Quantitative Disorders: Too Many or Too Few

1. ***Leukocytosis (High WBC Count)***

An increase in WBCs (> 11,000 cells/uL) usually indicates a reactive state to infection or inflammation.

Neutrophilia: Most common; seen in acute bacterial infections and tissue necrosis (e.g., MI or burns).

Lymphocytosis: Typically seen in viral infections (e.g., Infectious Mononucleosis, Mumps, Measles).

Eosinophilia: Associated with allergic reactions, asthma, and parasitic infections.

2. Leukopenia (Low WBC Count)

A decrease in WBCs (< 4,000 cells/uL) is almost always pathological and makes a patient highly susceptible to infection.

Neutropenia (Agranulocytosis): A severe reduction in neutrophils.

Causes: Chemotherapy, radiation, or bone marrow failure (aplastic anemia).

Clinical Sign: Deep, "punched-out" oral ulcerations and severe gingival infections.

Cyclic Neutropenia: A rare condition where neutrophil levels drop significantly every 21 days, leading to recurring oral ulcers and rapid periodontal bone loss.

Neoplastic Disorders: Leukemias and Lymphomas

White blood cell (WBC) malignancies are neoplastic proliferations of hematopoietic or lymphoid cells. For a dentist, these diseases matter for two critical reasons:

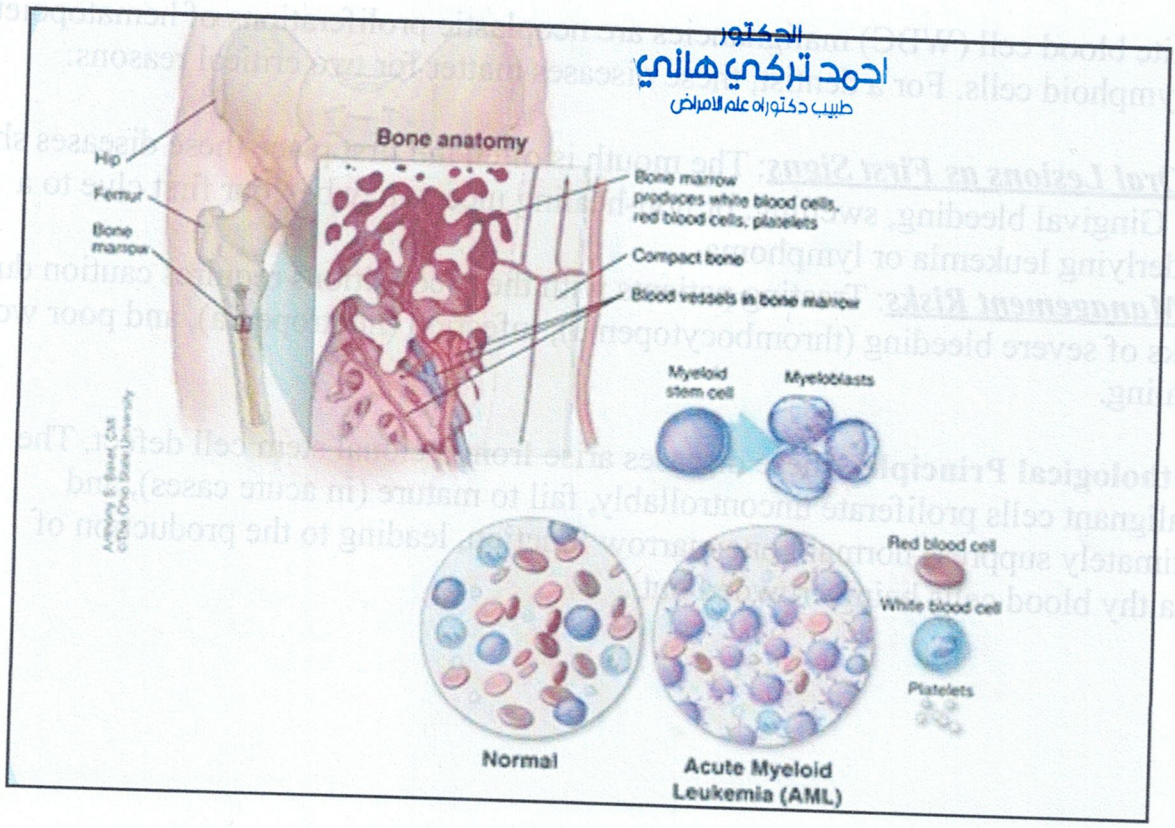
1. ***Oral Lesions as First Signs***: The mouth is often the first place these diseases show up. Gingival bleeding, swelling, or non-healing ulcers may be your first clue to a underlying leukemia or lymphoma.
2. ***Management Risks***: Treating patients with these conditions requires caution due to risks of severe bleeding (thrombocytopenia), infection (neutropenia), and poor wound healing.

Pathological Principle: These diseases arise from a clonal stem cell defect. The malignant cells proliferate uncontrollably, fail to mature (in acute cases), and ultimately suppress normal bone marrow function, leading to the production of healthy blood cells being crowded out .

The Leukemias (The "Liquid" Tumors)

Pathology: Malignant cells originate in the bone marrow and usually spill into the peripheral blood.

Type	Target Population	Key Feature
Acute Lymphoblastic (ALL)	Primarily children (ages 2–5)	Most common childhood malignancy; aggressive but often treatable.
Acute Myeloid (AML)	Adults (median age 65)	Rapidly progressive; presents with symptoms of bone marrow failure.
Chronic Myeloid (CML)	Adults (ages 40–60)	Associated with the Philadelphia Chromosome t(9;22).
Chronic Lymphocytic (CLL)	Elderly adults (> 60)	Most common adult leukemia; often indolent (slow-moving).



A. ***Acute Leukemias (AML vs. ALL)***

· **Pathology**: Characterized by a maturation arrest. The bone marrow is flooded with >20% blasts (immature cells). Normal hematopoiesis is suppressed .

· **Oral Manifestations**:

· Gingival Hyperplasia: Diffuse, boggy swelling of the gingiva. This is classic for Acute Monoblastic Leukemia (AML-M4/M5) because monocytic blasts have a tendency to infiltrate tissues.

· Mucosal Bleeding: Petechiae, ecchymosis, and spontaneous bleeding due to thrombocytopenia (low platelets).

· Mucosal Ulceration and Infections: Due to neutropenia (lack of functional neutrophils), patients are prone to severe bacterial and fungal infections (candidiasis, herpes).

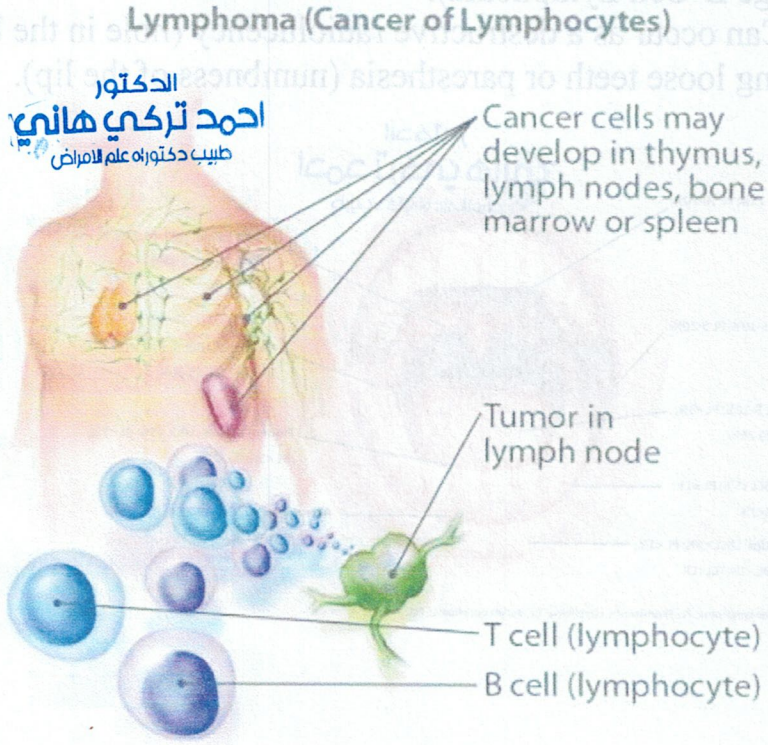
B. ***Chronic Leukemias (CML vs. CLL)***

· **Pathology**: Characterized by accumulation of relatively mature-looking but dysfunctional cells. The marrow is hypercellular, but blasts are not dominant (unless in blast crisis) .

· **Oral Manifestations**:

· Chronic Lymphocytic Leukemia (CLL): May present with painless lymphadenopathy (swollen neck nodes). Less commonly, diffuse lymphocytic infiltrates can cause non-specific swelling in the oral mucosa.

· Chronic Myeloid Leukemia (CML): Oral bleeding is common due to platelet dysfunction (even if platelet count is normal). Late-stage disease can resemble acute leukemia orally.

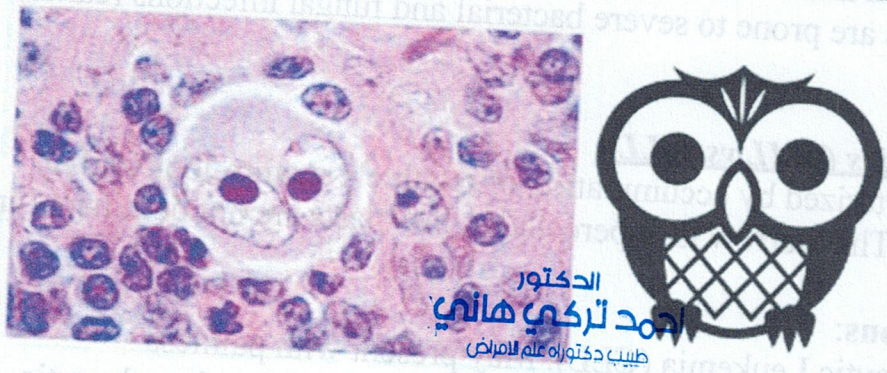


The Lymphomas (The "Solid" Tumors)

Pathology: Malignant lymphocytes proliferate and form tumors in lymphoid tissues (nodes, spleen, Waldeyer's ring).

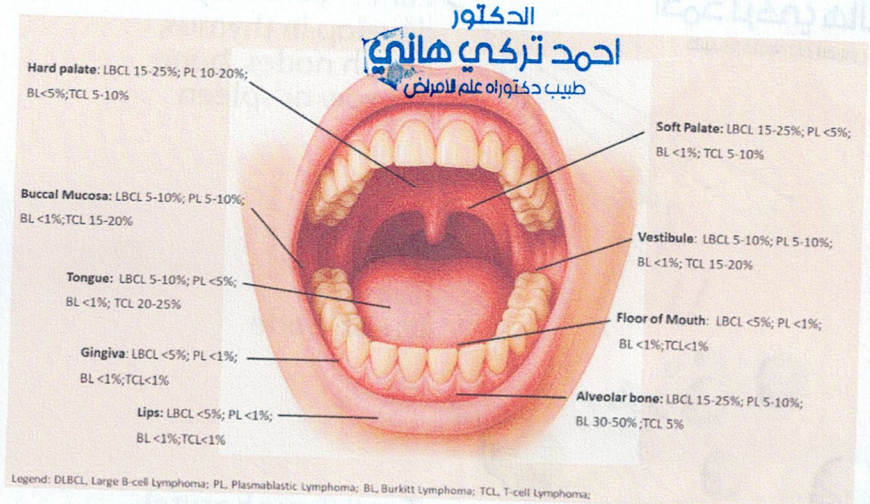
A. ***Hodgkin Lymphoma (HL)***

· **Pathology**: Defined by the presence of the Reed-Sternberg (RS) cell (large, binucleated, "owl-eye" appearance). It spreads contiguously between lymph nodes.
· **Oral Manifestations**: Rare in the oral cavity itself. Usually presents as cervical or supraclavicular lymphadenopathy (nodes you can palpate in the neck).



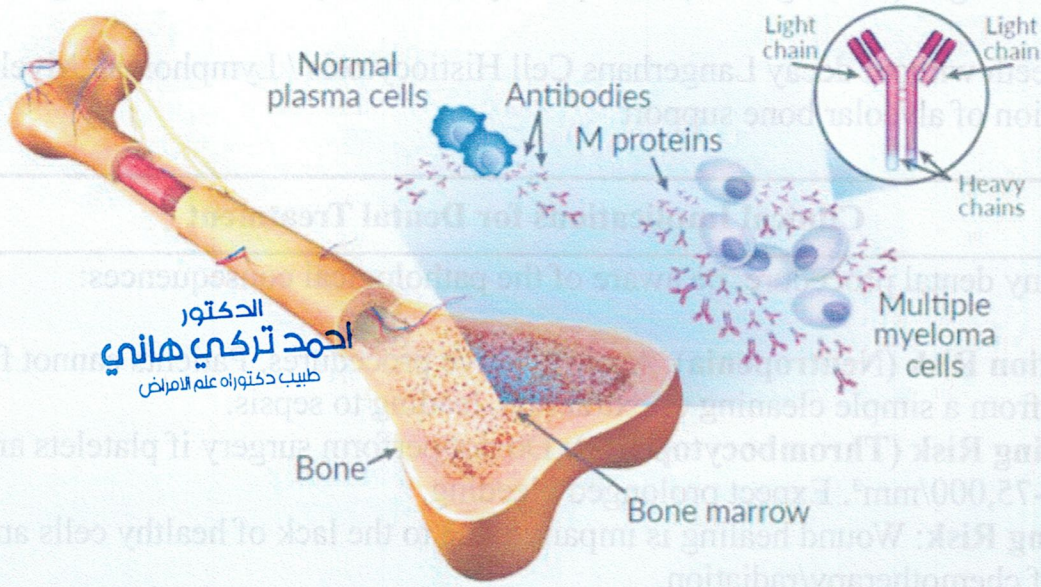
B. ***Non-Hodgkin Lymphoma (NHL)***

· **Pathology**: A diverse group of malignancies without Reed-Sternberg cells. They spread in a non-contiguous manner and frequently involve extranodal sites .
· **Oral Manifestations**:
· Waldeyer's Ring: The most common head and neck site. Presents as a painless, enlarging, firm mass in the tonsil, base of tongue, or soft palate. Often B-cell type (e.g., Diffuse Large B-Cell Lymphoma).
· Jaw Lesions: Can occur as a destructive radiolucency (hole in the bone) on a dental radiograph, causing loose teeth or paresthesia (numbness of the lip).



Plasma Cell Dyscrasias (Multiple Myeloma)

Pathology: Malignant proliferation of plasma cells in the bone marrow. These cells produce a monoclonal antibody (M-protein) and secrete cytokines (like IL-6) that activate osteoclasts, causing severe bone destruction .



· **Oral Manifestations**:

· Jaw Pain and Radiolucencies: The mandible (especially the ramus, molar area, and angle) is a common site for "punched-out" lytic lesions. On a radiograph, these appear as multiple, well-defined radiolucencies. Pathological fracture of the mandible is a risk.

· Amyloidosis: Deposition of abnormal protein (light chains) can cause macroglossia (enlarged tongue) with scalloping of the teeth indentations on the tongue borders.

· Neuropathy: Numbness or paresthesia due to nerve compression by plasma cell tumors or amyloid.

· Infections: High susceptibility to infections due to low levels of normal antibodies.

Differential Diagnosis Summary

When you see these oral lesions, think of the underlying pathology:

Oral Finding Suspect Malignancy Pathologic Basis

Boggy, Swollen Gums Acute Monocytic Leukemia (AML) Leukemic infiltration (gingiva has no barrier to blasts)

Spontaneous Bleeding / Petechiae Acute Leukemia / Advanced CML Thrombocytopenia (low platelets from marrow failure)

Non-healing Ulcer Acute Leukemia / NHL Neutropenia (no immune cells to fight infection) OR local tumor growth
"Punched-out" Radiolucency in Jaw Multiple Myeloma Osteoclast activation (bone is eaten away)
Enlarged, Firm Tonsil Non-Hodgkin Lymphoma Solid tumor growth in Waldeyer's ring
Enlarged Tongue (Macroglossia) Multiple Myeloma Amyloid deposition (protein buildup)
Loose Teeth without decay Langerhans Cell Histiocytosis / Lymphoma / Myeloma Destruction of alveolar bone support

Clinical Implications for Dental Treatment

Before any dental procedure, be aware of the pathological consequences:

1. **Infection Risk (Neutropenia)**: Avoid elective procedures. Patients cannot fight off bacteria from a simple cleaning or extraction, leading to sepsis.
2. **Bleeding Risk (Thrombocytopenia)**: Do not perform surgery if platelets are <50,000-75,000/mm³. Expect prolonged bleeding.
3. **Healing Risk**: Wound healing is impaired due to the lack of healthy cells and the effects of chemotherapy/radiation.
4. **Osteonecrosis Risk**: Patients with myeloma often receive bisphosphonates (bone strengtheners), putting them at risk for Medication-Related Osteonecrosis of the Jaw (MRONJ) after tooth extraction.

You are often the first line of defense. If you see unexplained gingival bleeding, massive gum swelling, or loose teeth with no obvious cause (like periodontitis), you must consider a hematologic malignancy and refer the patient for a full blood workup.