



Case Report

Late dental effects in children submitted to chemotherapy: A case report

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ABSTRACT

Chemotherapy may have many effects on teeth such as microdontia, hypoplasia and V shaped roots.

The incidence and severity of dental abnormalities depend on the age at the diagnosis, the type of chemotherapeutic agent used. Therefore, it is important that general and pediatric dentists be aware of the late adverse effects of cancer therapy in children, especially in the oral cavity. This article intends to document a case illustrating different dental anomalies secondary to chemotherapy in 20 years old boy who had a history of chemotherapy in childhood.

1. Introduction and importance

Cancers are the second most common cause of death in children around the world [1].

The survival rates of patients suffering from childhood cancers have improved dramatically with the advent of chemotherapy, with survival rates of childhood cancers reported at 70%–75% in some parts of Europe and North America [1]. However, Children submitted to antineoplastic treatment present several late effects in many organs and systems, including long-term consequences in the oral cavity. Dental abnormalities are the most frequent and long term side effects of childhood cancer therapy; these abnormalities include microdontia, hypodontia, shortening of roots, altered eruption patterns, coronal hypocalcification, early apical closure and higher incidence of caries [2].

The incidence and severity of dental abnormalities depend on the age at the diagnosis, the type of chemotherapeutic agent used, and the duration of antineoplastic treatment. Children who are treated at young ages appear to be more severely affected than children who are treated later [3].

These abnormalities, although not life-threatening, may have important consequences for these children, such as esthetic, functional and occlusal disturbances and can also affect facial development [2], consequently impacting quality of life.

This article intends to document a case illustrating different dental anomalies secondary to chemotherapy in 20 years old boy who had a history of chemotherapy in childhood.

This case report has been reported in line with the SCARE Criteria

[12].

2. Case presentation

A 20 year old boy presented to the center of consultations and dental treatments of Rabat, for rehabilitation of oral cavity with pain on the right maxillary roots.

Physically, the child appeared to be out of his chronological age. The medical history, when taken, revealed that the patient had undergone chemotherapy at the age of 6 years following Hodgkin's disease. After this anti-cancer therapy, the patient has been going for a regular check-up and has been relatively free of any symptoms.

Intraoral examination revealed an ogival palate, multiple carious lesions and an unsatisfactory overall hygiene. The gingiva was also inflamed [Figs. 1 and 2]. A panoramic X-ray [Fig. 3] was taken to have an overview of the dental and periodontal structures. It showed some dental anomalies, especially short roots of the second permanent mandibular molars and all mandibular premolars with a sharp apex. It also showed small wisdom teeth. Extraction of teeth 16 and 26 was done and treatment of carious lesions was planned. The patient was advised to maintain proper oral hygiene by brushing twice a day and to come back for periodic oral check ups.

3. Clinical discussion

The treatment of children's cancers by chemotherapy can cause significant sequelae. Dental abnormalities are among the most common

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Fig. 1. Intraoral Views showing different lesions and lack of oral hygiene.



Fig. 2. Intraoral Views showing different lesions and lack of oral hygiene.

and late effects of anti-neoplastic therapy.

Most anti-neoplastic drugs used for management of children malignancies, like vinblastine, doxorubicin, and cyclophosphamide, block the growth of cells or affects the cells involved in odontogenesis, causing disturbances in tooth eruption and development due to their cytostatic and cytotoxic effects [2].

Dental changes include abnormalities in shape (microdontia, macrodontia and taurodontia), number (hypodontia), enamel defects (discolorations and hypoplasia), root formation disorders (blunt root, tapering root and delayed root development), and dental development



Fig. 3. Orthopantomograph taken 13 years after patient finished oncologic treatment.

delay or retained teeth [3].

The severity of these effects on dentofacial structures was found to be related to the stage of odontogenesis, age at diagnosis and type of treatment performed [3]. Children treated before 5 years of age had the most severe dental defects, suggesting that immature teeth were at greater risk for developmental disturbances than mature teeth [3].

Microdontia is among the most frequent changes detected in long-term childhood cancer survivors. Several studies reported a prevalence of microdontia ranging from 7% to 78% [1,3,4]. Hölltä et al. found this rate as 75% in children younger than 3 years, 60% in those between the ages of 3 and 5 years, and 13% in those older than 5 years [5]. Proc et al. [6] stated that microdontia was mostly observed in the first and second premolars in pediatric patients whose treatments were started at the age of ≤ 30 months [1].

For antineoplastic therapy to result in dental agenesis, it must destroy the cells programmed to form a tooth or to affect the signaling systems between the tissues in a tooth bud and prevent calcification [5]. Some studies have reported a prevalence of hypodontia associated with anticancer therapy ranging from 6 to 44% [3].

The effects of cancer treatment in the later stages of tooth formation are characterized by disturbed root development [5]. The first signs of root development in permanent teeth are observed on panoramic radiographs beginning approximately at age 3 years (central incisors and permanent first molars) to age 7.5 years (permanent second molars) [5] and root formation is completed after the tooth has erupted into the oral cavity [7]. Changes in odontoblast activity caused by abnormal secretory functioning of the dentin microtubules and complex changes in inter- and intracellular relationships can produce shortened, tapered, V-shaped roots and blunted roots [3].

In the case reported, the anomaly that was most observed was microdontia of third mandibular molars, and short roots of mandibular second molars and premolars with a 'v' shaped roots of first and second premolars.

Another dental anomaly that is frequently detected in these patients is taurodontia, which is characterized by an enlarged pulp chamber, apical displacement of the pulpal floor and no constriction at the level of the cemento-enamel junction [8], which is caused by the failure of Hertwig's epithelial sheath diaphragm to invaginate at the proper horizontal level [9]. This abnormality usually affects permanent molar teeth, but it can also be observed in premolars and primary molar teeth and can become a challenge when endodontic treatment is needed, particularly because of its anatomy [10]. This wasn't the case of the patient reported [3].

These dental sequelae are generally symptomless and diagnosed during routine radiological investigations. Unfortunately, the complications mentioned above are irreversible. They have great impact because they can cause spacing and movement of teeth, compromising function and esthetic and impacting the patient's quality of life [11].

In the present case, the patient had started chemotherapy at the age of 6 and we found that most teeth who were in development when the oncological treatment started has shown abnormalities such as the second mandibular molars and mandibular premolars.

This clinical case shows the similarity with the other cases in the literature with regard to the symptoms.

It confirms that the most children treated before 5 years of age had the most severe dental defects, suggesting that immature teeth were at greater risk for developmental disturbances than mature teeth.

4. Conclusion

Dental abnormalities are common in pediatric patients treated by chemotherapy. Therefore, it is important that general and pediatric dentists be aware of the late adverse effects of cancer therapy in children, especially in the oral cavity. For these patients a careful dental consultation including clinical and radiological assessment should be performed which will allow to detect clinical and radiological abnormalities due to the anti-cancer treatment and to monitor oral infections and dental procedures that can complicate the treatment. This will improve the quality of life for this increasingly group of children.

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Dr Bousserouit Marwa: Drafting the work conception and design of the work.

Dr Benjelloune Laila: Revising the work; Acquisition and analysis the work.

Pr Chbicheb Saliha: Revising the work critically, Final approval to the version to be published.

Registration of research studies

1. Name of the registry:
2. Unique Identifying number or registration ID:
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

Guarantor

None.

Consent

None.

Declaration of competing interest

All authors declare any conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.104845>.

References

- [1] Long-term dental anomalies after pediatric cancer treatment, in: Children Kanser Tedavisi Gören Çocuklarda Uzun Süre Sonra Görülen Diş Anomalileri, 2018.
- [2] AGENESIS AND SHORTNESS ROOTS OF PERMANENT TEETH FOLLOWING ANTINEOPLASTIC CHEMO-RADIATION THERAPY: A CASE REPORT , J. Hammouti, Fz Benkarroum, H. Chhoul.
- [3] Dental Anomalies in Children Submitted to Antineoplastic Therapy Camila Merida Carrillo, I Fernanda Naha's Pires Corrê a, II Nilza Nelly Fontana Lopes, III Marcelo Fava, I,Iv Vicente Odone Filho.
- [4] S. Nishimura, H. Inada, Y. Sawa, H. Ishikawa, Risk factors to cause tooth formation anomalies in chemotherapy of paediatric cancers, Eur. J. Cancer Care 22 (2013) 353–360.
- [5] P. Hölttä, S. Alaluusua, U.M. Saarinen-Pihkala, J. Wolf, M. Nyström, L. Hovi, Long-term adverse effects on dentition in children with poor-risk neuroblastoma treated with high-dose chemotherapy and autologous stem cell transplantation with or without total body irradiation, Bone Marrow Transplant. 29 (2) (2002) 121–127.
- [6] P. Proc, J. Szczepańska, A. Skiba, M. Zubowska, W. Fendler, W. Mlynarski, Dental anomalies as late adverse effect among young children treated for cancer, Cancer Res Treat 48 (2016) 658–667.
- [7] I.G. van der Pas-van Voskuilen, J.S. Veerkamp, J.E. Raber-Durlacher, D. Bresters, A.J. van Wijk, A. Barasch, et al., Long-term adverse effects of hematopoietic stem cell transplantation on dental development in children, Support. Care Cancer 17 (9) (2009) 1169–1175.
- [8] J.L. Ackerman, L.A. Acherman, B.A. Ackerman, Taurodont, pyramidal, and fused molar roots associated with other anomalies in a kindred, Am. J. Phys. Anthropol. 38 (3) (1973) 681–694.
- [9] H. Jafarzadeh, A. Azarpazhooh, Mayhall Jt, Taurodontism: a review of the condition and endodontic treatment challenges, Int. Endod. J. 41 (5) (2008) 375–388.
- [10] S.C. Kaste, K.P. Hopkins, D. Jones, D. Crom, C.A. Greenwald, V.M. Santana, et al., Dental abnormalities in children treated for acute lymphoblastic leukemia, Leukemia 11 (6) (1997) 792–796.
- [11] A. Juneja MDS, MA (Psychology)) (Associate Professor)a,**, A. Sultan (MDS) (Professor)a, S. Iqbal, Exploring the Presence of Dental Anomalies as a Consequence of Treatment of Malignancy: A Case Report, 2020.
- [12] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus surgical CASE RReport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.