Long-term effects of cancer therapy on dental development: a case report

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As the prognosis of malignant conditions in children improve by cancer therapy, long-term side effects due to antineoplastic treatment may be encountered. This case report demonstrates the long-term alterations on dental development in patient who had been treated for malignant condition. Alterations were observed during radiographic control 8 years after the therapy and included short, blunted, tapered and V-shaped root malformations as well as delayed and ectopic eruptions.
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INTRODUCTION

Aggressive cancer treatment regimens may have some dramatic effects on health and quality of life in children who are long-term survivors of cancer.[1] This therapy includes radiotherapy to involved areas and single or multi agent chemotherapy protocols. As patients' lifespan increase, dental side effects of treatment become clinically significant.[2] Chemo-radiation-induced effects to dental development include: arrested root development, enamel defects and discolorations, microdontia and agenesis.[3-7] These impacts and side effects may vary depending on the age of the patient at the time of therapy.

This report represents the dental disturbances following cancer therapy in a child with initial presentation of Burkitt's lymphoma (BL) that had been diagnosed via biopsy from mandibular soft tissue mass 8 years ago.[8]

Figure 1. Intraoral view of the tumor (8).

CASE REPORT

A six-year old girl had been referred to Gazi University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery in 1995 for assessment of intraoral mass in the left posterior mandibular region of 5 months duration.[8] The mass was painful and many treatment attempts had been made in different centers including antibiotic prescription since her admission. Following the oral biopsy; lymphoma diagnosis was made and following the entire radiologic, clinical and laboratory examination of the patient (Fig 1); "Grade IV, BL" was diagnosed. For the treatment, BFM chemotherapy protocol and 2000 c GY total radiation were initiated. Chemotherapeutic agents in BFM protocol included such as cyclophosphamide, ifosfamide, vincristine, methotrexate, etoposide and adriamycine.[9] Before cancer therapy, panoramic radiogram had revealed a radiolucency beginning from bud of second premolar, extending to the mandibular ramus that displaced the bud of second molar posteriorly. The crypt of the third molar was not present at that time (Fig 2). The lesion had disappeared following the treatment[8] and the patient has still been in remission. Although the medical condition has been uneventful during the follow-up, some dental disturbances were detected due to the cancer therapy. Panoramic radiogram, that was taken 8 years later, showed delayed and inhibited

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Figure 2. Panoramic radiograph taken at the initial diagnosis (8).

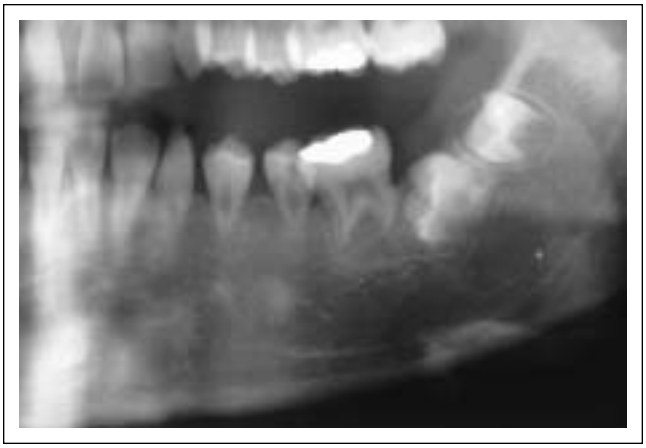

Figure 3. Panoramic radiograph taken 8 years after diagnosis.

eruption of left mandibular second molar and short, blunted, tapered and V-shaped root malformations beginning from the left mandibular canine to second molar teeth (Fig 3). These disturbances were analyzed using the Dahllöf *et al*. method.[10]

On clinical examination, teeth with root malformations were predominantly erupted in normal position except second molar without evidence of periodontal disease. Canine tooth was rotated itself. The third molar crypt that was not detected on initial radiologic examination was observed 8 years later. Oral hygiene of the patient was normal without any gingivitis or periodontitis. Dental treatments and follow-up has been continuing.

DISCUSSION

Non-Hodgkin's lymphomas (NHL) including BL grow rapidly and disseminate early in children and excessive number of patients have widespread disease at diagnosis. In spite of therapy regimens in the past, long-term survivals were only about 15%.[11] However, there has been remarkable improvement in the long-term prognosis for NHL in children over the past decade.[9]

The lack of specificity of chemotherapy protocols and radiation by means of differentiating tumor cells from normal cells may result in disturbances of dental development.[12] Cancer therapy may give damage to dentition and cause abnormal root development particularly in children who receive this therapy before and around 5 years of age.[13] Radiation has been reported (2000 to 4000 rad) to cause tooth and root dwarfism and root shortening.[12] In this present case, tapered-blunted roots were observed in canine, premolars and molars in the radiation field. Although chemotherapy may be assumed to cause those side effects alone,[5,9] effects of radiation specifically targeted to left posterior mandible was evident in this case. The severity of these effects is liked to be related on the child's age at diagnosis, type of antineoplastic drugs and the dose of radiotherapy to the head and neck. So if the root malformations were completed before cancer therapy, probably, these malformations would not have occurred in such a dramatic way. In addition, since the children treated for malignant condition may have some root disturbances and periodontal disease[14], it might be speculated that teeth with root malformations in this present case had some periodontal problems, if the patient would not have been professionally motivated for oral hygiene.

Animal studies have demonstrated that eruption status of the teeth can be inhibited by antineoplastic drugs.[15] On the contrary, a study has shown that timing of tooth eruption has not been affected by chemotherapy.[16] However, morphometric results have confirmed the alterations in tooth eruption following radiation.[17] The inhibition of the eruption of left second molar may be due to either radiotherapy or chemotherapy that is hard to claim which one is predominant in this present case.

Although agenesis is a common feature in patients receiving cancer therapy during the development of the teeth,[9,10] it was not detected including third molars in this present case.

CONCLUSION

This case report has shown that children treated for cancer are at risk of some disturbances in developing orodental structures. They may require extensive dental care and frequent dental examinations. These follow-up examinations should be continued even after the completion of antineoplastic therapy.

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