# White Blood Cells Diseases

- Defects in WBCs can manifest as delayed healing, infection, or mucosal ulceration and, in some cases, may be fatal. To ensure the health of the patient, the dentist should be able to detect WBC abnormalities through history, clinical examination, and screening laboratory tests and should provide prompt referral to a physician for diagnosis and treatment before invasive dental procedures are performed.

- Three groups of WBCs are found in the peripheral circulation: granulocytes, lymphocytes, and monocytes.
- The bone marrow can increase the production of granulocytes and monocytes in response to infection.

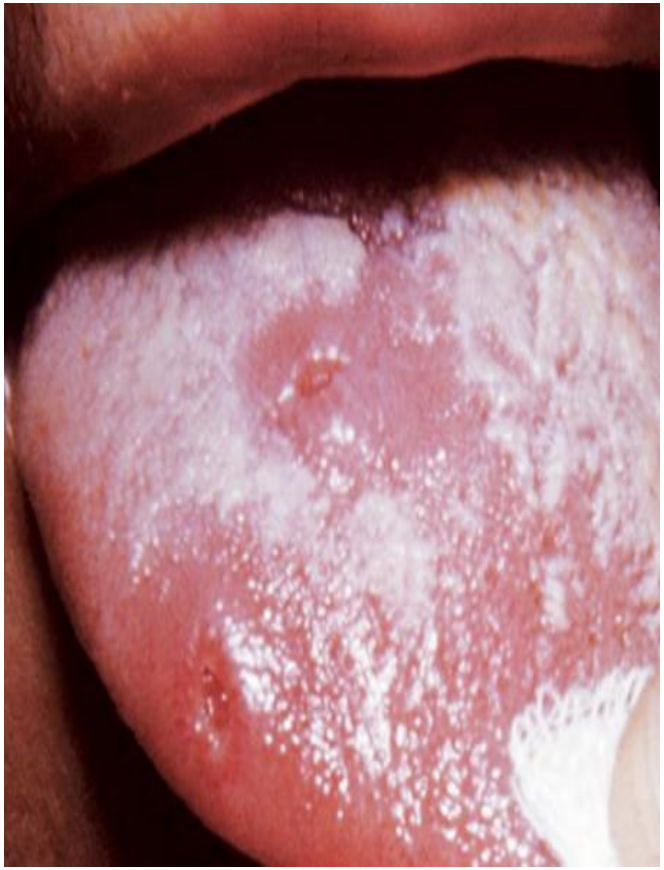
# LEUKOCYTOSIS AND LEUKOPENIA

- The number of circulating WBCs normally ranges from 4400-11,000/mm3 in adults (neutrophils 50-60%; eosinophils 1-3%; basophils less than 1%; lymphocytes 20-34%; and monocytes 3-7%).
- Leukocytosis is an increase in the number of circulating WBCs (lymphocytes or granulocytes) to more than 11,000/mm3.
- Leukopenia is reduction in the number of circulating WBCs (usually to <4400/mm3).

- Physiologic leukocytosis results from Exercise, pregnancy, and emotional stress. Pathologic leukocytosis can be caused by infection, neoplasia, and necrosis.
- Leukopenia may occur in the early phase of leukemia and lymphoma , agranulocytosis (reduction of granulocytes) and pancytopenia (decreased WBCs and RBCs) that result from toxic effects of drugs and chemicals. Leukopenia is a common complication that results from the use of chemotherapeutic (anticancer) drugs.

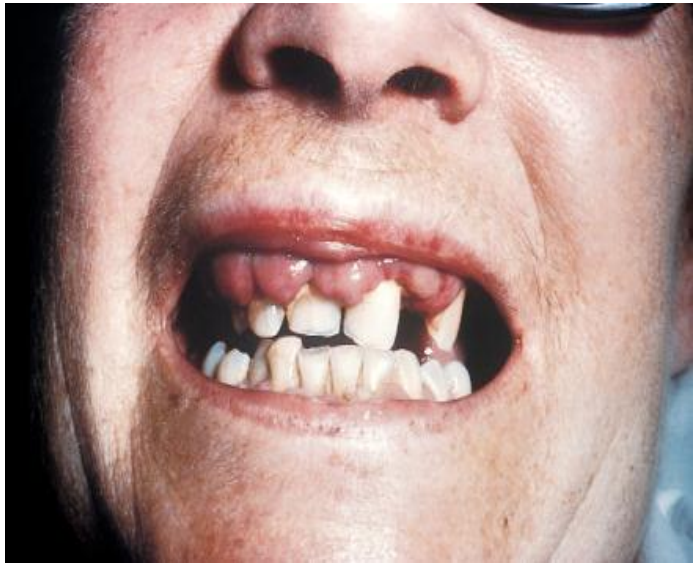
# Cyclic neutropenia

- An important form of leukopenia involving the cyclic depression of circulating neutrophils periodic decrease (at least a 40% drop) in the number of neutrophils (about every 21 to 28 days).
- During the period in which few circulating neutrophils are present, the patient is susceptible to infection, Familial and chronic idiopathic forms of neutropenia also contribute



# Leukemia

- Leukemia is cancer of the WBCs that affects the bone marrow and circulating blood. It involves exponential proliferation of a clonal myeloid or lymphoid cell and occurs in both acute and chronic forms.



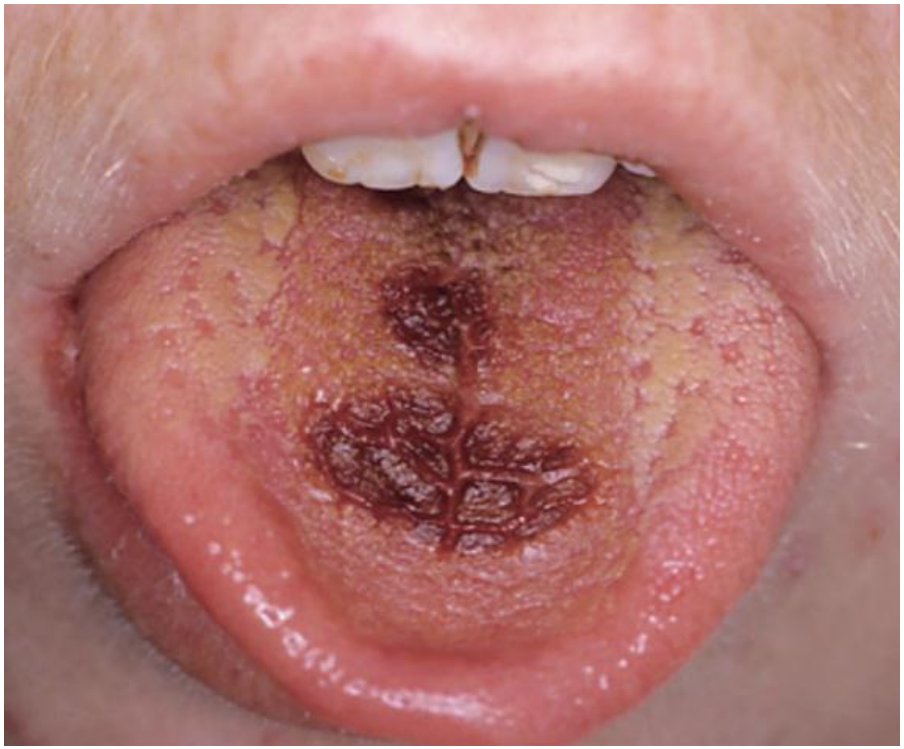
Acute leukemia is a rapidly progressive disease that results from accumulation of immature, functionless WBCs in the marrow and blood. Chronic leukemia has a slower onset, which allows production of larger numbers of more mature (terminally differentiated), functional cells.

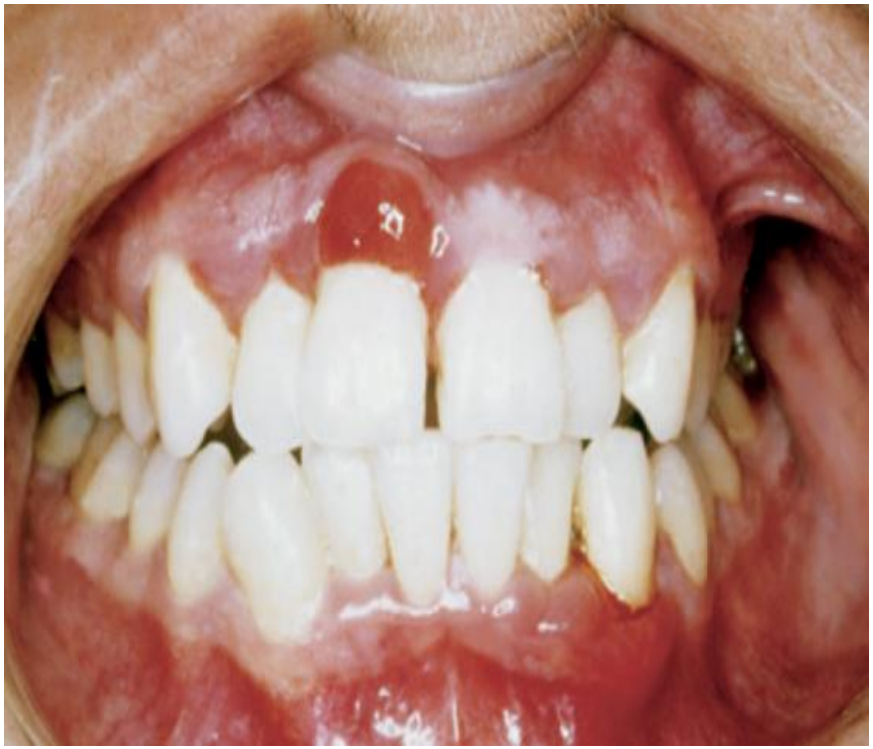
- Four types of leukemia: (1) acute lymphocytic, (2) acute myeloid, (3) chronic lymphocytic, and (4)chronic myeloid.
- leukemia are somewhat more common in men.
- Acute leukemia  is more common than chronic leukemia. Leukemia is 9 times more common in adults than in children, with more than half of all cases occurring after age 65 years.

- The cause of leukemia remains unknown. Increased risk is associated with large doses of ionizing radiation, certain chemicals (benzene), and infection with specific viruses (e.g., Epstein-Barr virus [EBV], human lymphotropic virus [HTLV]-1). Cigarette smoking and exposure to electromagnetic.

# Oral Manifestations of Acute Leukemia

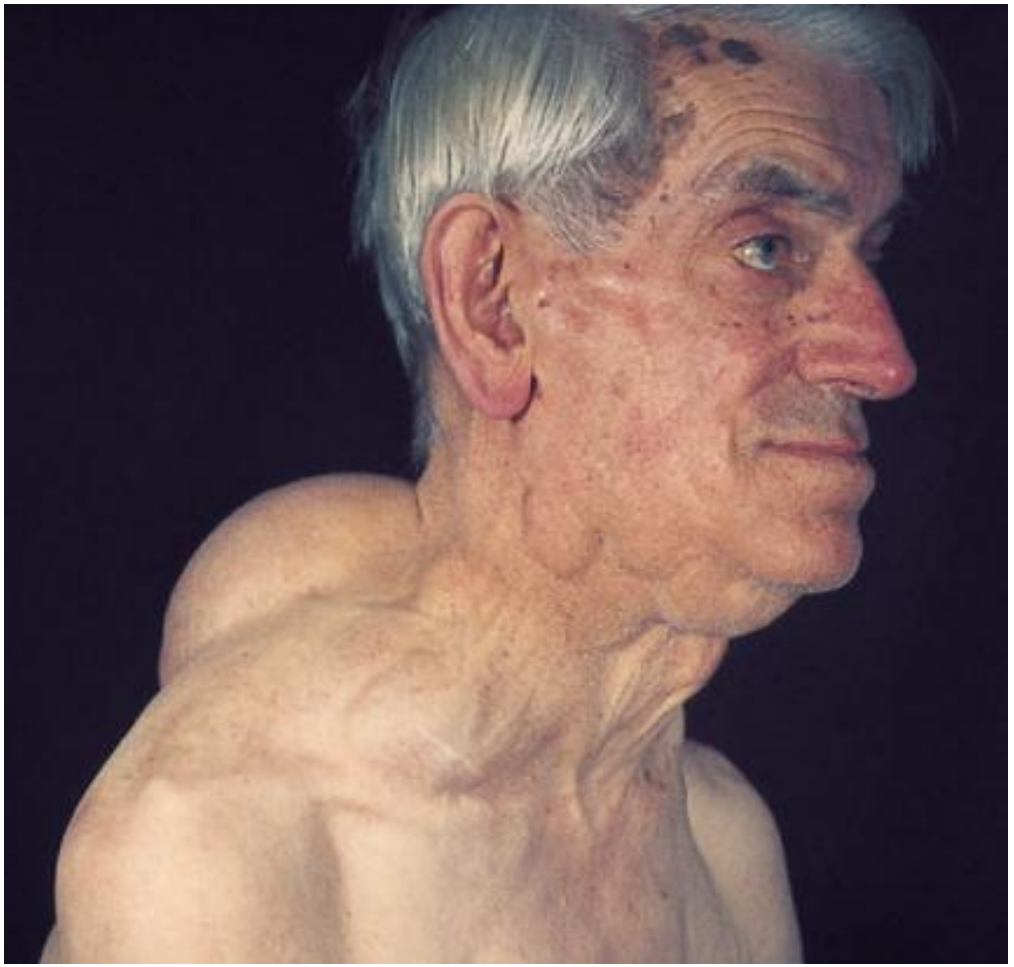
- gingival enlargement, ulceration, and oral infection





# CHRONIC MYELOID LEUKEMIA

- Generalized lymphadenopathy, pallor oral and Oral soft tissue infection.



# Lymphoma

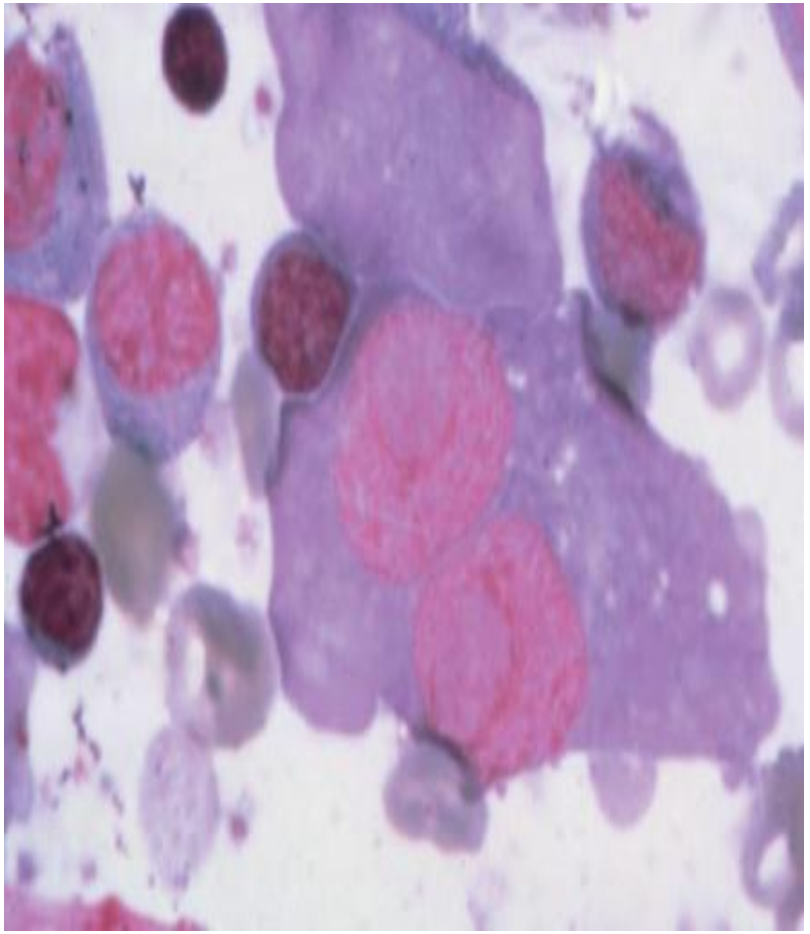
- is cancer of the lymphoid organs and tissues that presents as discrete tissue masses. Lymphomas are classified by cell type (B cell, T cell, MALT, plasma cell), appearance (small or large cell, cleaved or noncleaved nucleus), and clinical behavior (of low, intermediate, and high grade); higher grades have been noted to be more
- The most important types are (Hodgkin's disease, non-Hodgkin's lymphoma, Burkitt's lymphoma and multiple myeloma) . These diseases are of importance to the dentist because initial signs often occur in the mouth (e.g., Waldeyer's ring) and in the head and neck region, and precautions must be taken before any dental treatment is provided.

# Hodgkin's disease

- It is a malignant neoplasm  of B lymphocytes.
- The cause of Hodgkin's disease is unknown, but EBV is present in 40% of cases and Increased risk is associated with human immunodeficiency virus (HIV)-infected patients.
- Enlarging tumorous nodes may cause lung or vascular  obstruction, cough, shortness of breath, or dysphagia.

- The disease spreads in lymph nodes and spleen then hematogenously to extranodal sites, including bone marrow, liver, and lung.
- Without treatment, death occurs as a result of complications from bone marrow failure or infection.

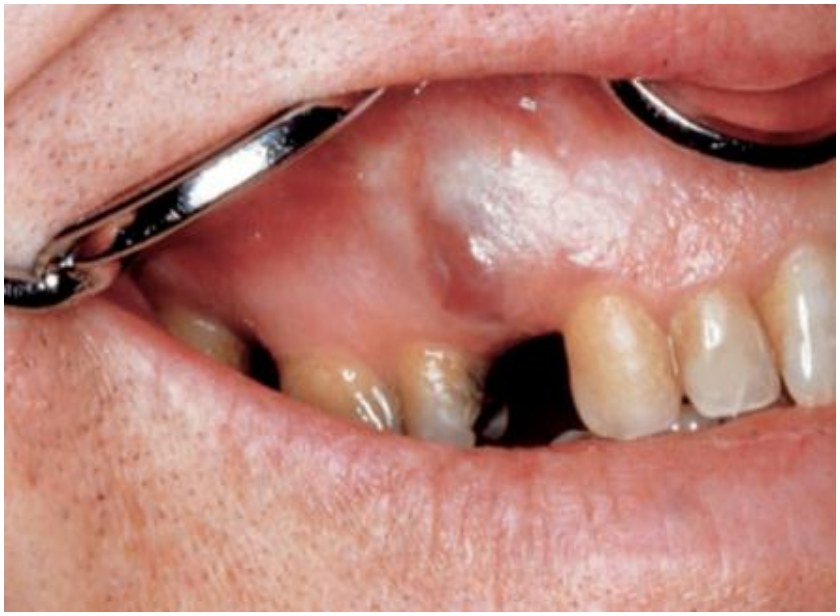
- The diagnosis of Hodgkin's lymphoma by nodal biopsy or bone marrow aspirate. Microscopically: tumor tissue typically shows large, multinucleated Reed-Sternberg (monoclonal B) cells

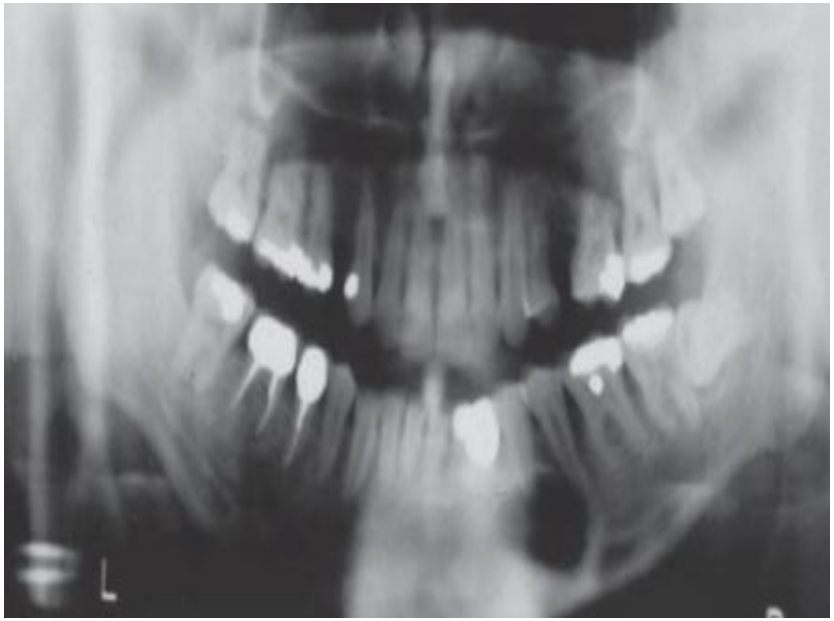


# Non-Hodgkin's lymphoma (NHL)

- It comprises a large group of lymphoproliferative disorders classified as of B-cell or T-cell origin. More than 80% of these neoplasms are of B-cell origin.
- Of the more than 20 types of NHL that have been identified, diffuse large B-cell and follicular lymphomas account for about 60% of cases

- The cause of NHL is unknown, but genetic factors, infectious agents (acquired immunodeficiency syndrome [AIDS], Helicobacter pylori in gastric lymphoma and EBV, Kaposi's sarcoma), radiation, chemotherapy are recognized as causative agents.
- Malignant lymphocytes have gene mutations in BCL2.





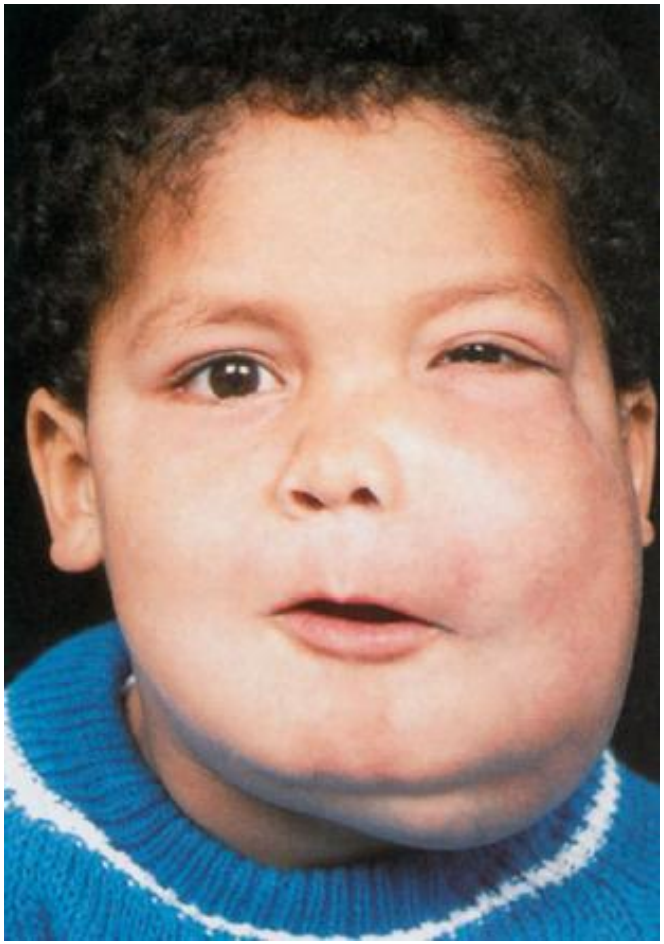
# Oral Complications and Manifestations

- Cervical lymphadenopathy (most commonly involves Waldeyer's ring (soft palate and oropharynx) salivary glands and mandible are affected.
- Enlargements may be painless or painful and patients may experience deep "crateriform" oral ulcers and fever.
- Patients with lymphoma who have received medical treatment for their disease sometimes suffer from  burning mouth symptoms, xerostomia, candidiasis, or anemia
- Osteoradionecrosis is a long-term risk associated with radiation doses to the jaws in excess of 50 Gy

# Burkitt's lymphoma

- It is an aggressive mature B-cell (non-Hodgkin's) lymphoma that express surface immunoglobulin (IgM). It is the most common lymphoma of childhood. All Burkitt's lymphomas are associated with translocation of the c-myc gene
- Burkitt's lymphoma in Africa is known as endemic Burkitt's lymphoma, in Western societies known as Sporadic (nonendemic) Burkitt's lymphoma affect older children and adults in their 30s. A third aggressive type occurs in HIV-infected individuals.

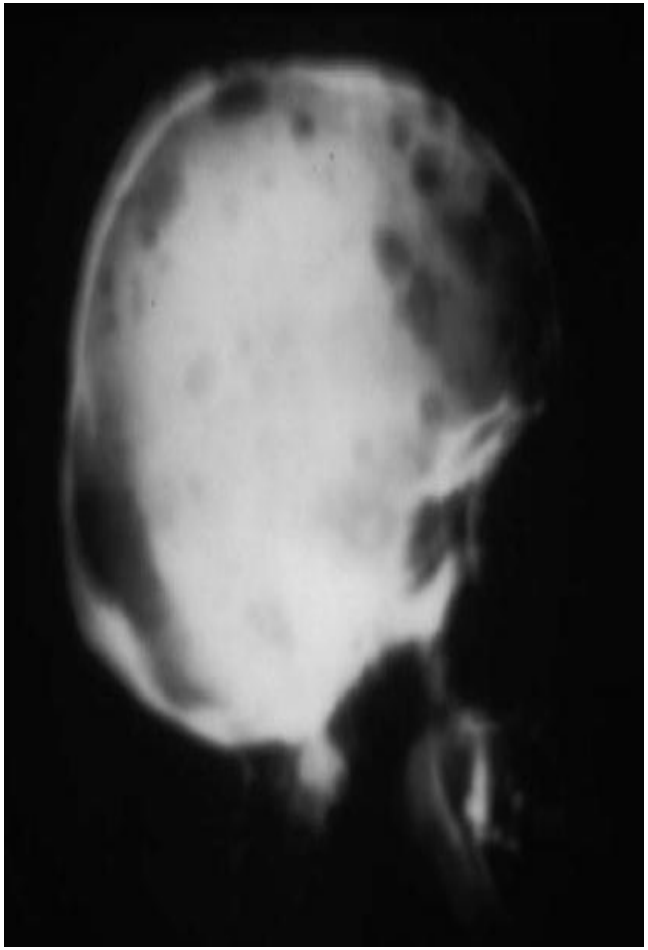
- Jaw involvement is more common in young patients, it presents as a rapidly expanding mass in the posterior region of the maxilla or mandible that pushes adjacent teeth (mobile).
- Pain and paresthesia accompany the condition.
- Radiograph: osteolytic lesion with poorly demarcated margins.



# Multiple myeloma (MM)

- is a lymphoproliferative disorder that results from overproduction of cloned malignant plasma cells that results in multiple tumor masses scattered throughout the skeletal system. Malignant plasma cells secrete monoclonal immunoglobulins (M) protein.
- Genetic mutation as chromosomal translocations appear as a caustive factor.
- Resorption of bone leads to release of calcium and serum hypercalcemia, anemia, leukopenia and thrombocytopenia. Infection is a primary cause of death in MM. Renal failure is the second most common cause of death.

- MM may have jaw lesions, soft tissue lesions from amyloid deposition. Bone and soft tissue lesions often are painful.
- Dental radiographs may show “punched-out” lesions
- Patients are often treated with bisphosphonates drugs that inhibit osteoclast activity that have adverse effect of osteonecrosis of the jaws.



# Bleeding disorders

- are conditions that alter the ability of blood vessels, platelets, and coagulation factors to maintain hemostasis. Inherited bleeding disorders are genetically transmitted. Acquired bleeding disorders occur as the result of diseases that affect vascular wall integrity, platelets, coagulation factors, drugs, radiation, or chemotherapy for cancer.

- Vascular Defects: Ehlers-Danlos disease, Marfan syndrome are hereditary disorders of connective tissue that may be associated with bleeding problems. Acquired conditions that may be complicated by bleeding include scurvy, patients on long-term use of steroids, and drugs.
- Platelet Disorders: von Willebrand's Disease
- Coagulation Disorders: Hemophilia A, Hemophilia B,
- Fibrinolytic Disorders

# Hemophilia

- This disease is an X-linked disorder of blood clotting that results in spontaneous bleeding, particularly into joints, muscles, and internal organs. Classic hemophilia is actually two distinct diseases, one resulting from mutations in the gene encoding factor VIII (hemophilia A), and the other caused by defects in the gene for factor IX (hemophilia B).

- The gene encoding factor VIII is located at the tip of the long arm of the X chromosome; mutations in it include gene inversions, deletions, point mutations, and insertions. Each family with hemophilia in its history harbors a different mutation. In half the cases, de novo mutations are the cause of the disorder.
- The severity of the bleeding tendency depends on the amount of factor VIII activity in the blood. Repeated bleeding into the joints causes a deforming arthritis. Hematuria as well as intestinal and respiratory obstruction may all occur, with bleeding into the lungs and gastrointestinal tract. Human recombinant factor VIII is now available for treatment, in addition to the more classical blood transfusions.

**Suggestive Reading**

**Vinay Kumer, Apul L. Abbass, Jon C. Aster. Rubbin Basic pathology, Elsevier, 9th edition, 2013**

# THANK YOU