

CASE REPORT

Dental Rehabilitation of a Child with Acute Lymphocytic Leukemia: A Case Report

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ABSTRACT

Leukemia is the cancer of blood cells and bone marrow and it is the most common cancer in children. The cause of acute lymphocytic leukemia is unknown, but many predisposing risk factors could be associated, such as an exposure to radiation, chemical or viral infections. A six-year-old boy was presented with multiple carious teeth and severe pain related to his lower left teeth. Regarding medical history, the child was diagnosed with acute lymphocytic leukemia and after consultation with patient's physician; dental treatment was planned to be accomplished under general anesthesia. The aim of treatment was to eliminate sources of infections, restore carious teeth, relief pain, and improve oral hygiene and patient's parents' education regarding general and oral health. Full-mouth rehabilitation was accomplished after preparing the patient with pediatric hematology/oncology team under general anesthesia. During recall visits, good oral hygiene and caries-free teeth were obtained. It is important to have solid knowledge regarding the medical conditions, the necessary consultations with medical subspecialties and the appropriate timings for treatment.

Keywords: Acute lymphocytic leukemia, Composite restorations, Risk assessment, Stainless steel crowns.

International Journal of Clinical Pediatric Dentistry (2019): 10.5005/jp-journals-10005-1664

INTRODUCTION

Leukemia is the cancer of blood cells and bone marrow. Although overall incidence is rare, leukemia is the most common type of childhood cancer. It accounts for 30% of all cancers diagnosed in children younger than 15 years. Within this population, acute lymphocytic leukemia (ALL) occurs approximately five times more frequently than acute myelogenous leukemia (AML) and accounts for approximately 78% of all childhood leukemia diagnoses. Despite many advances in the treatment of childhood leukemia, the causative factors of ALL remain unclear. Epidemiologic studies of acute leukemias in children have examined possible risk factors, including genetic, infectious, and environmental, in an attempt to determine etiology. Only one environmental risk factor (ionizing radiation) has been significantly linked to ALL. Most environmental risk factors have been found to be weakly and inconsistently associated with ALL.¹

ALL is usually treated by chemotherapy, radiotherapy, and bone marrow transplantation in case of no response to chemotherapeutic treatment. Remarkable progress has been made in the treatment of ALL with 5-year overall survival rate, reaching 90% in the high-income countries (HICs).¹

CASE DESCRIPTION

A 6-year-old Saudi male patient was presented to King Abdulaziz Medical City (KAMC) dental clinic in Jeddah, Saudi Arabia. His father reported that he wants to treat his son's teeth since most of them are carious and currently his son is complaining from severe pain related to his lower left teeth. The medical history showed that the child was diagnosed with ALL one year ago and he is currently in the maintenance phase of chemotherapy taking oral chemotherapeutic medications. Owing to his medical condition and the father's request, his treatment was planned to be completed under general anesthesia (GA). The patient

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How to cite this article: Gholman RR, Felemban EH, El Meligy OAES. Dental Rehabilitation of a Child with Acute Lymphocytic Leukemia: A Case Report. *Int J Clin Pediatr Dent* 2019;12(6):582–586.

Source of support: Nil

Conflict of interest: None

was referred to his physician (hematologist/oncologist) for consultation and clearance for dental rehabilitation under GA. The patient's preoperative hematological parameters revealed absolute neutrophil count (ANC) of 4,500/mm³ and platelets count of 349,000/mm³. Caries risk assessment was performed by asking the parents about their child's diet, oral hygiene, and lifestyle habits. The patient was classified as high-carries-risk patient based on caries-risk assessment tool (CRAT). Extraoral examination of the patient revealed a normal symmetry of the face, pale skin, dry lips, and enlarged submandibular lymph nodes. Intraoral examination revealed poor oral hygiene with mild plaque accumulation at the gingival margins along with the buccal and lingual surfaces of teeth, which had resulted in marginal gingivitis in addition to bleeding on probing. Also, multiple carious teeth

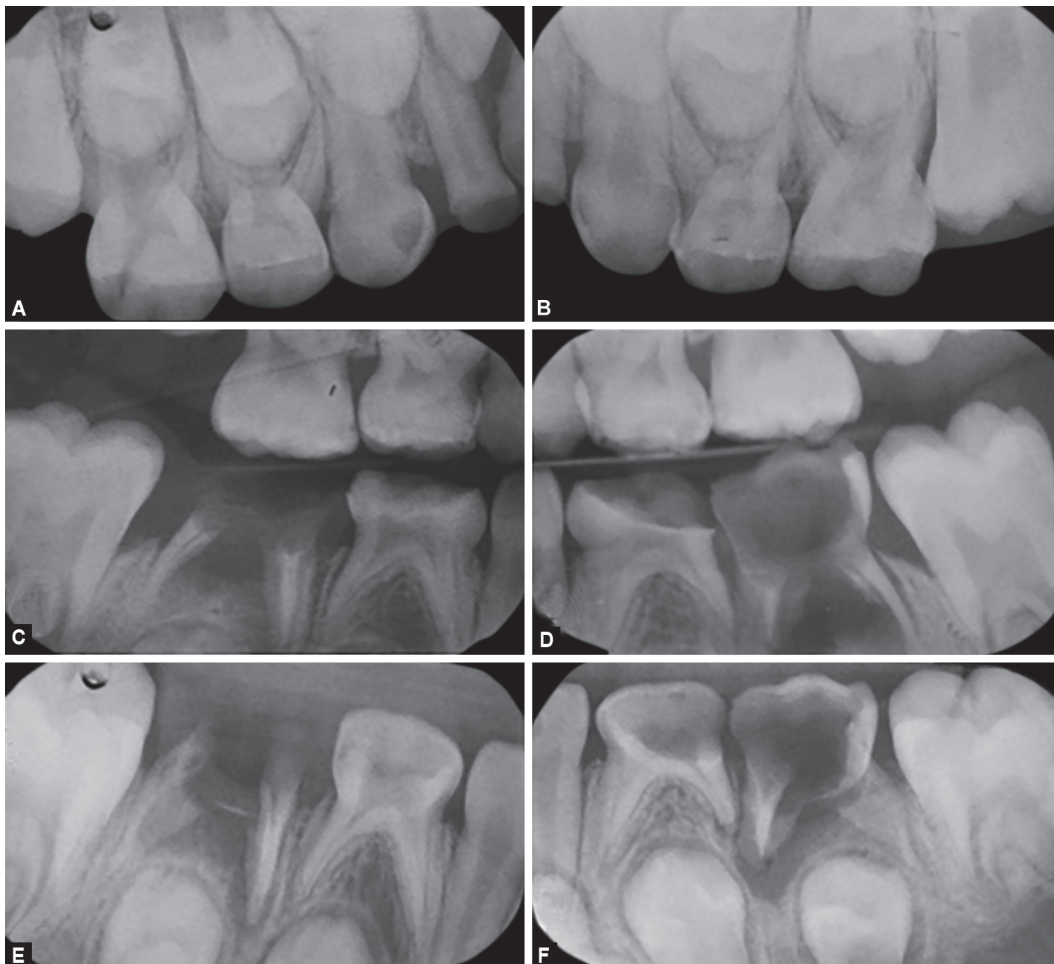
and abscessed primary teeth were present (Fig. 1). Radiographic examination revealed proximal caries, root resorption, and furcation involvement in some primary teeth (Fig. 2). The patient's dental age was normal when compared to his chronological age, which is 6 years.

DISCUSSION

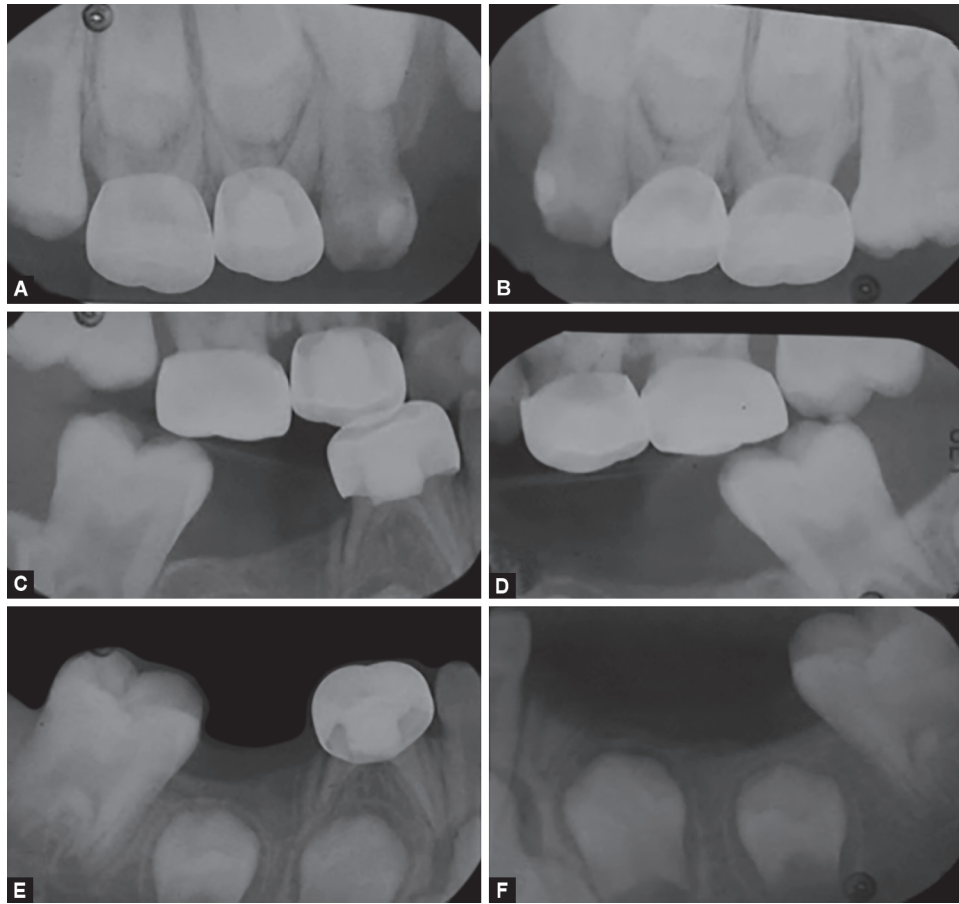
On the basis of CRAT, our patient was classified as high-caries-risk patient. A previous study was done with 52 children receiving chemotherapy revealed high caries prevalence among ALL



Figs 1A to E: Intraoral preoperative clinical pictures of affected teeth



Figs 2A to F: Intraoral preoperative radiographs



Figs 3A to F: Intraoral postoperative radiographs

children when compared with a control healthy group.² Although dental caries does not occur by direct effect of the disease process, chemotherapy, or radiotherapy, instead it is affected by negligence of oral hygiene, soft dietary intake, alteration of oral environment, and salivary glands.³ In addition of high caries prevalence, many oral manifestations that leukemic patient could be suffering from can be a guide for early diagnosis of leukemia. It varies according to patient's health state, including mucosal pallor, oral ulceration, herpetic infection, candidiasis, gingival swelling, and/or bleeding.⁴⁻⁸ As medical treatment of leukemia has been initiated, manifestations of leukemia often gradually subside, while complications of chemotherapy start to appear, including periodontal inflammation, hemorrhage, mucositis, xerostomia, fungal infections, bacterial infection, and recurrent herpes simplex virus infection.⁹ These complications should be managed immediately and the patient should be monitored pre, during, and post-chemotherapy.¹⁰

Management of leukemia patients should start first with hematologic preparation. According to the American Academy of Pediatric Dentistry (AAPD), hematological considerations and preparations include:¹¹

Absolute Neutrophil Count

- More than 2,000/mm³: No need for antibiotic prophylaxis.
- From 1,000 to 2,000/mm³: Use clinical judgment based on the patient's health status and planned procedures. Some authors suggest that antibiotic coverage (dosed per American Heart

Association (AHA) recommendations) may be prescribed when ANC is between 1,000 and 2,000/mm³. If infection is present or unclear, more aggressive antibiotic therapy may be indicated and should be discussed with the medical team.

- Less than 1,000/mm³: Defer elective dental care. In dental emergency cases, discuss antibiotic coverage (antibiotic prophylaxis vs antibiotic coverage for a period of time) with medical team before proceeding with treatment. The patient may need hospitalization for dental management.

Platelet Count

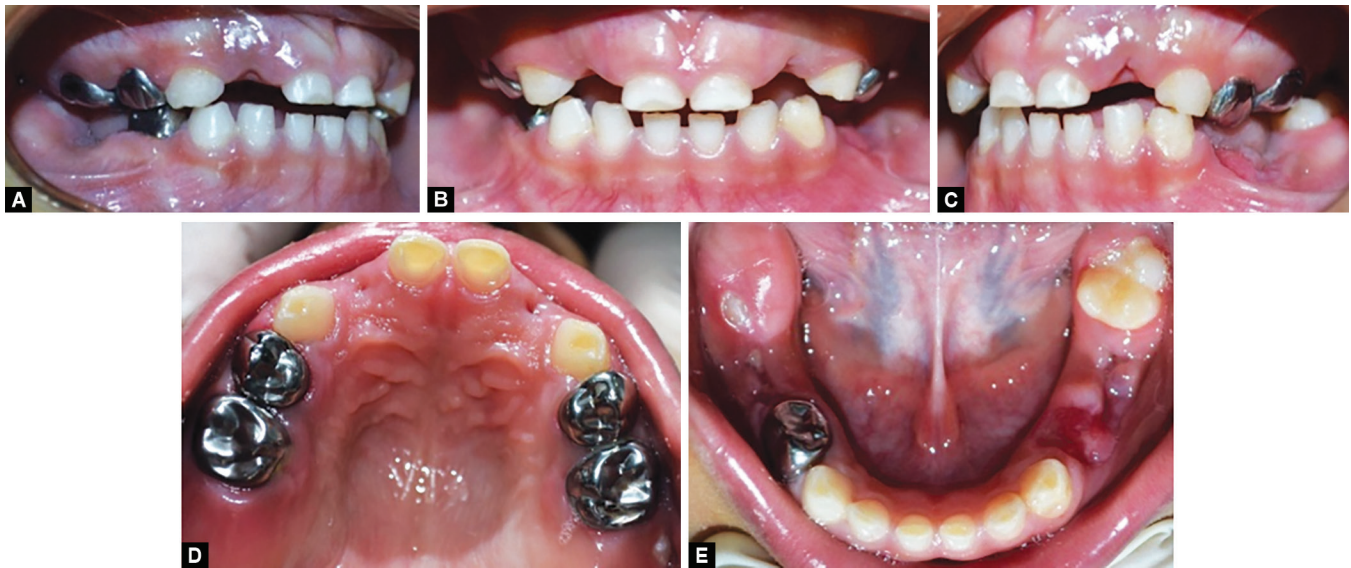
- More than 75,000/mm³: No additional support needed.
- From 40,000 to 75,000/mm³: Platelet transfusions may be considered pre- and 24 hours post-operatively. Localized procedures to manage prolonged bleeding may include sutures, hemostatic agents, pressure packs, and/or gelatin foams.
- Less than 40,000/mm³: Defer care. In dental emergency cases, contact the patient's physician to discuss supportive measures (e.g. platelet transfusions, bleeding control, hospital admission and care) before proceeding. In addition, localized procedures (e.g. microfibrillar collagen, and topical thrombin) and additional medications as recommended by the hematologist/oncologist (e.g. aminocaproic acid and tranexamic acid) may help control bleeding.

Our patient's preoperative hematological parameters were within the normal range. Dental treatment of leukemia patients

should be planned according to the antineoplastic therapy involving the medical team. Overall health state and stages of disease are also important especially in invasive dental procedures. Risk of bleeding and infection should be considered as well.¹²

Treatment Intervention

Prior to treatment, a written informed consent was obtained from the parents. Dental rehabilitation under GA was accomplished as follows: (1) full coverage of carious teeth # 55, 64 and 65 using



Figs 4A to E: Postoperative follow-up intraoral clinical photograph



Figs 5A to E: Six months' recall intraoral photos

stainless steel crowns (SSCs); (2) pulpotomy performed followed by SSCs in teeth # 54 and 84 (According to AAPD, pulp therapy is a relative contraindication in children with malignancies, but the decision to perform pulp therapy was due to the stable laboratory parameters of the patient during the previous three months in addition he was in maintenance phase of chemotherapy); (3) composite restoration in teeth # 51, 53, 61, 63, 72, and 73; (4) extraction of badly decayed teeth # 52, 62, 74, 75, and 85; (5) no space maintenance was planned to be done until the patient receive the full dose of his chemotherapy, since immunity might be compromised and the appliance might act as a source of infection.

Treatment Outcomes

During the 3 and 6 months recall visits, the planned treatment was successful; all pulpotomized teeth showed evidence of success and all restorations were intact without any complaints. Only mild space loss in the lower arch due to mesial drifting of permanent first molars occurred (Figs 3 to 5). Upon recall visits, the child's behavior was improved and clinical examination revealed fair oral hygiene with intact restorations and caries-free state. Gingival inflammation resolved and the gingiva was healthy.

CONCLUSION

The following conclusions can be made:

- It is important to have solid knowledge regarding the medical conditions, the necessary consultations with medical sub-specialties and the appropriate timings for treatment.
- While performing dental treatment for leukemic patients, considerable risks might occur. Thus, hematological considerations must be addressed.

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