Leukemia

They are hematopoietic malignancies in which abnormal leukocytes (blast cells) proliferate in the bone marrow, replacing normal cells, and disseminate into the peripheral blood, accumulating in other tissues and organs of the body.

Leukemia is classified according to the morphology of the predominant abnormal leukocytes in the bone marrow. These types are further categorized as acute or chronic, depending on the clinical course and the degree of differentiation, or maturation, of the predominant abnormal cells.

Although the cause of leukemia is unknown, ionizing radiation, certain chemical agents, and genetic factors have been implicated. For example, children with chromosomal abnormalities (Down syndrome and Bloom syndrome), children with an identical twin who has leukemia, and children with immunologic disorders have an increased risk for leukemia. In the United States, leukemia rates for white children are about 1.5 times those for black children.

ORAL MANIFESTATIONS OF LEUKEMIA

Abnormalities in or around the oral cavity occur in all types of leukemia and in all age groups. However, oral pathologies are more commonly observed in acute leukemia than in chronic leukemia.

The most frequently reported oral abnormalities attributed to the leukemic process include:
1. Regional lymphadenopathy.
2. Mucous membrane petechiae and ecchymosis,
4. Pallor, and nonspecific ulcerations.

Manifestations seen occasionally are:
Cranial nerve palsies, chin and lip paresthesias, odontalgia, jaw pain, loose teeth, extruded teeth, and gangrenous stomatitis. Each of these findings has been reported in all types of leukemia.

Like the systemic manifestations of leukemia, oral changes can be attributed to anemia, granulocytopenia, and thrombocytopenia, all of which result from the replacement of normal bone marrow elements by undifferentiated blast cells or direct invasion of tissue by these leukemic cells. Very high circulating white blood cell numbers in the peripheral blood can lead to stasis in small vascular channels. The subsequent tissue anoxia results in areas of necrosis and ulceration that can readily become infected by opportunistic oral microorganisms in patients with neutropenia. A person with severe thrombocytopenia, having lost the capacity to
maintain vascular integrity, is likely to bleed spontaneously. Clinical manifestations are petechiae or ecchymosis of the oral mucosa or frank bleeding from the gingival sulcus. The propensity for gingival bleeding is greatly increased in persons with deficient oral hygiene because accumulated plaque and debris are significant local irritants. Direct invasion of tissue by an infiltrate of leukemic cells can produce gingival hypertrophy. Such gingival changes can occur despite excellent oral hygiene. Infiltration of leukemic cells along vascular channels can result in strangulation of pulpal tissue and spontaneous abscess formation as a result of infection or focal areas of liquefaction necrosis in the dental pulp of clinically and radiographically sound teeth. In a similar fashion the teeth may rapidly loosen as a result of necrosis of PDL.

Skeletal lesions caused by leukemic infiltration of bone are common in childhood leukemia. The most common finding is a generalized osteoporosis caused by enlargement of the Haversian and Volkmann canals. Osteolytic lesions resulting from focal areas of hemorrhage and necrosis and leading to loss of trabecular bone are also common. Evidence of skeletal lesions is visible on dental radiographs in up to 63% of children with acute leukemia.

Manifestations in the jaws include generalized loss of trabeculation, destruction of the crypts of developing teeth, loss of lamina dura, widening of the PDL space, and displacement of teeth and tooth buds. Because none of the oral changes is a pathognomonic sign of leukemia and all can be associated with numerous local or systemic disease processes, a diagnosis of leukemia cannot be based on oral findings alone. Such changes should, however, alert the clinician to the possibility of malignancy as the underlying cause.

Candidiasis is common in children with leukemia. They are especially susceptible to this fungal infection because of:

1. General physical debilitation,
2. Immunosuppression,
3. Prolonged antibiotic therapy,
4. Chemotherapy,
5. Poor oral hygiene.

DENTAL MANAGEMENT OF PATIENTS WITH LEUKEMIA

Before any dental treatment is administered to a child with leukemia, the child’s hematologist/oncologist or primary care physician should be consulted. The following information should be ascertained:

1. Primary medical diagnosis
2. Anticipated clinical course and prognosis
3. Present and future therapeutic modalities
4. Present general state of health
5. Present hematologic status

It is also important to establish, by consultation with the patient’s physician, when dental treatment may be most propitious and to schedule the patient’s treatment accordingly. The proposed procedures should be discussed to determine if they are appropriate. For a child whose first remission has not yet been attained or one who is in relapse, all elective dental procedures should be deferred. However, it is essential that potential sources of systemic infection within the oral cavity be controlled or eradicated whenever they are recognized (e.g., immediate extraction of carious primary teeth with pulpal involvement). Routine preventive, restorative, and surgical procedures can usually be provided for a patient who is in complete remission yet is undergoing chemotherapy. The time when such procedures may be completed without complications will depend on the specific agents administered and the time of administration.

- Before the appointment—preferably the same day—a blood cell profile (complete blood count) and platelet count should be obtained
- Pulp therapy on primary teeth is contraindicated in any patient with a history of leukemia.
- Endodontic treatment for permanent teeth is not recommended for any patient with leukemia who may have a chronic, intermittent suppression of granulocytes. Even with the most exacting technique, an area of chronic inflammatory tissue may remain in the periapical region of endodontically treated teeth. An area of low-grade, chronic inflammation in a healthy patient is generally well tolerated, but in an immunosuppressed, neutropenic patient the same area can act as an anachoretic focus with devastating sequelae.
- A platelet level of 100,000/mm³ is adequate for most dental procedures
- Routine preventive and restorative treatment, including non-block injections, may be considered when the platelet count is at least 50,000/mm³.
- If the platelet count is lower than 20,000/mm³, all the intraoral mucosal tissues may show clinical evidence of spontaneous hemorrhaging (e.g., petechiae, ecchymosis, or frank hemorrhage). No dental treatment should be performed at such a time without a preceding prophylactic platelet transfusion. Good oral hygiene must be maintained while the platelet count is at this level, but it may be necessary to discontinue the use of a toothbrush and to substitute cleaning with moist gauze wipes, supplemented by frequent saline rinses.
- The use of a soft nylon toothbrush for the removal of plaque is recommended.
Infection and hemorrhage are the primary causes of death other than resistant disease or relapse in children with leukemia. Therefore the primary objective of dental treatment in a child with leukemia should be the prevention, control, and eradication of oral inflammation, hemorrhage, and infection.

It is important that significant local irritants, including orthodontic appliances, be removed. Scaling and subgingival curettage should not necessarily be perceived as elective dental treatment in all patients. This is especially true if the anticipated clinical course may place the patient at high risk for hemorrhage and infection. Patients with classic leukemic gingivitis experience various degrees of discomfort. The use of warm saline rinses several times each day may assist in the relief of symptoms. Erosive or ulcerative lesions are common in children with leukemia. These lesions are often associated with the use of certain chemotherapeutic agents.

HEMATOPOIETIC STEM CELL TRANSPLANTATION

The transplantation of hematopoietic stem cells can be curative for a variety of disorders, including aplastic anemia, thalassemia, and severe combined immunodeficiency.

ORAL COMPLICATIONS OF BONE MARROW TRANSPLANTATION

The oral complications of bone marrow transplantation differ from those seen during conventional therapy for malignant disease only in degree and duration. Oral ulceration, mucositis, and transient salivary gland dysfunction are frequent consequences of stomatotoxic chemotherapy and total-body irradiation. Minor trauma to atrophic mucous membranes often results in self-induced ulceration of the buccal mucosa, lips, and tongue. Thrombocytopenic gingival bleeding and bleeding from oral ulcerations are also frequently encountered. Oral ulceration and mucositis are common sequelae of cancer treatment, and they resolve with the return of bone marrow function and rising absolute neutrophil counts.

SOLID TUMORS

Solid tumors account for approximately half of the cases of childhood malignancy. The most common tumors include brain tumors, lymphoma, neuroblastoma, Wilms’ tumor, osteosarcoma, and rhabdomyosarcoma. Because many of the malignancies can involve bone marrow and their treatment with
chemotherapy and radiation can suppress marrow function, many of the complications seen in acute leukemia are also seen with these patients. Bleeding diatheses and the propensity to infection are the most notable medical complications seen. In general, the dental management of patients with solid tumors is similar to that of patients with acute leukemia.