



SUPERNUMERARY TEETH: CO-RELATION AMONG ITS DISTINCTIVE VARIABLES AND RELATED COMPLICATIONS- AN ORIGINAL STUDY

Meenakshi Bodh, Samir Dutta, Ritu Namdev, Mitali Jain, Arun Kumar*

Department of Pedodontics & Preventive Dentistry, Post Graduate Institute of Dental Sciences, Rohtak.

Corresponding Author:- **Arun Kumar**
E-mail: drarun922@gmail.com

Article Info	ABSTRACT
<p>Received 15/10/2015 Revised 27/10/2015 Accepted 02/11/2015</p> <p>Key words: Supernumerary, Complications, Rudimentary, Teeth.</p>	<p>The Supernumerary teeth are developmental anomaly that can disturb the entire oral cavity functionally and aesthetically. The clinical behavior and radiographic appearance of supernumerary teeth is necessary for prime recognition, early diagnosis and long term treatment planning. Aims to determine the prevalence, clinical features and complications associated with supernumerary teeth; and to evaluate the relationship between different variables. The study involved 77 children aged 6-12 years with 97 supernumerary teeth visited a tertiary care hospital. The data collected includes relevant/demographic information of the subject, number, morphology, location, sagittal position, orientation, root development, eruption status and complications resulted from supernumerary teeth. Thereafter, the relationship between variables was analyzed statistically. The prevalence was 1.76 with a male predominance (2.08:1). Single Supernumerary 57 and double in 20 children were found. Rudimentary type was the most predominant (85.56%) whereas supplemental were 14.43%. Out of 48.45% clinically erupted pre-maxillary supernumerary teeth, 72.16% were-palatal and 79.38% vertically oriented. Most common complication was displacement of adjacent teeth in 18 subjects (23.57%) followed by rotation (14.81%), diastema (13.58%), crowding (12.98%), delayed eruption (11.68%), impaction (6.49%), deviated occlusion (5.19%) and alteration in path of eruption of permanent teeth (3.89%). Statistical significant relationships were found between studied variables.</p>

INTRODUCTION

Tooth development is a perpetual process in which a number of physiologic growth processes and various morphologic stages interplay to consummate the final form and structure. Any clogging in the interim can lead to multitudinous anomalies[1]. Supernumerary teeth are subtle transmutation of odontogenesis conferred as preeminent number of teeth than in standard dental formula. Discrete studies have been organized for reckoning prevalence of supernumerary teeth reporting it to be 0.03% to 0.66% in primary dentition to 1.5% to 3.36% in permanent dentition and 0.45% to 2% collectively [2]. While there is no cogent sex distribution in primary supernumerary teeth, males are afflicted twice as

frequently as females in permanent dentition [2]. It can be substantiated in discrete forms, number, location, position and orientation [3]. It may either remain as a silent member of the dentition or may badger the integrated dentition inciting delayed eruption, displacement, crowding, spacing, dilacerations, root resorption, diastema, rotation, cyst formation /or nasal eruption [4-7].

Although copious studies have been conducted to surmise the prevalence, clinical features and complications of supernumerary teeth, only few handful studies have centralized on the correlation between the disparate variables of supernumerary teeth. Throwing more light on these perspective of supernumerary teeth can avail in



formulating assertive guidelines which in turn acquiesce for more comprehensive long term treatment planning, more favorable prognosis and in certain instances, less extensive interception. Keeping in view the above, the present study was outlined to figure out the prevalence, clinical features, complication and in accession to relate the various variables of supernumerary teeth that can help in premier diagnosis, judicious management and unequivocally surpassing results.

MATERIALS AND METHODS

The study was presided for a time period of two years in the Department of Paediatric Dentistry, Post Graduate Institute of Dental Sciences Rohtak, Haryana. A total of 4352 healthy subjects (2399 males and 1953 females) aged 6-12 years were examined clinically in the outpatient department for the presence of supernumerary teeth. Patients with syndromes predisposed to supernumerary teeth such as cleft lip and palate, cleidocranial dysplasia, gardners syndrome were excluded from the study.

Intraoral radiographs were taken for the subjects where supernumerary was present or questionable based on the clinical evaluation. Intra-oral periapical, occlusal and/or panoramic radiographs were considered according to the location of supernumerary teeth and as per patient's need and clinician decision. The tube/horizontal shift technique was used to actuate the sagittal position of the impacted supernumerary teeth. Demographic data of the individual and the clinical characteristics of the supernumerary teeth including number, morphology (supplemental, rudimentary (conical, tuberculate, molariform) location (midline region, lateral incisor region, canine region, premolar region and molar region), sagittal position (palatal, labial, within arch), orientation (inverted, vertical and transverse), eruption status (erupted, impacted), root development (complete, incomplete) and complications associated with them were noted for each subject.

Final decisions regarding characteristics of the supernumerary teeth were taken after surgical removal of the teeth. Additionally the consanguinity of eruption status with shape; sagittal position; orientation; root development and shape with orientation; position; root development and complications were statistically analyzed using chi square test.

RESULTS

The prevalence of supernumerary teeth was found to be 1.76 with male to female ratio of 2.08:1. A total of 97 supernumerary teeth were found in 77 subjects with mean of 1.25. Fifty seven children (74%) had single whereas 20 (26%) had double supernumerary teeth. The results are shown in table 1.

Out of 97 supernumerary teeth found in the study, 83 (85.56%) were rudimentary including 75 conical and 8 tuberculate whereas 14 (14.43%) were supplemental in shape. 86 (88.65%) supernumerary teeth were located in the anterior maxilla in the midline region and 11 in lateral incisor region. Seventy (72.16%) of the supernumerary teeth were palatally positioned, 16 (16.49%) were buccally located and 11 (11.34%) were within the arch. Seventy seven (79.38%) of supernumerary teeth were vertically oriented; 18 were inverted and 2 were transversally oriented. Fourty seven supernumerary teeth were clinically erupted whereas 50 were impacted. Root formation was complete in 87 supernumerary teeth however, 10 had incomplete root formation. Most common observed complication was displacement of adjacent teeth (23.57%) followed by rotation (14.81%), diastema (13.58%), crowding (12.98%), delayed eruption (11.68%), impaction (6.49%), deviated occlusion (5.19%), alteration in path of eruption of permanent teeth (3.89%), root resorption and cystic change in 1.29 % respectively whereas 3.89% had no associated complications. The results are shown in table 2 and 3.

Eruption status of the supernumerary teeth can be swayed by various factors like its morphology, orientation, sagittal position and root completion. Supplemental forms had an eruption rate of 78.57% while rudimentary had 43.37% and the difference was found to be statistically significant ($p < 0.05$). Vertically erupted supernumerary teeth had an eruption rate of 61.03% whereas saggital positioned supernumerary teeth erupted within arch either labially or palatally had an eruption rate of 56.25% and 38.57% respectively. All the supernumerary teeth evaluated had their completed root formation with only 47 teeth erupted. On applying chi-square test the relationship was found to be statistically significant ($p < 0.05$). (Table 4).

All the supplemental and tuberculate form had vertical orientation except one while 74.6% of conical supernumerary teeth had vertical orientation. Analysing the relationship between shapes with orientation statistically, the result was found to be significant ($p < 0.05$). However, when compared with position and root development results were statistically non significant. (Table 5)

Considering the complications caused by supernumerary teeth, the tuberculate form was most commonly (50 %) associated with delayed eruption; supplemental form with displacement (41.16%) and conical form was nearly equal associated with complications like rotation (20%), diastema (16.36%), displacement (16.36%). On applying chi-square test, statistically significant associations were found between the supernumerary teeth their related complications. The results are shown in table 6.



Table 1. Showing the Prevalence and Distribution of Supernumerary Teeth.

Subjects examined Age range=6-12 years		Subjects with supernumerary teeth		Number of supernumerary teeth		Distribution of supernumerary teeth	
Males	Females	Males	Females	Males	Females	One per patient	Two per patient
2399	1953	52	25	64	33	57	20
Total = 4352		77 Prevalence =1.76%		97 Avg in males =1.23 Avg in females= 1.32 Avg in total= 1.25		One per patient=74% Two per patient = 26%	

Table 2. Showing the detailed distribution of factors involved in the study.

Type				Position			Orientation			Eruption status		Root Development	
Acc.to morphology		Acc. to location		Palat al	Labi al	Arch	Vertic al	Inver ted	Transve rse	Erupte d	Impact ed	Compl ete	Incompl ete
Sup ple ment al	Ru dim ent ary	Mid line	LI reg ion	70	16	11	77	18	2	47	50	87	10
14	83	86	11										

Table 3. Showing different types of complications resulting from Supernumerary Teeth.

Complications	Number	Percentage
Displacement	18	23.38
Rotation	12	15.58
Diastema	11	14.28
Crowding	10	12.98
Delayed Eruption	9	11.69
Impaction	5	6.49
Deviated Occlusion	4	5.19
Alteration In Path Of Eruption	3	3.89
None	3	3.89
Cystic Change	1	1.29
Root Resorption	1	1.29

Table 4. Association of eruption status with other variables

Eruption status and shape			Eruption status and orientation			Eruption status and position			Eruption status and root development	
Erupted	SM	RM	V	IV	TS	PL	LL	A	Complete	Incomplete
	11	36	47	0	0	27	9	11	47	0
Impacted	3	47	30	18	02	43	07	0	40	10
Eruption rate	78.57	43.37	61.03	0	0	38.57	56.25	100	54.02	0
$\chi^2=4.61$ P<0.05			$\chi^2=11.73$ P<0.01			$\chi^2=12.22$ P<0.05			$\chi^2=8.42$ P<0.01	
Significant			Significant			Significant			Significant	

SM= supplemental, RM=Rudimentary, V=Vertical, IV=Inverted, TS=transverse, PL=Palatal, LL=Labial, A=Arch.



Table 5. Association of shape with other variables

Shape and Orientation			Shape and Position			Shape and Root Development		
	V	IV	TS	PL	LL	A	Complete	Incomplete
Conical	56	18	1	55	11	9	67	8
Tuberculate	07	0	1	8	0	0	6	2
Supplemental	14	0	0	7	2	5	14	0
Total	77	18	2	70	11	16	77	10
$\chi^2=11.01$ P<0.01			$\chi^2=7.47$ P>0.05			$\chi^2=3.48$ P>0.05		
Significant			Non Significant			Non Significant		

V=Vertical, IV=Inverted, TS=transverse, PL=Palatal, LL=Labial, A=Arch.

Table 6. Complications associated with various forms of supernumerary teeth

Complication	Conical	Tuberculate	Supplemental	Conical and Supplemental
Delayed eruption	3	4	1	1
Diastema	9	1	1	0
Rotation	11	0	1	0
Displacement	9	3	5	1
Deviated occlusion	4	0	0	0
Cystic change	1	0	0	0
Root resorption	1	0	0	0
Crowding	7	0	3	0
Impaction	4	0	1	0
Nasal eruption	0	0	0	0
Alteration in path of eruption of permanent teeth	3	0	0	0
Dilacerated root	0	0	0	0
None	3	0	0	0
Total	55	8	12	2

$\chi^2 = 39.45$; $p < 0.05$ Significant

DISCUSSION

Supernumerary tooth disturbs both the dentition even though a higher incidence of the anomaly is acclaimed in the permanent dentition. These are spasmodically bestowed in primary dentition with a prevalence ranging from 0.02 - 1.9 by Ersin et al and 0.3 - 0.85 by Shah A et al [3-8]. An illusionary rationalization for a low incidence of hyderdontia in primary dentition is on the ground that it is frequently overlooked owing to its customary shape; direction; proper alignment due to the physiologic spaces and often can be mistaken for germination and fusion anomalies [6,9]. Therefore, in the present study children with primary dentition were not subsumed as this might put up an underestimation of prevalence. The prevalence of supernumerary teeth in permanent dentition ranged between 0.15%- 3.8% and this could be accredited to manifold factors like racial variation, differences in ages of subjects and examination methods [10-12]. In studies by MacPhee GG [13] and Sarkar S et al [9], only visual examination was carried out which could be a acumen behind its lower incidence (0.3% and 0.09%) regardless of a higher sample size of 4000 and 2622 children respectively. With only visual examination, the results would be distant down the factual prevalence. In

this study prevalence rate came out to be 1.76% which is greater than that above-mentioned studies. This could be imputed to methodology used as both clinical and radiological evaluation were done; supplemented by periapical radiographs and maxillary occlusal view whenever required. Radiographs were also executed out in those subjects where the subsistence of impacted supernumerary teeth was suspected, based on clinical findings. Sexual dimorphism for supernumerary teeth has been reported by most authors with males being more commonly affected [14-17]. As unvarying with the various studies this study also had a male predominance with male to female ratio of 2.08:1. This gender variation can be traced to either the sex predominance of males over females or the contingency of sex linked inheritance for the aetiology of this anomaly [18].

Supernumerary teeth can be single or multiple, unilaterally or bilaterally, in the maxilla, mandible or both. Single supernumeraries occur in 76–86% of cases, double in 12–23% of cases and multiple in less than 1% of cases [19-21]. In the present study, 74% of the total had one supernumerary tooth, 26% had double supernumerary teeth and all were found in pre-maxillary region. 88.65% of the



Supernumerary teeth were observed near the maxillary midline region superseded by 11.34% in the lateral incisor region. All these findings are in accession with other studies reported in literature [5,22,23]. A higher concern in regard to aesthetics and its psychological implications could be ratiocination behind its higher incidence being reported in anterior dentition.

In the presented study the classification by Primosch [24] was followed that classifies supernumerary teeth into supplemental and rudimentary type. Supplemental (Eumorphic) refers to supernumerary tooth with normal shape and size, and may also be termed incisiform. Rudimentary (or dysmorphic) defines teeth of abnormal shape and smaller size including conical, tuberculate and molariform types. There is a unanimity among researchers regarding conical form being the most common [25,26]. In this study too, the rudimentary form compassed 85.56% of the total whereas 14.43% were supplemental type. Supernumerary teeth may erupt in normal direction, appear inverted, transverse, assume an ectopic position and/or follows an abnormal eruption path. Here, 79.38% of supernumerary teeth were vertically oriented, 18.55 % were inverted and 2.06% were transversely oriented. This substantiates the results of many studies reported in literature [7,27,28] but in few other studies, more number of inverted supernumerary teeth were found as correlated to the normally oriented teeth [26,29]. The explanation for this disagreement is speculative; nevertheless, racial dimorphism is a possibility.

Sagittal position is an important feature when evaluating surgical access, thus precisely related to management. In the present study 72.16% of the supernumeraries were located palatally, 16.49% were buccally placed and 11.34% were present within the arch. Thus, the palatine position predominates as in the precedent studies [6,17,29]. The predominant impacted palatal position may be because lip inhibits the labial repositioning and thick dense palatal bone possibly inhibits the eruption of these teeth. Of the total supernumerary teeth 89.96% had complete root development whereas 10.30% had incompleting root formation. Supernumerary teeth can erupt normally or remain impacted. Majority of the studies have stated that approximately 25% of permanent supernumerary teeth are erupted, and the remainder are unerupted [6,19,30]. In contrast, Tay F et al [31] recorded a lower figure, of approximately 15%, of permanent supernumeraries erupted and Liu JF [26] reported a higher figure, of 34%. In the present study, 48.45% were erupted and 51.54% were impacted. Believing that eruption potential may be influenced by shape, sagittal position, orientation and root development of the teeth, authors evaluated the obtained data. Contemplating the supplemental teeth with rudimentary forms it was found that while supplemental forms had an eruption rate of 78.57% whereas rudimentary forms had 43.37%. Only the supernumerary teeth with vertical

orientation were erupted while those with inverted and transverse orientation were impacted. Supernumerary teeth placed palatally, labially and within arch had an eruption rate of 38.57%, 56.25% and 100% respectively. One substantial finding noticed was that all the erupted supernumerary teeth had complete root, none of those with incomplete root were erupted. On statistically evaluating this variation it was found to be statistically significant. No such study has been documented till date upto the best of author's knowledge where a comparison of eruption status of supernumerary teeth based on shape, position, orientation and root development has been done, most studies have focussed on single variable comparing shape and eruption status [32]. The authors tried to asset the relationship of shape with orientation, position, root development and various complications. Although no statistically significant relationship of shape with position and root development was seen, however shape with orientation and complications were commenced to be statistically related. Of 75 conical supernumerary teeth 56 were vertical in orientation, 18 inverted 1 had transverse orientation; 7 of 8 tuberculate forms had vertical orientation and 1 was transverse; all supplemental forms had vertical orientation. The results imparted a statistical significant difference between the form of tooth and their orientation. Foster TD et al [33] also reported that most of the conical and tuberculate forms were vertically oriented.

Complications

In the present study the most commonly recognized complication was displacement of adjacent teeth, subsequently followed by rotation of the permanent teeth, diastema formation, crowding and delayed eruption. Statistical analysis disclosed a significant difference in the complications brought about by the various types of supernumerary teeth. Conical teeth were chiefly afflicted with rotation, displacement, diastema and crowding whereas the tuberculate form mostly caused delayed eruption. It has been stated that the tuberculate type are more anticipated to impede eruption because of its palatal position relative to the maxillary incisors [34]. Foster TD et al [36] also stated that tuberculate supernumerary teeth are repeatedly coupled with delayed eruption of incisors, whereas conical shaped teeth ordinarily did not delay eruption of incisors. The supplemental form was mainly identified with displacement. The explanation of displacement may be that the forming crown of normal permanent tooth might have been displaced from its normal path of development by the supernumerary tooth growing alongside it on the tooth bud or dental lamina. Only single cases each for radicular resorption of adjacent teeth or Dentigerous cyst respectively were observed in the present study. This probably could be attributed to the young age of patients that comprised the sample and the fact that supernumerary teeth had been diagnosed and extracted before cystic transformation of follicle could take place. The findings of Asaumi JI et al [29] also indicated



that when mesiodens had been impacted for a long period, they were at high risk of forming dentigerous cysts.

CONCLUSION

Most often a pedodontist is in a dilemma between the two schools of thought given for the treatment planning of supernumerary teeth. More detailed knowledge regarding the clinical behavior and complications can be a help in choosing an appropriate intervention which limits the possible future complications.

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ACKNOWLEDGEMENT: None

CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.



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