Scientific Research Publishing

Health, 2022, 14, 939-948
https://www.scirp.org/journal/health
ISSN Online: 1949-5005
ISSN Print: 1949-4998

Retrospective Survey on Mesiodens and Corresponding Odontoparallaxis in Japanese Children

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How to cite this paper: Watanabe, K., Yoshiga, D., Sago, T., Oda, M., Yoshioka, I., Watanabe, S. and Morimoto, Y. (2022) Retrospective Survey on Mesiodens and Corresponding Odontoparallaxis in Japanese Children. *Health*, **14**, 939-948.
https://doi.org/10.4236/health.2022.149067

Received: August 16, 2022
Accepted: September 10, 2022
Published: September 13, 2022

Abstract

Supernumerary tooth in the upper central incisor region is called mesiodens. Mesiodens causes serious complications such as displacement, retarded eruption, and rotation in the adjacent permanent incisors, inducing inhibition of oral development. This report was aimed to provide epidemiology of mesiodens in Japanese children. Using dental record, panoramic radiographs and images of cone-beam computed tomography in 128 non-syndromic child patients, patients' age at their first visit, gender composition, shape of mesiodens, position of mesiodens, posture of mesiodens, and age distribution of the patients based on each complication were investigated. In addition to the survey, patient age was compared between the groups with and without each complication. Patients' age ranged 3 - 10 years old. Male-to-female ratio was approximately 3:1. Conical shape (75%) and inverted position (49%) were the most frequent among the patients. Displacement was the commonest complication. Age comparison indicated that patients with displacement or retarded eruption consulted the dentist younger than those without the complications. The present study provided etiology of mesiodens in Japanese children that will contribute to daily clinical practice in the field of pediatric dentistry.

Keywords

Mesiodens, Displacement, Retarded Eruption, Rotation

1. Introduction

Supernumerary tooth is defined as the extra tooth or tooth like structure in addition to 20 deciduous and 32 permanent teeth [1] and occurs in 1% - 3.5% of population [2]. It is often found in the premaxillary region [3] that is called mesiodens. It is classified into two groups based on its shape and size; one is eumorphic tooth that resembles to central incisor with normal shape and size, and the other is dysmorphic tooth that has variable shape and size. The dysmorphic tooth is further subdivided into: conical, tuberculate, molariform and infundibular tooth [4]. Mesiodens induces ectopic/prevented eruption, displacement, rotation, or root resorption in the adjacent teeth [5] [6]. Moreover, mesiodens itself may erupt into nasal cavity, or cause dentigerous cyst [6]. Though the negative impacts on both primary and permanent dentition are significant [7] [8], the survey of mesiodens in Japanese children has not been reported enough. In this report, existence or absence of complications such as displacement, prevented eruption/low tooth germ position, or rotation in the adjacent teeth were surveyed in addition to the number, posture, and shape of the mesiodens in 128 child patients aged from three to ten years old (6.1 years old on average) visiting Kyushu Dental University Hospital. This study was approved by the research ethics committee of Kyushu Dental University (approval number: 22-12).

2. Materials and Methods

2.1. Survey on the Patients and the Mesiodens

Retrospective investigation was conducted over images of dental radiographs, panoramic radiographs, and cone-beam computed tomography (CBCT) in child patients with mesiodens who visited our hospital for their first visit from November 2017 to March 2022. Such patients without any disease that affected mesiodens were included; on the contrary, those with hereditary disease or other diseases that affected mesiodens were excluded. As a result, 128 patients participated in the investigation. Gender composition of the patients, age of their first visit, and the number and shape of the mesiodens (supplemental, conical, tuberculate, and molariform) were surveyed. Existence or absence of the corresponding complications in the adjacent permanent teeth such as displacement, retarded eruption/low tooth germ position, and rotation were also investigated.

2.2. Analysis of the Complications

The patients were divided into two groups for each complication in the adjacent permanent teeth; displacement (D) and without displacement (WOD) groups, retarded eruption/low tooth germ position (R/L) and without retard eruption/low tooth germ position (WOR/L) groups, or rotation (R) and without rotation (WOR) groups. Patient age was compared between the groups with and without each complication.

2.3. Statistical Analysis

Values in the text and Tables are shown as mean ± standard deviation (SD). The significance of differences between two groups was analyzed using the unpaired Student's *t*-test (for equal variance) or Welch's correction (for unequal variance). A p-value < 0.05 was considered significant.

3. Results

3.1. Distribution of the Patients

The ages of the patients' first visit ranged from three to ten years old (Figure 1). The patient population consisted of ninety-seven males and thirty-one females (Figure 2).

3.2. Distribution of the Mesiodens

Ninety-seven patients had one mesidens, while thirty-one had two. For shape of mesiodens, one-hundred and twenty were conical, thirty-four tuberculate, one molariform, and four supplemental (Figure 3).

For posture, seventy-three mesiodens were vertical, seventy-eight inverted, and eight horizontal (Figure 4). Since thirty-one patients had two mesiodens, the total number of the mesiodens did not equal the number of the patients.

The presence or absence of displacement, retarded eruption/low tooth germ

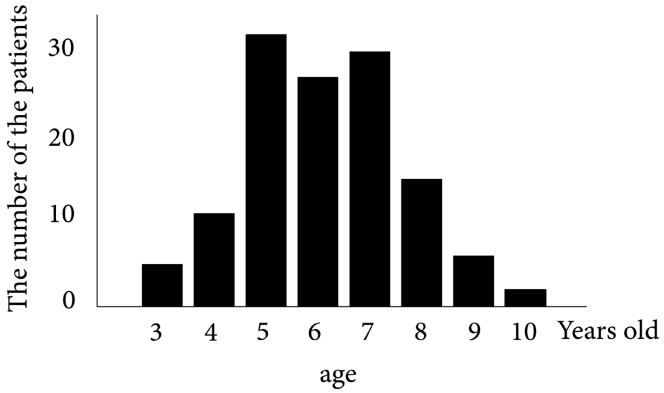

Figure 1. Age of the patients. Almost 70% of the patients with mesiodens who visited our hospital were between the ages of 5 and 7 years old.

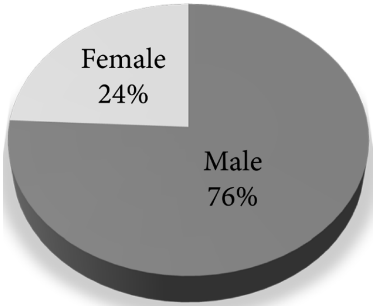

Figure 2. Gender composition of the patients. Males occupied approximately one-fourth of the patient population.

position, or rotation were investigated based on the age of the patients. The two common kinds of displacement among the patients were diastema and labiogression. More than 67% of the patients at all ages had displacement (Figure 5).

As shown in Figure 6, all the three-year-old patients had low tooth germ position. The incidences of retarded eruption/low tooth germ position in four to six-year-old patients were around 68%, with a decreasing incidence in seven- and eight-year-old patients, and no eruption defects in ten-year-old patients.

Rotation was observed eight and less-year-old-patients, but not in nine and ten years old (Figure 7). Incidences of retarded eruption/low tooth germ position

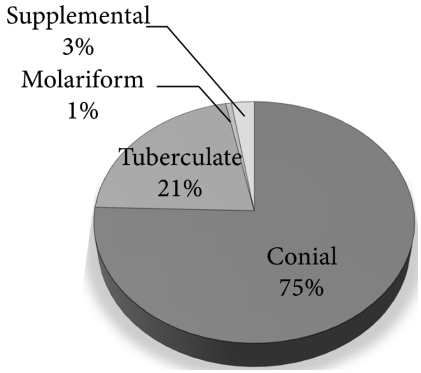

Figure 3. Shape of the mesiodens. Conical shape was the commonest, followed by tuberculate one among the patients.

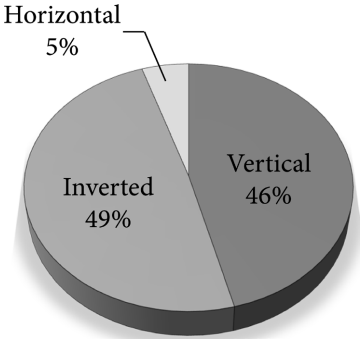

Figure 4. Posture of the mesiodens. Inverted posture accounted for the highest percentage; however, vertical posture was also found at the similar percentage.

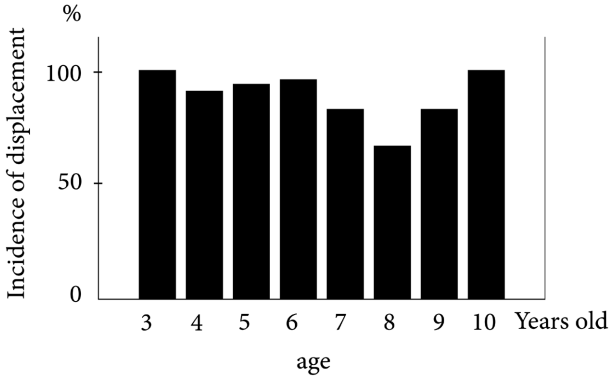

Figure 5. Incidence of displacement. Displacement was found at all surveyed ages.

in four to six-year-old patients were around 68%, with a decreasing incidence in seven- and eight-year-old patients, and no eruption defects in ten-year-old patients.

Rotation was observed eight and less-year-old-patients, but not in nine and ten years old (Figure 7).

3.3. Age Comparison Based on Each Complication

Since some complications of mesiodens were affected by age, dentition [9] [10], and oral development [11], patients' age was compared between the D and WOD, R/L and WOR/L, or R and WOR groups. As shown in Table 1, age of the patients in the WOD group was significantly higher than that of the D group ($p < 0.05$). Age of the patients in the WOR/L group was also significantly higher than that in the R/L group ($p < 0.01$).

4. Discussion

4.1. Distribution of the Patients

Upper incisor region is well known for preferred site of dental caries. Hence,

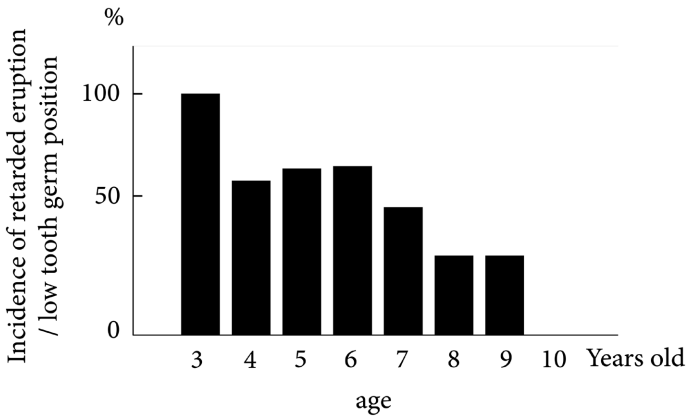

Figure 6. Incidence of retarded eruption/low tooth germ position. Incidence of retarded eruption/low tooth germ position was 100% in the 3-year-old patients, on the other hand, it was 0% in the 10-year-old patients. The incidence decreased in the older children.

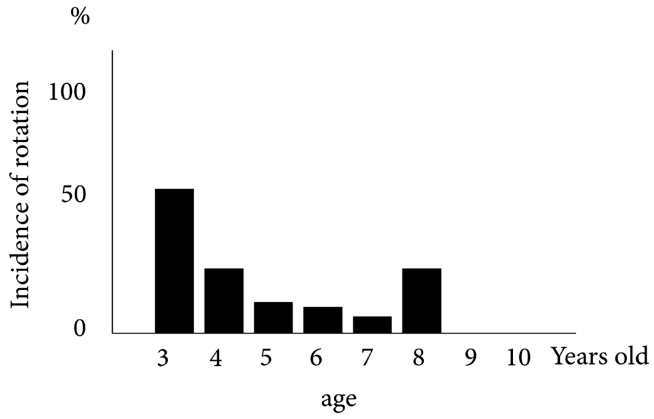

Figure 7. Incidence of rotation. No rotation was found in 9- and 10-year-old-patients.

Table 1. Age comparisons between with and without each complication.

Group	Age (Year) Mean ± SD	
D	6.0 ± 1.5	*
WOD	6.9 ± 1.4	
R/L	5.8 ± 1.4	**
WOR/L	6.7 ± 1.6	
R	5.5 ± 1.8	
WOR	6.2 ± 1.5	

**p < 0.01, *p < 0.05; D: The group in which displacement was found in the adjacent permanent teeth. WOD: The group in which displacement was not found in the adjacent permanent teeth. R/L: The group in which retarded eruption/low tooth germ position was found in the adjacent permanent teeth. WOR/L: The group in which retarded eruption/low tooth germ position was not found in the adjacent permanent teeth. R: The group in which rotation was found in the adjacent permanent teeth. WOR: The group in which rotation was not found in the adjacent permanent teeth.

dentists take radiographs of that region in their clinical practices. So, it was considered that mesiodens was accidentally found through dental treatment or checkup in three- to five-year-old patients, resulting in finding mesiodens. Upper central incisors erupt approximately one year after the lower central incisors' eruption. The upper central incisors' eruption is known for being retarded by mesiodens [12] [13]. So, it was considered that in the cases mesiodens interfered with the eruption of the adjacent upper central incisor, patients consulted their dentist for retarded eruption of the upper central incisor around the ages of their eruption; from six to seven years old.

Previous studies reported that male/female ratio was approximately 3:1 [14] [15] [16], supporting our result. Though the ratio varied by paper [17] [18] [19], these previous reports concluded that the number of patients with supernumerary teeth is higher in men than in women.

4.2. Distribution of the Mesiodens

For shape, conical was previously reported to be the commonest [4] [20] [21] and tuberculate occupied 14% - 20% [22] [23] [24], supporting our results.

Kim *et al.* (2018) [25] and Nam *et al.* (2015) [26] reported that the most common direction of mesiodens in Korean children was inverted (59.5% and 56.2%, respectively). Zhao *et al.* (2021) [27] also concluded in their investigation of mesiodens in Chinese children that invert posture was the most frequent, all supporting our result. On the other hand, Gündüz *et al.* (2008) [21] and Altan *et al.* (2019) [22] reported in their respective investigations among children in Turkey or black sea area that vertical position was the most frequent in mesiodens. These present and previous reports suggested that invert mesiodens was the most frequent in east Asian children, and the most frequent posture of the su-

pernumerary tooth may vary by region or race.

4.3. Age Comparison Based on Each Complication

In previous studies, displacement, retarded eruption, and rotation in adjacent teeth are the major complications of mesiodens [14] [16] [21] [24] [28]. The complications were determined by the positional relationship between the mesiodens and the adjacent teeth, and the relationship could be affected by oral and maxillofacial growth, hence the patients' age was compared between groups with and without each complication. The present study indicated that the patients with displacement or retarded eruption/low tooth germ position visited our hospital younger than those without such complications by eleven months. The difference suggested that if the patients recognized displacement or retarded eruption/low tooth germ position in the upper permanent incisors either by radiograph or by actually looking inside the oral cavity, they wished to consult their dentist as soon as possible for functional or aesthetic reasons. Especially, incidence of retarded eruption/low tooth germ position was low in eight- and nine-year-old patient and got zero in the patients at 10 years old, thus it was suggested that most of the patients having retarded eruption/low tooth germ position visited their dentist and finish the treatment before they got 10 years old. On the other hand, no age difference was found regardless of existence or absence of rotation. Notably, in this investigation, all the participating patients accompanying rotation had displacement, retarded eruption/low tooth germ position, or both of the complications, too. Therefore, rotation was considered to be associated with displacement and retarded eruption/low tooth germ position. Taking the results into consideration, it was suggested that all the patients with rotation might have consulted their dentist for treatment of mesiodens and corresponding multiple complications at the similar ages as the patients with displacement or retarded eruption/low tooth germ position did.

There was a report on supernumerary tooth in Japanese deciduous dentition [29]; however, radiographs were not taken in all patients in the survey. In the present study, investigation was conducted using dental radiographs, panoramic radiographs and CBCT images, that enable us detecting both unerupted mesiodens and complications existing in the maxillary bone.

Mesiodens causes serious complications that inhibit development of oral function. Moreover, mesiodens itself may turn into cystic lesion. The present report will contribute to knowing and diagnosing mesiodens in Japanese children better.

4.4. Limitation of this Investigation

This investigation suggested that invert mesiodens was the most frequent in east Asian children, and the most frequent posture of the supernumerary tooth may vary by region or race. It also suggested that rotation was accompanied by displacement or/and retarded eruption. However, present report couldn't provide

their supporting evidence, so further study is needed to conclude the suggestions with evidence.

5. Conclusions

1) Most of the patients with mesiodens visited our hospital for their first visit at the ages of 5 - 7 years old.

2) Male-to-female ratio of the patients was approximately 3:1.

3) Conical shape was the most frequent (75%), followed by tuberculate one (24%).

4) Inverted posture was the commonest (49%), but vertical one was almost the same incidence (46%).

5) Patients with displacement or retarded eruption/low tooth germ position in permanent teeth adjacent to mesiodens consulted their dentist younger than those without the complications. On the other hand, patients with rotation in permanent teeth adjacent to mesiodens did not necessarily consult their dentist younger than those without the complication.

6) It was suggested that rotation in permanent teeth adjacent to mesiodens was associated with displacement or retarded eruption/low tooth germ position of the teeth themselves.

Acknowledgements

This manuscript was subsidized by JSPS KAKENHI Grant Number 20K10233.

The authors would like to thank Mis. Konami Yamada for organizing data. This work greatly contributed to making this manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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