoma. Conical shaped supernumerary teeth are the most common and are usually found in the anterior maxillary area. Supplemental supernumerary teeth usually occur in the premolar region, while tuberculate are associated with delayed eruption of adjacent incisors.^{6,14,16,22}

Multiple supernumerary teeth (hyperdontia) are commonly associated with various syndromes such as Gardner's syndrome,^{2, 6, 9, 12, 13, 16, 21, 24, 25, 28, 29, 30} Fabry-Anderson syndrome, Ehlers-Danlos syndrome,²¹ Nance-Horan syndrome, steroid dehydrogenase deficiency, Rothmund-Thomson syndrome,¹⁵ facial fistulas or cleidocranial dysplasia^{2,6,9,12,13,16,21,24,28,30,31,32, 33,34} or also in association with cleft lip and palate.^{2,6, 13,16,19,21,22,24,25,26,30,35,36}

Clinically, supernumerary teeth are able to cause various local disturbances, including retention of the primary tooth, delayed eruption of the permanent tooth, food lodgment, interproximal caries, ectopic eruptions, tooth displacements, diastema, follicular cysts and other alterations, requiring surgical or orthodontic intervention.^{1,7,9,25}

Conventional radiographs in the form of intraoral periapical (IOPA), occlusal,

orthopantomograph(OPG) and lateral cephalograph are taken to know position of supernumerary teeth.^{6,21} OPG is advised in cases of multiple supernumerary teeth which serves as a screening aid and provides additional information regarding supernumerary teeth. Tube shift technique enables the practitioner to decide the position of supernumerary teeth.⁶ Nevertheless, in some cases, they do not provide all the information needed in order to locate the supernumerary teeth three dimensionally in relation to the adjacent structures and to make decisions about therapeutic options. In such cases, computed tomography (CT) can be used as a basic technique to assess patients with supernumerary teeth, and recently, cone-beam computed tomography (CBCT) has been suggested as a substitute for CT due to its low radiation dose and lower cost.⁹

Extraction of these teeth is a general rule for avoiding complications.⁶ Kruger considers that the extraction of supernumerary teeth should be postponed until the apices of the adjacent teeth have sealed. According to Donado, treatment should be provided as soon as possible in order to avoid displacement and delayed eruption of permanent teeth.¹ When dealing with unerupted supernumerary teeth, it should be understood that each case must be fully studied with a multidisciplinary approach (pedodontics, orthodontics and oral surgery) so as to decide the prime moment for extraction. Likewise, an evaluative monitoring should also be done.⁹

MATERIALS AND METHODS

- The study included total 50 patients coming to the Out Patient Department (OPD) of the Oral Medicine and Radiology Department of the institute during the period July 2009 to June 2010.
- 50 patients were selected from the dental OPD with criteria of an extra tooth in any arch as clinical finding or incidental finding during routine clinical or radiographic examination.
- All 50 patients were asked specific questions prepared for this study and the related details were

filled in the special proforma prepared for the study.

- General examination of all the patients was done to see any abnormality related to head, facial appearance, clavicle, abdominal pain, diarrhea, constipation and rectal bleeding, etc. to rule out any related syndrome.
- Intraoral examination was carried out to see the dentition in which supernumerary teeth is present as well as to determine its location, number, size and shape, cuspal anatomy, eruption status and to see any harmful effect on the dentition.
- Clinical photographs of all patients were taken.
- Radiographs in form of IOPA, radiovisuograph (RVG), occlusal or OPG were taken to evaluate the root morphology of supernumerary teeth & its relation with surrounding structures.
- In patients with erupted supernumerary teeth, diagnostic impressions were taken and study models were prepared to evaluate the exact position and relation of the supernumerary teeth with adjacent teeth.
- On the basis of clinical and radiographic findings, final diagnosis was made and treatment plan was decided accordingly.

RESULTS

A total of 50 patients were included in the study selected from OPD (7649 patients) of the institute. Based on the epidemiological results obtained, the prevalence rate of supernumerary teeth in the present study was 0.65%.

Table I shows age and gender distribution of patient with supernumerary teeth. Maximum patients [13 (26%)] were between age group of 21 to 30 years and least patients were recorded between 51 to 70 years [2(4%)]. It was found to be more common in males [39 (78%)] than in females [11 (22%)]. Familial tendency for the occurrence of supernumerary teeth was not seen in any patient.

TABLE I

TABLE I Distribution of supernumerary teeth according to age and gender			
AGE (IN YEARS)	MALE	FEMALE	TOTAL NUMBER OF PATIENTS
0-10	4 (66.67%)	2 (33.33%)	6(12%)
11-20	10 (83.33%)	2(16.67%)	12(24%)
21-30	10 (76.92%)	3 (23.08%)	13 (26%)
31-40	9 (81.82%)	2 (18.18%)	11 (22%)
41-50	5 (83.33%)	1 (16.67%)	6 (12%)
51-60	1 (100%)	0 (0%)	1 (2%)
61-70	0 (0%)	1 (100%)	1 (2%)
TOTAL	39 (78%)	11 (22%)	50

Table II shows distribution of patient based on their chief complain. Out of 50 patients, most of the patient [34(68%)] came with a chief complain which was not related to supernumerary teeth. Out of these 34 patients, maximum patient [15(44.12%)] had other teeth (other than mesiodens, paramolar and distomolar) followed by mesiodens [9 (26.47%)], distomolar [6 (17.65%)] and paramolar [4 (11.76%)]. 11 (22%) patients came with a chief complain which was related with effect of supernumerary teeth on surrounding dentition e.g. spacing, diastema, displacement, etc. of which 7 (63.64%) patients were having mesiodens and 4 (36.36%) patients were having paramolar. 5 (10%) patients came with a specific complain of an extra tooth in oral cavity of which all patients (100%)were having mesiodens.

TABLE II

TABLE II Distribution of supernumerary teeth based on chief complain of patient					
Chief Complain	Mesiodens	Paramolar	Distomolar	Other	Total
Related to supernumerary teeth	5 (100%)	0	0	0	5 (10%)
Related with effect caused by supernumerary teeth	7 (63.64%)	4 (36.36%)	0	0	11 (22%)
Not related with supernumerary teeth (Incidental finding)	9 (26.47%)	4 (11.76%)	6 (17.65%)	15 (44.12%)	34 (68%)
Total	21(42.00%)	8 (16.00%)	6 (12.00%)	15 (30.00%)	50

Table III shows distribution of supernumerary teeth in all the three types of dentition (deciduous/mixed/permanent). It was found that supernumerary teeth were commonly found in permanent dentition [38 (76%)] followed by mixed dentition [11 (22%)] and deciduous dentition [1

(2%)]. In permanent dentition, 16 (42.11%)patients were having mesiodens, followed by paramolar and other in 8 (21.05%)patients each and 6 (15.79%)patients with distomolar. In mixed dentition, 6 (54.55%)patients had other teeth and 5 (45.45%)patients were having mesiodens. In deciduous dentition, only one patient (100%) with other teeth was seen.

TABLE III

Dentition	Mesiodens	Paramolar	Distomolar	Other	Total
Deciduous	0	0	0	1 (100%)	1 (2%)
Mixed	5 (45.45%)	0	0	6 (54.55%)	11 (22%)
Permanent	16 (42.11%)	8(21.05%)	6 (15.79%)	8 (21.05%)	38 (76%)
Total	21 (42%)	8 (16%)	6 (12%)	15 (30%)	50

Table IV shows distribution of supernumerary teeth in maxilla and mandible along with their presence in single and pair forms. It was found that mesiodens were seen most common in maxilla [21 (100%)patients]. Out of these 21 patients, it occurred singly in 19 (90.48%) patients while in pair in 2 (9.52%) patients. Paramolar were seen more in maxilla [6 (75%)patients] than in mandible [2 (25%)patients]. In maxilla 4 (50%)patients had single paramolars while 2 (25%)patients had paired paramolars. In mandible, only 2 (25%)patients with single paramolar were seen. Distomolar were found more common in maxilla [4 (66.68%)patients] than in mandible [2 (33.32%)patients]. In maxilla they were all singly present whereas in mandible [1(50%)patients] was single and [1 (50%)patients] was paired. Supernumerary teeth in other locations were more common in maxilla [12 (80.00%)patients] than in mandible [3 (20.00%)patients] and all were singly present.

TABLE IV

TEETH		Mesiodens	Paramolar	Distomolar	Others	Total out of 50 patients
Maxilla	Single	19 (90.48%)	4(50%)	4 (66.68%)	12 (80%)	39 (78%)
	Paired	2 (9.52%)	2 (25%)	0	0	4 (8%)
	Total	21(42%)	6 (12%)	4 (8%)	12 (24%)	43 (86%)
Mandible	Single	0	2 (25%)	1 (16.66%)	3 (20%)	6 (12%)
	Paired	0	0	1 (16.66%)	0	1 (2%)
	Total	0	2 (4%)	2 (4%)	3 (6%)	7 (14%)

Table V shows distribution of various types supernumerary teeth (Mesiodens/Paramolar/Distomolar/other)

according to their different shapes. Mesiodens was seen more in conical form [22(95.65%) patients] (**Figure. 1**) followed by molariform form [1(4.35%)patient] (**Figure. 2**) Tuberculate, supplemental and globular forms were not seen in mesiodens. Paramolars (**Figure. 3**) were commonly seen in conical form [6 (60.00%)patients] followed by supplemental [3 (30.00%)patients] and tuberculate form [1 (10.00%)patients]. Distomolar were commonly seen in conical form [6 (85.71%)patients] followed by tuberculate form [1(14.29%)patient]. Other supernumerary teeth were seen in supplemental form [8 (53.33%)patients] followed by conical [6 (40.00%)patients] and globular form [1 (5.88%)patient].

TABLE V

Teeth	Mesiodens	Paramolar	Distomolar	Others	TOTAL (Out of 50 patients)
Conical	22 (55.00%)	6 (15.00%)	6 (15.00%)	6 (15.00%)	40 (72.73%)
Tuberculate	0	1 (50.00%)	1 (50.00%)	0	2 (03.63%)
Supplemental	0	3 (27.27%)	0	8 (72.73%)	11 (20.00%)
Globular	0	0	0	1 (100%)	1 (01.82%)
Molariform	1(100%)	0	0	0	1 (01.82%)
TOTAL (Out of 50 patients)	23 (41.82%)	10 (18.18%)	7 (12.73%)	15 (27.27%)	55



Fig: 1 – Photograph showing a conical mesiodens exactly between two central incisors



Fig: 2 – Photograph showing molariform mesiodens



Fig: 3 – Photograph showing paramolars in upper and lower arches.

Table VI shows distribution of supernumerary teeth based on their eruption status in oral cavity. Maximum supernumerary teeth were fully erupted [34 (61.82)patients] followed by unerupted [16(29.09)patients] and partially erupted [5 (9.09%)patients] supernumerary teeth. Fully erupted supernumerary teeth were 14 (41.18%) mesiodens followed by 9 (26.47%) other supernumerary teeth, 8 (23.53%) paramolars and 3 (08.82%) distomolars. Unerupted supernumerary teeth were 7 (43.75%) mesiodens followed by 5 (31.25%) other supernumerary teeth, 2 (12.50%) each paramolars and distomolars which were diagnosed incidentally on radiographs (Figures. 4 & 5). Partially erupted supernumerary teeth were 2 each (40%) mesiodens and distomolars and 1 (20%) other supernumerary teeth.

TABLE VI

Table – VI Distribution of supernumerary teeth according to their eruption status					
Teeth	Mesiodens	Paramolar	Distomolar	Others	TOTAL (out of 50 patients)
Fully Erupted	14 (41.18%)	8 (23.53%)	3 (08.82%)	9 (26.47%)	34 (61.82%)
Partially Erupted	2 (40.00%)	0	2 (40.00%)	1 (20.00%)	5 (09.09%)
Unerupted	7 (43.75%)	2 (12.50%)	2 (12.50%)	5 (31.25%)	16 (29.09%)
TOTAL (out of 50 patients)	23 (41.82%)	10 (18.18%)	7(12.73%)	15 (27.27%)	55



Fig: 4 – Radiograph (IOPA) showing two conical mesiodens: one is erupted whereas the other one is impacted and inverted



Fig: 5 – OPG showing paired impacted supernumerary teeth in the mandibular arch

Table VII shows other lesions associated with supernumerary teeth. Only 3 (6%)patients showed associated lesion with supernumerary teeth. The lesions seen were dentigerous cyst, partial anodontia (Figure. 6), and complex odontoma in 1 patient (2%) each.

TABLE VII

Table – VII Lesion associated with supernumerary teeth	
Lesions	Total (out of 50 patients)
Dentigerous Cyst	1 (2%)
Partial Anodontia	1 (2%)
Complex Odontoma	1 (2%)
Total (out of 50 patients)	3 (6%)



Fig: 6 – Photograph showing association of supernumerary teeth with partial anodontia

Table VIII shows the effects of supernumerary teeth on the dentition. The most common being displacement [8 (16%)patients] (**Figure. 7**) spacing [6 (12%)patients] and diastema [5 (10%)patients]. Displacement was seen in 6 (75%)patients with mesiodens and 2 (25%)patients with other supernumerary teeth. Spacing was seen in 3 (50%)patients each with mesiodens and other supernumerary teeth. Diastema was seen in 5 (100%)patients with mesiodens. Impacted teeth, crowding and fusion were found in one (2%)patient each (**Figure. 8**).

TABLE VIII

Table – VII Distribution of supernumerary teeth according to its effects on surrounding dentition					
Harmful Effects	Mesiodens	Paramolar	Distomolar	Other	Number of Patients
Crowding	0	0	0	1 (100%)	1 (2%)
Displacement	6 (75.00%)	0	0	2 (25.00%)	8 (16%)
Diastema	5 (100%)	0	0	0	5 (10%)
Impacted Teeth	0	0	0	1 (100%)	1 (2%)
Fusion	1 (100%)	0	0	0	1 (2%)
Spacing	3 (50.00%)	0	0	3 (50.00%)	6 (12%)
None	6 (21.43%)	8 (28.57%)	6 (21.43%)	8 (28.57%)	28 (56%)
Total	21 (42.00%)	8 (16.00%)	6 (12.00%)	15 (30.00%)	50



Fig: 7- Showing a mesiodens causing displacement of I1 with crowding



Fig: 8 - Supernumerary tooth (Mesiodens) fused with right central incisor

No effect was seen in 8 (28.57%) patients each with paramolars and distomolars followed by 6 (21.43%) patients each with mesiodens and other supernumerary teeth.

Treatment of supernumerary teeth depends on chief complain of patient and its effect on permanent dentition. Extraction and orthodontic treatment is advised as required in patient with supernumerary teeth.

DISCUSSION

Supernumerary teeth are infrequent developmental dental alterations that may manifest in any zone of the dental arches and involve any tooth. They may be associated with syndromes or can be found in non-syndromic population also.¹ The prevalence rate of supernumerary teeth found in present study was in accordance with the previous literatures.^{1,2,6}

The present study reveals that supernumerary teeth are more common in 21-30 years of age, which is in coincidence with the findings of other authors. According to Salcido-Garcia et al, the appearance of supernumerary teeth is more frequent in the first three decades of life than in older age groups.^{1,6} This observation may be due to the fact that a large percentage of such teeth tend to be a casual finding in the course of third molar extractions conducted in patients in this particular age range. As well as patient at this age are more conscious about their appearance and seek dental treatment for correction of spacing or displaced teeth caused by supernumerary teeth.^{1,8,12,30}

Regarding the gender distribution, we coincide with most authors that males are more commonly affected than females.^{1, 7, 8, 9, 25, 28} No case with inheritance occurrence was noted in the present study. There are no satisfactory explanations for the mode of inheritance of supernumerary teeth in literature but occasionally a positive family history exists.²

In present study, most patients having supernumerary teeth were diagnosed incidentally

either on clinical or radiographic examination. The most common complaints associated with supernumerary teeth are spacing, diastema, displacement, etc. However, some patients also came with typical complain of an extra tooth^{7,8,9,25,28} which is in accordance with previous literatures.

Supernumerary teeth are also commonly found in permanent dentition as compared to mixed and deciduous dentition^{6,25} which is in accordance with present study.

Supernumerary teeth are more common in maxilla than in mandible. In maxilla, premaxillary region is the most common site. Mesiodens was the most common supernumerary teeth followed by paramolar and distomolar. Supernumerary teeth occurring at other sites in the jaws (other than mesiodens, paramolar, distomolar) are more frequently seen in maxilla and are singly present with supplemental shape.^{6,25}

The most common shape of supernumerary teeth is conical shape^{1, 8, 28, 37} followed by supplemental, tuberculate and rare is molariform shape.^{2, 8, 9, 28} A dichotomy of the tooth bud and local hyperactivity in the dental lamina has also been suggested as a possible etiological factor for such findings.^{1,2,6,13,23,25,37}

Radiographs (in form of IOPA, occlusal and OPG) were taken in all the patients as indicated. Most of the supernumerary teeth in present study were fully erupted and diagnosed clinically only. However, unerupted supernumerary teeth were also present which were diagnosed incidentally on radiographs. Most common unerupted supernumerary tooth was mesiodens which was often in inverted position.^{6,8,23} OPG was advised in patient with suspected multiple impacted supernumerary teeth. This is supported by the literature that thorough examination for prevalence of supernumerary teeth is through clinical and radiographic examination.^{1,6,9,12,20}

In the present study association of supernumerary teeth with dentigerous cyst,⁷ complex odontoma

and partial anodontia has been found in one patient each. Association of supernumerary teeth with partial anodontia has been reported in literature also. Disturbance in migration, proliferation and differentiation of the neural crest cells and interaction between the epithelial and mesenchymal cells during initiation stage of tooth development has been suspected as possible cause.^{3,6,17} No patient with cleidocranial dysplasia^{31, 32, 33, 34} or Gardner's Syndrome²⁹ or Cleft lip³⁵ was found in our study because of the rarity of these conditions and patients with such conditions rarely seek dental treatment as first choice. So this study fell into the category of non-syndromic supernumerary teeth.^{8,9}

Various effects like crowding, failure of eruption of adjacent permanent teeth, ectopic eruption, displacement, diastema, root resorption of adjacent teeth, spacing and eruption of teeth into the nasal cavity and antrum are reviewed in the literature. In the present study, various harmful effects like crowding, displacement, diastema, impacted teeth and spacing were recorded.^{1,2,6,20,21,24}

In the present study, supernumerary teeth that caused harmful effects on the surrounding dentition or was patient's chief complain were extracted followed by orthodontic treatment as required. Patients with supernumerary teeth with other associated lesions were treated with the required treatment.^{2,5,6,8,13,16,20,21,25,28,37}

CONCLUSION

Based on this study, it can be concluded that supernumerary teeth are one of the common dental anomalies; more commonly seen in maxilla than mandible, males than females, third decade than other decades of life and permanent dentition than deciduous dentition. Most commonly supernumerary teeth are seen in conical shape. Most common effects caused by supernumerary teeth on surrounding dentition include displacement, diastema and spacing. They may occur as isolated dental finding or as part of a syndrome. Detection of supernumerary teeth is best achieved by thorough clinical and radiographic examination. An alert

clinician should suspect and search for supernumerary teeth when encountered by delayed, ectopic or asymmetric eruption. Early diagnosis of supernumerary teeth minimizes the treatment

required and prevents development of associated problems.

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