Clinical Significance of Impacted Supernumerary Teeth of a Group of Sri Lankan Children Aged 7 to 13 Years

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Abstract: Aim: The objective of this study was to investigate the characteristics of impacted supernumerary teeth (SNT) and their sequalae in a group of Sri Lankan children.

Methods: Data were collected from the archives of patient's records and radiographs. Descriptive analysis was made from data using Minitab Statistical Software.

Results: A total number of 58 impacted SNT were found in 49 children. The mean age of the sample was 9.89 ± 2.01 years and male to female ratio was 2.77: 1. Out of 49 subjects 81.6% had one impacted supernumerary tooth and 18.4% had two. The majority of the children with impacted SNT were in the age range of 8-10 years (44.9%%) followed by 11-13 years (40.82%) and 5-7 years (14.28%). While 57 (98.3%) SNT were identified in the region of premaxilla only one was seen in the canine region. The commonest shape was conical (63.8%), followed by tuberculate (20.75%), odontomes (12.1%) and supplemental (3.4%) respectively. Regarding the direction of impaction of SNT, many (48.3%) were inverted followed by vertical orientation (37.9%) and other directions (13.78%). The common sequalae associated with impacted SNT were delayed eruption of the permanent teeth (46.55%) and malocclusion (20.68%). There were considerable numbers of cases without any clinical effects (29.31%) at the time of presentation to the clinic. Vertically oriented SNT caused more clinical problems (72.72%) than the inverted impacted SNT (64.28%).

Conclusion: SNT were more prevalent among males (M:F = 2.77:1) than females and were mostly diagnosed in the age range between 8 - 13 years. DPT (Dental Panaromic Tomogram) radiological investigation is suggested when the patient presents with one SNT as there is a tendency for paired supernumeraries.

Keywords: Impacted, Odontome, Supernumerary, Teeth, Sri Lanka.

1. INTRODUCTION

Teeth in excess of the normal number are called supernumerary teeth (SNT). They may be present in both the primary and the permanent dentitions. The reported prevalence of SNT ranges from 0.3%-0.8% in the primary dentition and 0.1%-3.8% in the permanent dentition [1]. The etiology of SNT is not well defined, though many theories have been proposed to explain their occurrence. Local and independent hyperactivity of the dental lamina, dichotomy of the tooth bud, familial tendency and X- linked inheritance are some of them [2]. Out of these theories, local and independent hyperactivity of the dental lamina is widely accepted [3, 4]. SNT may erupt normally, following a normal path of eruption; stay impacted or assume an ectopic position. Approximately 25% of SNT in the permanent dentition erupt while the majority (75%) remain impacted [5]. They may occur singly, in multiples, unilaterally or bilaterally in the maxilla or mandible or both [6]. The majority of SNT are found in the maxilla with a predilection in the premaxilla. [1,6,7]. SNT are

classified according to their morphology and location [4]. Morphologically these teeth are mainly of two types, eumorphic and dysmorphic. Eumorphic refers to the SNT of normal size and shape, whereas dysmorphic refers to the teeth of abnormal shape and size. Dysmorphic teeth may be conical, tuberculate or odontome- like. According to the location they are classified as mesiodens, parapremolar, paramolar, distomolar [3].

The presence of SNT can cause a variety of complications such as delayed eruption of the permanent tooth, malalignment of teeth such as displacement/rotation or crowding, median diastema, cyst formation & root resorption of the adjacent tooth. Previous studies have indicated a great variation in the prevalence and characteristics of SNT depending on the race and source of sample [1]. The occurrence of SNT in different regions of the mouth has also shown a diversification among different races [1,8]. Sequelae of SNT vary according to the stage of eruption, their characteristics and the dentition. Our previous study reported characteristics and effects of erupted SNT in Sri Lankan children [7]. The objective of this study was to investigate the characteristics of impacted SNT and their sequalae in a group of Sri Lankan children who

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presented to the Paedodontic clinic of Faculty of Dental Sciences, University of Peradeniya, Sri Lanka.

2. MATERIALS AND METHODS

This is a descriptive, cross sectional study. The sample comprised 58 impacted SNT in 49 children who attended or were referred to the Division of Paedodontics, Faculty of Dental Sciences, University of Peradeniya Sri Lanka between 2010 November and November 2012 with impacted SNT. Patients with cleft lip and palate patients, syndromic patients and records with incomplete data were excluded from the study. All data were collected from patient's records, study models and radiographs (standard occlusal views and intra-oral periapical views) which were taken for the clinical management of the patient. Results were analyzed using MINITAB version 15.0 (Minitab, State College, PA, USA). The significance level was considered as $P \le 0.05$ throughout the analysis.

3. RESULTS

A total number of 58 impacted SNT were found in 49 children. The mean age of the sample was $9.89 \pm$

2.01 years, with a range of 7 - 13 years. Majority of the children with impacted SNT were in the age range of in 8 - 10 years (44.9%) followed by 11 - 13 years (40.82%) and 5 - 7 years (14.28%) (Table 1). Out of 49 subjects, 36 (73.46%) were male and 13 (26.53%) were female and the M:F ratio was 2.77: 1. This gender difference was statistically significant (Fisher's exact test p< 0.05). There were 81.6% and 18.4% single and double impacted SNT respectively, while none of the subjects had more than two. The majority (44.9%) of patients presented with a complaint of delayed eruption while 36.7% were referred by other clinics.

All the impacted SNT were located in the maxilla and none was found in the mandible. While 57 teeth (98%), (95% CI 90.8-99.9) were identified in the region of premaxilla only one tooth (Odontome) was found in the canine region (Figure 1). Many of the SNT were found in the left side (67.21%). Among all impacted SNT, 96.5% (n=56) were dysmorphic and only 3.44% (n=2) were eumorphic. The commonest shape was conical (63.79%), followed by tuberculate (20.68%), odontomes (12.10%) and supplemental (3.44%) respectively in all age groups (Table 1). Among 9

Table 1. Distribution of children with impacted SNT According to the Age and the Shape	Table 1:	Distribution of	f Children with	Impacted SNT	According to	the Age and the Shape
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Age Groups Years	Gender			Total			
	Male	Female	Conical	Tuberculate	Odontome	Supplemental	, otal
5-7 (7) 14.28 %	5	2	6	1	1	-	8
8-10 (22) 44.9%	16	6	21	2	2	1	26
11-13 (20) 40.82%	15	5	10	9	4	1	24
Total (49)	36 73.46%	13 26.53%	37 63.79%	12 20.68%	7 12.06%	2 3.44%	58





Figure 1: Radiograph (a), of an impacted odontome of a patient (b).

Table 2: Clinical Effects of Impacted SNT According to the Shape

	Clinical Effect						
Shape	Delayed Eruption	Malocclusion (Displacement /Rotation/ Crowding)	Median Diastema	No Effects	i otai %		
Supplemental	0	1	-	1	3.45 (2)		
Conical	13	8	2	14	63.79 (37)		
Tuberculate	8	3	-	1	20.69 (12)		
Odontome	6	-	-	1	12.07 (7)		
Total %	46.55 (27)	20.69 (12)	3.45 (2)	29.31 (17)	58		

Table 3: Clinical Effects of Impacted SNT According to the Age

No. of SNT in Age Groups	Delayed Eruption (27)	Malocclusion (12)	Median Diastema (2)	No effect (17)
5-7 (8)	4	1	-	3 (37.5%)
8-10 (26)	11	4	2	9 (34.61%)
11-13 (24)	12	7	-	5 (20.83%)

Table 4: Clinical Effects of Impacted SNT According to their Orientation

Direction of Impaction of SNT	Shape of SNT				Sequalae of SNT			
	Conical (37)	Tuberculate (12)	Odontome (7)	Supplementary (2)	Delayed Eruption (27)	Malocclusion (12)	Median Diastema (2)	No Effect (17)
Vertical (Normal) (22)	10	11	-	1	12	4	-	6
Inverted (28)	26	1	-	1	9	7	2	10
Horizontal (1)	1					1		
Other (7)			7		6			1

patients who had paired unerupted SNT, majority (66.71%) depicted similar shapes and locations in the same arch while the predominant shape was conical teeth. When the clinical effects of the impacted SNT were assessed, the commonest problem was delayed eruption of the permanent teeth (46.55%) followed by malocclusion (20.68%) (Table 2). However, a considerable number of cases had no clinical effects (29.31%) at the time of presentation to the clinic. Median diastema was the least common problem. The odontome and tuberculate forms caused a higher frequency of delayed eruption compared with the conical type (Table 2). However, a significant difference was seen between odontomes and conical forms (p < 0.05). The number of patients with no effects to

the presenting dentition was reduced with increase of age and the highest affected group was between 8-13 years (Table **3**). Regarding direction of impaction of SNT, many (28; 48.3%) were inverted followed by vertical (normal) orientation (22; 37.9%) and other directions (8; 13.78%) (Table **4**). The details of direction of teeth impaction according to the shape of SNT is shown in Table **4**. The majority of conical and tuberculate SNT were in inverted and vertical (normal) directions, respectively. Vertically oriented SNT caused more clinical problems (72.72%) than the inverted impacted SNT (64.28%). Although a lesser number (8) of SNT were found in other directions such as transverse and multidirectional orientation, many (7) of them caused delayed eruption or malocclusion.

4. DISCUSSION

Impacted SNT are usually identified by findings of the radiographic examination unless they are associated with some clinical complications. This study investigated a sample of 58 impacted SNT in 49 non syndromic children of 5-13 years old. The study group was limited to the above age range as the division of Pedodontics caters only for children between 0-16 Syndromic patients were excluded vears. as presentations of SNT of these patients could differ from non-syndromic patients. As reported for erupted SNT in our previous study, the present study also found the highest presentation of impacted SNT in the age group of 8-10 years [7]. A recent review of 14 studies indicated that SNT were most frequently diagnosed in children between the age of 8-13 years. [8]. It is interesting to note that the male female ratio for occurrence of impacted SNT (2.77:1) reported in the present study is quite same as for erupted SNT which was reported in our previous study [7]. Therefore, our findings suggest slightly higher predilection for male compared to many other studies which have reported a ratio of 2:1 between men and women [8,9]. SNT are seen as a single, paired or multiple, unilaterally or bilaterally and either in one jaw or both jaws. Wide ranges of percentages have been reported for occurrence of single (76%-90%) and double (7.5% -23.1%) SNT in the literature [8]. These widely differing results could be due to the manner in which samples are considered. In this study, close values of 81.61% and 18.39% were noticed for single and paired impacted SNT respectively. However, a lower value (9.6%) has been observed for paired SNT in our previous study which was conducted on patients with erupted SNT [7]. Therefore, it is highly possible that these patients may have more than one supernumerary tooth although they presented to the clinics with only one erupted form. Taking into account the findings of our previous study and the present study, we emphasise the importance of radiological investigation of the full mouth or at least the same site of contralateral jaw quadrant of the patient who presents with one erupted supernumerary tooth as there is a tendency for occurrence of another impacted form of SNT. None of the subjects in our study had more than two supernumeraries. This may be due to the fact that we have excluded the data of syndromic patients, in whom multiple supernumeraries are commonly seen although multiple SNT have been reported rarely unassociated with any systemic disorder or syndrome [6,10,11]. In agreement with many other studies, our results also revealed that the most involved area for

SNT in the arch is the premaxilla showing 98.29% of SNT in this region [1,11]. However, there is inconsistent evidence regarding the prevalence of SNT in the canine, premolar and molar regions. In the present study, only one supernumerary tooth was found in the canine region and no SNT were observed in the premolar or the molar regions. This may be due to the facts that the study sample consisted of children below 13 years and we have not taken dental panoramic tomograms (DPT) for the investigation as it was not a routine radiograph taken in our clinic. Supernumeraries appear in a variety of shapes. Various studies have obtained prevalence data that vary from 31 to 80% for conical, 9.75 to 39.9% for tuberculate, and 4 to 33% for supplementary teeth [1,8,12,13]. The most common shape in the present study is conical (63.79%) concurring with the findings of other studies [14-18]. Impacted SNT may show vertical, inverted, or transversal orientations while precise direction cannot be determined in some cases e.g odontomes (Figure 1). In our study, most of the SNT (48.3%) were inverted, followed by the vertical (37.9%) direction. A similar trend has been reported in a few other studies although the majority have reported that the vertical form is the commonest [1, 13].

The relationships between shapes of SNT and the resulting complications have been investigated a number of times. Both the median diastema and delayed eruption have been reported as the commonest complications in the literature [14,19,20]. Our previous study reported that the commonest sequalae of erupted SNT is the malocclusion caused by rotation, displacement and median diastema [7]. In the present study, the delayed eruption is the commonest complication caused by all forms of impacted SNT (Table 2) except the supplemental form of which only a small number (2) was found in our sample. Furthermore, delayed eruption is more frequently associated with odontomes (85.7%) than tuberculate (66.7%) form. Although the median diastema is one of most common sequels of erupted SNT, only 2 conical teeth (3%) caused this complication in the present sample. In contrast, our previous study of erupted SNT reported a relatively higher presentation (19.25%) of median diastema and a lower value (6.69%) for delayed eruption [7]. These differences between the two studies may be due to the fact that the majority of patient included in present sample turned up with the complaint of delayed tooth eruption (44.9%) followed by referrals (36.7%). It appears that the presence of supernumerary tooth in

the premaxillary region in the erupted form can cause median diastema mostly while the impacted SNT may lead to delayed eruption. However, further studies using a bigger sample are necessary for a definitive conclusion. It is evident from both the studies that the number of patients without considerable clinical effects to presenting dentition is reducing with increasing age irrespective of the eruption stage of SNT. Therefore, it is sensible to monitor these patients both clinically and radiographically so that timely intervention can be arranged.

A limited number of studies have attempted to identify a relationship between the orientation of SNT and clinical complications caused by them. Our study found that SNT with vertical orientation caused more the inverted complications than form which corresponds with findings of Yun-Hoa et al, (2016) who investigated impacted SNT in the premaxillary region [14]. Furthermore, they have reported that vertically oriented impacted supernumeraries were more frequently associated with delayed eruption of the permanent incisors than inverted types. In line with these observations, the present study observed that 54.5% and 32.1% vertical and inverted positioned impacted SNT caused the delayed eruption of permanent incisors respectively while 35.7% of the latter form did not make any effects to the presenting dentition (Table 4). Moreover, all tuberculate SNT which caused delayed eruption positioned in vertical direction. It is worth reporting that majority of inverted forms are conical shape which did not make complications. It is difficult to explain why fewer effects are seen with SNT which are in inverted orientation than the vertical form. When the teeth are in inverted position within the jaw, it can be speculated that they may move away from the dental arch as the crown of the tooth is directed away from the occlusal plane. However, it is difficult to conclude that the inverted forms do less harm than the vertical impacted SNT without further studies and continuous follow ups. Therefore, radiological reviews are highly recommended for these patients although they may present with no effects to the presenting dentition.

CONCLUSION

The present results together with our previous study on erupted SNT provide valuable information on SNT of Sri Lankan children in respect to their characteristics and sequalae. Also it sheds light on the influence of orientation of SNT on clinical complications. However, further studies are necessary with a bigger sample size based on radiographic investigations using DPTs.

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