



Contents lists available at ScienceDirect

Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology

journal homepage: www.elsevier.com/locate/jomsmmp

Oral Medicine/Case Report

Agensis of a large number of permanent teeth after treatment of neonatal leukemia

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ARTICLE INFO

Article history:

Received 15 January 2014

Received in revised form 11 July 2014

Accepted 2 September 2014

Available online 5 October 2014

Keywords:

Dental development
Stem cell transplantation
Tooth agensis
Missing teeth
Leukemia

ABSTRACT

The intensive treatment of hematological malignancy can cause dental abnormalities when applied during the period of dental and craniofacial development. Here, we report a case of absence of numerous teeth after treatment of neonatal leukemia.

An 11-year-old boy was referred to our hospital complaining of delayed (no) eruption of many teeth. The patient had a history of neonatal acute monocytic leukemia. He had undergone systemic chemotherapy and allogeneic peripheral blood stem cell transplantation (PBSCT) during the period between 7 days and 9 months after his birth. Intraoral examination and a panoramic radiograph revealed absence of 25 of the permanent teeth (12, 13, 14, 15, 17, 18, 22, 23, 24, 25, 27, 28, 31, 32, 33, 34, 35, 37, 38, 41, 42, 44, 45, 47, and 48). Microdontia of the bilateral maxillary central incisors and right mandibular canine and taurodontism of the bilateral maxillary first molars were also observed. The developmental period of these affected teeth agreed with the period of chemotherapy and PBSCT.

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1. Introduction

In recent years, advances in treatments of childhood leukemia have been remarkable. The number of long-term survivors has increased as a result of improvement of treatment outcomes, and increasing interest has been focused on the long-term survivors of childhood cancer and their quality of life.

With regard to dental and maxillofacial development, anti-oncologic treatments including combination chemotherapy, total body irradiation (TBI), and hematopoietic stem cell transplantation (HSCT) have significant potential for adverse impacts [1]. The severity of long-term disturbances in dental and craniofacial development is dependent on the age when the patient underwent diagnosis and treatment [2]. Survivors of childhood leukemia often have dental abnormalities that may affect their quality of life. Dental abnormalities including root stunting, microdontia, hypodontia,

taurodontia, over-retention of primary dentition, etc. [3,4] have been reported. However, few studies have reported deficiency of a large number of permanent teeth.

In this paper, we report a case of absence of 25 permanent teeth. The patient had a history of allogeneic peripheral blood stem cell transplantation and chemotherapy for acute monocytic leukemia (AML) in infancy.

2. Case report

An 11-year 4-month-old boy came to our department for further evaluation of missing (delayed eruption) of a large number of permanent teeth. His medical history revealed that he was a survivor of hematological malignancy. He had been diagnosed as acute monocytic leukemia (AML-M5b) right after birth. He subsequently underwent high-dose multiagent induction chemotherapy [5] (ANLL91 protocol, Table 1) during the period between 7 days and 8 months of age. At 9 months after birth, he received peripheral blood stem cell transplantation (PBSCT) from his sister after pre-treatment with the alkylating agents busulfan (BUS) and melphalan (L-PAM). Total body irradiation (TBI) was not applied in the preparative regimen. The clinical course after PBSCT was not eventful and he had been followed-up by his pediatrician.

Dental history revealed that he visited his dentist at the ages of 7 years 5 months and 9 years 7 months complaining of tooth

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Table 1
Treatment scheme of the ANLL91 regimen for infant AML.

Induction	d	1	2	3	4	5	6	7	8	9	10	11	12
Etoposide	150 mg/m ²	↓	↓	↓	↓	↓							
AraC	200 mg/m ²						▽	▽	▽	▽	▽	▽	▽
Mitoxantrone	5 mg/m ²												
Intensification	d	1	2	3	4	5							
Courses 1 and 2													
HD-AraC	3 g/m ² × 2		▽▽		▽▽			▽▽					
Etoposide	100 mg/m ²		↓		↓			↓			↓		↓
Mitoxantrone	10 mg/m ²												
Courses 3 and 4													
AraC	200 mg/m ²		▽...▽		▽...▽			▽...▽			▽...▽		▽...▽
Etoposide	100 mg/m ²		↓		↓			↓			↓		↓
THP-ADR	45 mg/m ²		▼										
Courses 5 and 6													
HD-AraC	3 g/m ²		▽		▽			▽			▽		▽
Etoposide	100 mg/m ²		↓		↓			↓			↓		↓
Aclarubicin	30 mg/m ²		◎		◎			◎					
Courses 7 and 8													
HD-AraC	3 g/m ²		▽		▽			▽			▽		▽
Etoposide	200 mg/m ²		↓		↓			↓			↓		↓
VCR	1.5 mg/m ²		↑										

The use of each drug was as follows. Induction: etoposide, 2 h drip i.v. (intravenous) for 5 days; cytarabine (AraC), 2 h drip i.v. for 7 days; mitoxantrone, i.v. for 5 days. Courses 1 and 2: HD-AraC, 3 h drip i.v. twice a day for 3 days; etoposide, 2 h drip i.v. for 5 days; mitoxantrone, i.v. Courses 3 and 4: AraC, 20 h drip i.v. for 5 days; etoposide, 2 h drip i.v. for 5 days; THP-ADR, 2 h drip i.v. Courses 5 and 6: HD-AraC, 3 h drip i.v. for 5 days; etoposide, 2 h drip i.v. for 5 days; aclarubicin, i.v. for 3 days. Courses 7 and 8: HD-AraC, 3 h drip i.v. for 5 days; etoposide, 2 h drip i.v. for 5 days; VCR, i.v. As a CNS prophylaxis, intrathecal methotrexate, Ara-C, and hydrocortisone were used in induction and each course of intensification therapy.

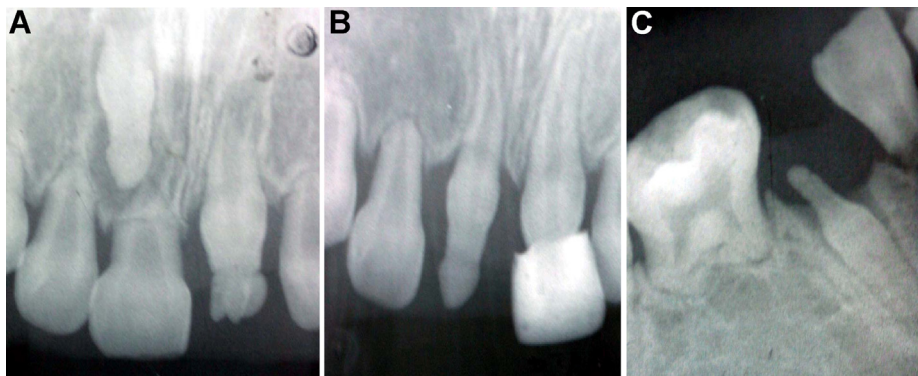


Fig. 1. Dental radiographs at patient’s family dental clinic. (A) Maxillary central incisors at the age of 7 years 5 months. (B) Maxillary central incisors at the age of 9 years 7 months. (C) Lower right canine at the age of 10 years 6 months.

abnormal contour (microdontia) of 21 and 11, respectively. On each occasion he underwent tooth restorations with resin filling (Fig. 1 A and B). At the age of 10 years 6 months, he again consulted the dentist complaining of delayed tooth eruption after the loss of a deciduous tooth (83). The dental radiograph revealed abnormal shape of the successor (Fig. 1C). The absence of multiple permanent teeth was suspected and the patient was referred to us for further examination.

At the first clinical examination, his height was 134 cm and his weight was 26 kg, which was below average size. An X-ray of his carpal bone at the age of 7 years and 8 months had suggested that his skeletal age was the same as a 6 year-old. (The Japanese standard bone age TW2 method was investigated using the *Honetaro Ver5.0* software package.) Intra-oral examination showed that oral hygiene was fair and the gingivae were healthy (Fig. 2). There were 23 teeth (6 permanent teeth and 17 deciduous teeth), as listed below:

16 55 54 53 52 11 21 62 63 64 65 26
46 85 84 82 81 71 72 73 74 75 36 (FDI two-digit system)



Fig. 2. Intra-oral views at the first medical examination.

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