

Oral and Dental Care in Acute Lymphoblastic Leukemia: Role of Pediatric Dentist

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ABSTRACT

The increase in the prevalence on childhood cancer and widespread use of chemotherapy in many patients leads to an increase the risk of oral infection in children. Short-term effects of cancer treatment are oral mucositis and glossitis, xerostomia, intra-oral infections, acute ascending sialadenitis and gingivitis.

This article presents the need of oncology protocol modifications such as an early pre-treatment oral assessment and the need of appropriate dental services with a pediatric dentist at referral cancer treatment services.

Key Words: Oral-dental care, Acute lymphoblastic leukaemia, Pediatric dentist

ÖZET

Akut Lenfoblastik Lösemide Ağız ve Diş Bakımı: Pedodontistin Rolü

Çocukluk çağı kanserlerinin yaygınlaşması ve birçok hastada kemoterapi uygulanması ile çocuklarda ağız enfeksiyonu görülme riski artmıştır. Kanser tedavilerinin kısa dönemde görülen yan etkileri oral mukositis, glossitis, ağız kuruluğu, ağız içi enfeksiyonlar, sialadenitis ve gingivittir.

Bu makalede onkoloji tedavi protokollerinde tedavi öncesi ağız ve diş muayenesi yapılması zorunluluğunun eklenmesi ve kanser tedavi merkezlerinde içinde bir pedodontistinde çalışacağı ağız diş sağlığı ünitelerinin kurulması gerekliliği ortaya konmuştur.

Anahtar Kelimeler: Ağız-diş bakımı, Akut lenfoblastik lösemi, Pedodontist

INTRODUCTION

In Turkey, there are approximately 2500-3000 new childhood cancer and 1200-1500 leukemia cases each year under the age of 16.^{1,2} Children receive cancer treatment at 33 referral centers in Turkey.¹ Leukemia constitutes about 35% of childhood cancer cases. Acute lymphoblastic leukemia (ALL) and acute myeloblastic leukemia (AML) are the main groups of leukemia cases. Symptoms of leukemia are as loss of appetite, anemia, and weight loss, bone pain in the legs, bleeding under the skin, nose and gum bleeding and fever. Faced with a diagnosis of malignancy, a patient and/or their parents may not see dental care as a high priority.³

Irrespective of the centre in which it is carried out, treatment of ALL follows broadly common guidelines.⁴ The first period of treatment (approximately one month) is concerned with the induction of remission with chemotherapeutics. During this time, the bone marrow is cleared of visible leukemic cells and repopulated with normal ones. Induction is followed by consolidation, usually accomplished by the administration of several lines of high dose chemotherapy over the 6-9 months following diagnosis. Finally there is a period of maintenance period during which treatment with anti-metabolites is continued on a daily basis. This usually lasts for between 18 months and 3 years, depending on the protocol employed.⁵

The immunosuppressive effect of treatment protocol increases the risk of oral infection in children. The oral cavity is a region in which acute complications frequently occur during treatment, and chronic complications may hang over long after this has lasted.⁶ Short-term effects of cancer treatment could be listed as; oral mucositis and glossitis, xerostomia, intra-oral infections, acute ascending sialadenitis and gingivitis. Long-term effects include tooth agenesis, microdontia, crown hyperplasia, disturbed root formation and atrophy of the soft tissues.⁷⁻¹¹ The oral and dental care is important for children undergoing treatment for ALL and other childhood cancers.¹²

The effects of chemotherapeutic drugs on dental and oral tissues depend on the age period. If the treatment is received during the developmental stage of permanent teeth, microdontia could be seen. If

the period overlaps during the root formation then the complication occurs as taurodontism or short length root formation. This could be evaluated by taking a panoramic radiograph before the oncology, so it can give the chance to the dentist to predict the developmental dental anomalies and to plan the appropriate dental treatment. As the treatment protocol in ALL patients is administration of chemotherapy, it will be more illustrative to list recommendations as precautions for oral health before and after chemotherapy.

Oral Dental Health Care Before Chemotherapy

Precautions of oral and dental health before chemotherapy are intended to reduce or prevent the complications that may occur during or after chemotherapy. Pediatric dentist should evaluate oral hygiene, dental caries, periodontal tissues, gingival, lips, palate and soft tissues. Periodontal problems should be eliminated primarily because chemotherapeutic treatment could stimulate myelosuppression, and during myelosuppression period chronic periodontal situations could show an acute attack.¹³ The systemic sequel as a result of these immunosuppressive treatments induces many oral and dental complications. The direct and indirect stomatotoxic effects are associated with the development of ulcerative, hemorrhagic, or infectious complications.¹⁶ As a consequence, all these problems can potentially cause increasing mortality and morbidity.

Intensive chemoradiotherapy damages the mucosal barrier of the mouth and throat and it is often associated with severe oral inflammation and infection, including herpes simplex, candidiasis, mucositis, and gingivitis.^{4,9,11} On the other hand, these oral complications could make difficulty in nutrition of children.

Secondarily, pediatric dentist should evaluate the caries teeth which could not be restored.

These teeth must be extracted before the chemotherapy because in future they could act as a focal infection source for the children.

Oral treatment should be finished one week prior to chemotherapy, if there is a need for eliminating acute infection, dental treatment should be done two weeks before the cancer treatment.¹⁴

Oral Dental Health Care after Chemotherapy

Severe oral complications occur mostly when children are in hospital for therapy. Patients should be evaluating systematically, and oral hygiene should be maintained. Tooth brushing and using tooth flosses and other oral hygiene methods helps to prevent complications in patients who have platelet level under 5000/mm. Pediatric dentist could also recommend sodium bicarbonate or saline mouthwash 3 or 4 times a day for these patients.

Sodium bicarbonate (5%) could dilute the mucous secretion, moisten the oral mucosa, and increase the oral pH, and inhibit the *Candida Albicans* colonization.^{14,17} If the dental treatment is indicated when platelet level is under 5000/mm, platelet transfusion should be done prior to dental treatment.

Routine dental treatments could be done when platelet level is 5000/mm or above. Prior to dental treatment, dentist must also evaluate the white blood cell level (above 2000/mm³) and granulocyte level (1500/mm³). The white blood cell level should be constant during the dental therapy.

When chemotherapy procedure decreases the granulocyte level (under 2000/mm³), dental treatment should be postponed unless it is not an emergency for patient. If the patient needs dental surgical treatment such as tooth extraction or an endodontic treatment, antibiotic prophylaxis is indicated.¹⁸ Periodontal treatment should be done either before the therapy or after the therapy, but not during the cancer treatment period.^{13,14} Level of platelet, prothrombin time and partial thromboplastin time should be also determined before tooth extraction.¹⁴ Dentists and oncologists have to make a detailed consultation for these types of childhood cancer patients.

When the tooth extraction is indicated during chemotherapy procedure, the platelet level should be tested first. If the level is under 4000/mm³, platelet transfusion should be done 30 minutes before the extraction. If it is lower than 2000/mm³, antibiotic prophylaxis is indicated. Ideally, tooth extraction should be done 3 days before the initial chemotherapy procedure.

Hemorrhagic complications are seen frequently in oral cavity, especially on palate, gingiva, lips and tongue. Bleeding occurs usually due to trauma and

is in dark-red color.¹⁹ Bleeding could be related to periodontal disorders, mobile teeth, traumatic oral hygiene procedures (hard tooth brushes.etc), fractured teeth and orthodontic treatment. 88% of hemorrhagic complications are primarily due to thrombocytopenia or myelosuppression.^{13,14,19} Intraoral bleeding could be controlled with leveling platelet and coagulation factors.

Standard tooth brushing and flossing procedures should be postponed when the platelet level is under 2000/mm³ because the cleaning procedure can induce the risk of septicemia. In this situation oncologist should consult to pediatric dentist to change the oral hygiene procedure. The teeth and gum could be cleaned by a sponge immersed in sodium bicarbonate or chlorhexidine based mouthwashes.^{13,14}

Intraoral infection is one of the complications of chemotherapy procedure which has vital importance.¹⁹ Clinically, immunosuppression could lead the colonization of bacteria on oral mucosa, superficial or deep ulceration, cellulites, tissue necrosis and alveolar bone perforation.¹⁷ Intraoral infection is seen at 35 % of oncology patients. Fungus (*candida albicans*), herpes simplex virus, gram + and – basils are the type of organisms which became pathogenic under this conditions.¹⁹⁻²¹ Oral bacterial infection could be related to mucosal or odontogenic factors. Consultation must be done to eliminate the focal point.

Ideally, a pediatric dentist should diagnose the ALL patient before the initial chemotherapy procedure to maintain a proper oral hygiene.

Mucositis is also a common complication during or after chemotherapy treatment. The severity of the infection is correlated to the type and dose of the agent and also due to the toleration of the patient. Mucositis lesions vary from superficial degeneration and erosion to severe ulcerations.

Chlorhexidine based mouthwashes are used as a prophylactic agent to avoid these kind of infections.

Xerostomia is also a predisposing factor for the intraoral infections. It is seen 21% of the patients under cancer therapy. It is due to the decrease at salivary flow and seen 2 or 3 days after the chemotherapy agent deliver. Xerostomia decreases salivary pH, induce periodontal destruction and also incre-

ases the dental caries incidence.^{17,19} There are some medicaments used for moistening the oral cavity which could help to avoid the irritation of the oral mucosa. Phenol or alcohol based mouthwashes and toothpaste usage should be avoided in cancer patients not to stimulate the mucosal irritation. Some types of chemotherapy agents could have a toxic effect on nerves and patients could perceive this situation as toothache. Intraoral complication prevalence is higher in young patients than the elder ones.

As a conclusion there is clearly a need to establish a team for childhood cancer patients to avoid intraoral complications which are dangerous for children survive. This team should comprise a Pediatric Dentist.

Ideally, oncology protocols should include an early pre-treatment oral assessment consisting of thorough clinical and radiographic examinations.

The development of appropriate dental services with a pediatric dentist at referral cancer treatment services should avoid the complications related to cancer treatment.

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