1. Management of the Medically Compromised Dental Patient - Part I

Management of the Medically Compromised Dental Patient - Part I

Kanchan Ganda, MD
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2. Assessment of The Medically Compromised Patient: Guidelines...

Assessment of The Medically Compromised Patient (MCP): Guidelines

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3. Assessment of The Medically Compromised Patient (MCP)

**Assessment of The Medically Compromised Patient (MCP)**

- Complete Health History
- Date of Last Physical Examination
- Name, Address & Tel. # of PCP and Specialists
- List of Medical conditions being treated
- List of Medications
- Allergies & Medical emergencies experienced
- Hospitalizations

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4. Assessment & Management Tools

**Assessment & Management Tools**

- PT/INR; PTT; BT
- LFTs. & Hepatic Serology
- Serum Creatinine
- FBS, PP & Hba1C
- CD4 count & Viral Load
- Thorough knowledge of Diseases & Medications
- Thorough knowledge of Anesthetics, Analgesics, Antibiotics-The AAAs

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5. Preparation for Dental Treatment

Preparation for Dental Treatment

- Determine the status of diseases
- Are the diseases well controlled or uncontrolled
  - Diabetes:
    - FBS < 125mg / dL
    - PP < 140mg / dL
    - HbA1C < 7% (N: 4-6%)
  - Hypertension:
    - Assess the BP and categorize as:
      - Stage I Hypertension
      - Stage II Hypertension
      - Stage III Hypertension

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6. Assessment: Prescribed Medications

Assessment: Prescribed Meds

**Digitalis**
- Digitalis is a Cardiac Glycoside
- Treats: Congestive Heart Failure (CHF) or Atrial Fibrillation (AF)

**Mechanism of action:**
- Digitalis binds to and inhibits:
  - The Magnesium and Adenosine Triphosphate dependent Na+ & K+ ATPase
- This increases the influx of Calcium ions
- This in turn enhances myocardial contractility

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7. Digitalis and the AAA Guidelines

**Digitalis and the AAA Guidelines**

**AVOID WITH DIGITALIS**
- L.A.s with Epinephrine
- Aspirin: Decreases Digitalis absorption & Displaces Digitalis at the Protein binding sites
- NSAIDS: Decrease renal clearance of Digitalis
- Macrolides & Tetracycline: Increase serum levels of Digitalis, causing toxicity

**USE WITH DIGITALIS**
- ANESTHETIC: Mepivacaine
- ANALGESICS: Acetaminophen
  
  Acetaminophen + Codeine
  Acetaminophen + Hydrocodone
  Acetaminophen + Oxycodone
- ANTIBIOTICS: Penicillins
  
  Cephalosporins
  Clindamycin

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8. Theophylline & AAA Guidelines

**Theophylline & AAA Guidelines**

- Theophylline is a Xanthine derivative
- Theophylline has a very narrow “Therapeutic index”
- Theophylline is a potent bronchodilator
- It is used in the management of moderate to severe asthma

- **AVOID:**
  1. Local Anesthetics with Epinephrine
  2. Macrolides

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9. Steroid History

Steroid History

- Is there a current or past history of Corticosteroid intake of two weeks or longer within the past two years

- Assess if any extra Steroids will be needed for major dental procedures

- Consult with the patient’s MD to confirm the pre & post op steroid dosage, when needed

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10. Assessment of Diagnostic Laboratory Tests

Assessment of Diagnostic Laboratory Tests

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11. Significant LabTests in Dentistry

Significant LabTests in Dentistry

Hematological Tests
- CBC: Complete Blood Count with Platelets and WBC differential
- ESR: Erythrocyte Sedimentation Rate
- P.T.T.: Partial Thromboplastin Time

Renal assessment Tests:
- Serum Creatinine (S. Cr.)
- Blood Urea Nitrogen (BUN)

Diabetes assessment Tests:
- FBS: Fasting Blood Sugar
- PPBS: Post Prandial / Post Meal Blood Sugar
- HbA1C: Hemoglobin A1C

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12. Significant LabTests in Dentistry

Significant LabTests in Dentistry

Liver assessment Tests:
- Hepatic Serology
- Liver Function Tests (LFTs)

Bone Assessment Tests:
- Serum Calcium (Ca²⁺)
- Serum Phosphorus (PO⁴)
- Alkaline Phosphates (AlkP)

HIV/AIDS Status Assessment Tests:
- CD4 Count & Viral Load (HIV RNA)
- CBC w/ Plts. & WBC Diff.
- LFTs
- PT / INR

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13. Analysis of CBC with WBC Differential, Platelet Count & ESR...

Analysis of CBC with WBC Differential, Platelet Count & ESR

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14. Complete Blood Count (CBC)

Complete Blood Count (CBC)

- WBC: 4,000 - 10,000 / mm³
- RBC: 4.2 - 5.9 million / mm³
- Hemoglobin: Males: 14 - 18 g / dL
  Females: 12 - 16 g / dL
- Hematocrit: Males: 40 - 54%
  Females: 37 - 47%
- MCV: 86 - 98 μm³ / cell
- MCH: 27 - 32 μg / RBC
- RDW: Red Cell Distribution Width – 11.5-14.5
- Platelet Count: 150,000 - 400,000 / mm³
- WBC Differential:
  - Neutrophils: 40-75%
  - Lymphocytes: 15-45%
  - Monocytes: 1-10%
  - Eosinophils: 1-6%
  - Basophils: 0-2%

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15. White Blood Cells: Function

**White Blood Cells: Function**

**Neutrophils:**
- Engulf bacteria and cellular debris

**Lymphocytes:**
- Produce antibodies and regulate immune response

**Monocytes:**
- Associated with engulfing cellular debris, antigen processing

**Eosinophils:**
- Associated with parasitic infection and allergic response

**Basophils:**
- Associated with hypersensitivity and release histamine

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16. Leukocytosis: Diff. Analysis

**Leukocytosis: Diff. Analysis**

- Diff. is used to follow the course of diseases, infection & neoplastic conditions
- WBC count & Neutrophils: Acute Bacterial Infection
  - Treatment: Antibiotics
- Neutrophils & Lymphocytes: Viral Infections
  - Treatment: Anti-viral agents
- Monocytes: Chronic Bacterial Infections: S.B.E.; M.T.B.
  - Acute exacerbation of inflammation: S.L.E., R.A.
  - Treatment: Deferr routine dental treatment for 4-6 weeks
- Eosinophils: Allergies; Parasites; Hodgkin's lymphoma
- Basophils: CML; Polycythemia

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17. Leukopenia & ANC

Leukopenia & ANC

- ANC: Absolute Neutrophil Count
- Leukopenia causes: Aplasia
  - Drugs
  - BM invasion
  - Viral or Bacterial infections
  - Radiation
- Most common cause of decreased ANC: Chemotherapy
- Calculate the ANC when the WBC count is BELOW NORMAL
- ANC Calculation: $\text{ANC} = \text{WBC} \times (\% \text{ Neutrophils} + \% \text{ Bands}^*)$

*Bands: Immature Neutrophils

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18. Absolute Neutrophil Count (ANC)

Absolute Neutrophil Count (ANC)

- ANC values BELOW 1,500 cells/mm³ predicts the risk for:
  - Mild infection OR Moderate infection OR Serious (fatal) infection
- Average Neutrophil count: 1,500-7,200 cells/mm³
- 1000-1,500 Neutrophils/mm³: Mild risk of infection
- 500-1,000 Neutrophils/mm³: Moderate risk of infection
- LESS THAN 500 Neutrophils/mm³: Life threatening sepsis risk

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19. Mild / Moderate Neutropenia

Mild / Moderate Neutropenia

- These patients can have Major or Minor dental procedures
- **ORAL, CIDAL or STATIC** antibiotics can be prescribed
- The *moderately* Neutropenic patient *(500-1,000 cells/mm³)*:
  - Gets Premedication as per AHA guidelines for **ALL** procedures
- The *mildly* Neutropenic patient *(1,000-1,500 cells/mm³)*:
  - Gets Premedication for **major procedures only**

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20. Mild / Moderate Neutropenia

Mild / Moderate Neutropenia

- Additionally use antibiotics for 3-5 days following major dental procedures in the mild & moderate Neutropenia
- Note: Always have the patient use a non alcoholic mouth rinse prior to ALL dental visits, in the presence of Leukopenia

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Neutropenia: Infection S/S

- Fever is usually the only symptom present
- Minimal or no pus formation occurs with oral infections
- Consequently there is no fluctuation & exudate either
- Pain and erythema may be the ONLY sign of infection

Neutropenia: Summary

Mild Neutropenia:
- 1,000-1,500 cells
- Use non-alcoholic mouth rinse for all procedures
- Mild risk of infection
- Can have major or minor Dentistry
- Premed. for major surgery only
- Use cidal / static agents
- Use antibiotics for 3 / 5 days post major surgery

Moderate Neutropenia:
- 500 - 1,000 cells
- Moderate risk of infection
- Can have major or minor Dentistry
- Use non-alcoholic mouth rinse always
- Premed. for major & minor dentistry
- Use cidal / static agents
- Use antibiotics for 3 / 5 days post major surgery

Severe Neutropenia:
- LESS than 500 cells
- Risk of life threatening infection
- Patient isolated & hospitalized
- Oral infection S/S masked
- Only palliative dental Rx. provided

Prior to palliative Dentistry:
- Determine if a WBC transfusion (NEUPOGEN) is needed
- Only systemic Cidal agents used
- Premedicate with systemic antibiotics as per AHA guidelines
- Use a non-alcoholic mouth rinse

Post treatment:
- Use systemic antibiotics for 5-7-10 days depending on the type of infection
- Provide systemic pain medication
- Maintain nutritional support for adequate T cell function

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23. RBC Analysis & Anemias

**RBC Analysis & Anemias**

- RBC count can be normal or decreased with anemia
- Hematocrit (Hct) measures the percentage of formed elements in the blood:
  - RBCs
  - WBCs
  - Platelets
- Hct, Hb, MCV & MCH collectively evaluated to assess the type of anemia
- RDW (11.5-14.5): Measures the degree of variability in the RBC size in the peripheral smear

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24. Anemias by RBC Patterns

**Anemias by RBC Patterns**

- ↓Hb; ↓Hct; ↓MCV; MCH: Microcytic, Hypochromic pattern:
  - Iron deficiency anemia
  - Thalassemia
- ↓Hb; ↓Hct; ↑MCV; MCH: Macrocytic / Megaloblastic pattern:
  - Vit. B₁₂ or Folic acid deficiency
- “N” MCV and “N” MCH: Normochromic, Normocytic pattern
  - Acute hemolysis
  - Aplastic anemia
  - Chronic disease

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25. "Chair side" Staging of Anemia

"Chair side" Staging of Anemia

Staging depends on the Percentage drop of Hb:

- Normal: Females: 12-16 g / dL
  Males: 14-18 g / dL
- Mild anemia: Hb. decreased by 25% from normal
- Moderate anemia: Hb. decreased by 25-50% from normal
- Severe anemia: Hb. drops by more than 50% from normal

Differ routine dental treatment in severe anemia

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26. Platelets

Platelets

- Normal Platelet Count: 150,000 - 400,000 /mm$^3$
- Primary hemostasis needs adequate Plt. number & function
- Von Willebrand's Factor (VWF) enhances Platelet cohesiveness
- Increased Platelets: Acute infections
  Post surgery
  Malignancy
  Myeloproliferative disease
- Decreased Platelets: Aplasia
  Marrow invasion
  Idiopathic Thrombocytopenic Purpura (I.T.P.)
  Cirrhosis

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27. Thrombocytopenia

Thrombocytopenia

- CBC demonstrates the Platelet number
- Bleeding Time (B.T.) determines Platelet function
- Thrombocytopenia: Platelet count is less than 150,000/mm³
- Minor dentistry: Counts should be greater than 50,000/mm³

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28. Thrombocytopenia

Thrombocytopenia

- For Periodontal or Oral surgery:
  Platelet counts should be above 75,000/mm³
- For major surgical procedures done in the O.R.:
  Platelet count should be above 100,000/mm³
- Spontaneous bleeding occurs when the platelet count is less than 20,000 / mm³

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29. Thrombocytopenia cont.

**Thrombocytopenia cont.**

- Platelet count < 50,000 /mm³ is treated with:
  - Plasma (PRP) Platelet Rich
  - Concentrate (PRC) Platelet Rich
  - (DDAVP) Desmopressin

- Rx. Of Idiopathic Thrombocytopenic Purpura (ITP):
  - Corticosteroids

- Initial ITP Rx: 1mg / kg / day Prednisone, P.O for 2-6 weeks
- Subsequent ITP Rx with Prednisone is individualized for every patient:
  - Dose tapered to less than 10mg per day for 3 months and then withdrawal
- Splenectomy done if discontinuation of Prednisone causes a relapse

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30. Coagulation Tests

**Coagulation Tests:**

- B.T.
- P.T. / I.N.R.
- P.T.T.

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31. Elements of Hemostasis

Elements of Hemostasis

- Adequate Platelet count
- Adequate Platelet function: Bleeding Time (BT)
- Adequate levels of Von Willebrand's Factor
- Adequate levels of Clotting Factors: Pt/INR, PTT
- Adequate Blood Vessel response
- BT will be prolonged with low Platelet number & Platelet dysfunction

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32. The Clotting Cascade

The Clotting Cascade

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33. Bleeding in Relation to Surgery

Bleeding in Relation to Surgery

- Immediate Type of Bleeding:
  Oozing occurs BEYOND 24 hours post op.
  Defect in PRIMARY HEMOSTASIS

- Delayed Type of Bleeding:
  Deep tissue bleeding occurs 4-10 days post op.
  Defect in SECONDARY HEMOSTASIS

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34. Immediate Type of Bleeding: Causes

Immediate Type of Bleeding: Causes

- Platelet deficiency / Thrombocytopenia

- Platelet dysfunction:
  Aspirin
  NSAIDS
  von Willebrand's Disease

- Vascular fragility due to chronic Corticosteriod use

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35. Immediate Type of Bleeding

Immediate Type of Bleeding

- Often associated with H/O superficial bleeding
- Small bruises and Petechiae seen on the skin
- Mucus membrane (MM) bleeding can occur
- Tests: BT
  Platelet count

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36. Delayed Type of Bleeding

Delayed Type of Bleeding

- Associated with deep tissue bleeding
- Large bruises (hematomas) can occur
- Hemarthrosis (bleeding into joints) can occur
- Tests: PT / INR
  PTT

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Deep Tissue Bleeding: Causes

- Clotting factor deficiencies
- Chronic liver disease: Cirrhosis
- Chronic small bowel disease: Coeliac disease, Crohn’s disease
- Anti-coagulants: Heparin, Coumadin

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Cirrhosis & Clotting Factors

- Thrombocytopenia can occur with Cirrhosis
- Cirrhosis is not always associated with a prolonged PT / INR
- Clotting factor reserves have to drop by more than 50% to result in prolongation of the PT / INR
- Always determine the Platelet count and the PT / INR in every Cirrhotic patient, prior to probing

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39. Clotting Factor Tests

Clotting Factor Tests

- **PT/INR**: Measures the extrinsic pathway
  - Normal range of PT: 10-12 seconds
  - Affected by COUMADIN intake
  - PT was maintained at 1.3-1.5 times normal during anti-coagulation

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40. International Normalized Ratio Test

**INR (International Normalized Ratio) Test**

\[
\text{INR} = \frac{\text{Patient PT}}{\text{Control PT}} \times \text{ISI}
\]

- **Normal INR**: 0.9 - 1.2
  - INR: 2.0 - 3.0: Therapeutic Range with Coumadin
  - INR under 2.0 is associated with minimal bleeding
  - INR of 3 - 4.5: Associated with excessive bleeding
  - INR is checked every 4-6 weeks

*International Sensitivity Index of Thromboplastin

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41. International Normalized Ratio

International Normalized Ratio (I.N.R.)

- I.N.R. of 3.0 – 4.5 is required for patients with a H/O:
  
  Mechanical Valves
  
  D.V.T. (deep vein thrombosis)
  
  Recent massive M.I. (myocardial infarction)
  
  Atrial fibrillation (AF) associated with Stroke or M.I.
  
  Pulmonary embolism (PE)

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42. Clotting Factor Tests cont.

Clotting Factor Tests cont.

- PTT: Measures the Intrinsic pathway
  
  Normal range of PTT: 25 - 38 seconds
  
  Affected by Heparin and excessive Coumadin intake
  
  PTT is maintained at 1.5 - 2.0 times with IV Heparin
  
  PTT is not monitored with LMWH
  
  Patient injects Low Molecular Weight Heparin SC

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Blood Tests for Renal Function

- Normal S. Creatinine: 0.4 – 1.2 mg/dL
- Serum Creatinine (S. Cr.) level evaluates the renal status
- Renal failure is associated with increased serum Creatinine
- S. Cr. is more specific an indicator of Renal disease than BUN
- BUN levels increase with changes in the plasma volume and renal failure
  - Protein catabolism
  - Hemorrhage
  - Shock
  - Renal failure

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45. Blood Tests for Renal Function

Blood Tests for Renal Function

- S. Creatinine and BUN are not useful in detecting early renal insufficiency
- Levels do not become abnormal till 50% of renal function is lost
- Creatinine clearance is more sensitive in the detection of early renal disease
- Creatinine is excreted by the renal tubules and filtered by glomeruli
- Normal Creatinine clearance: 80-120 ml/min

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46. Blood Tests for Diabetes

Blood Tests for Diabetes

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47. Blood Tests for Diabetes

Blood Tests for Diabetes

- Fasting Blood Sugar (FBS): <125 mg/dL
- Current stringent FBS guideline: < 100 mg/dL
- Post Prandial (PP) or Post Meal: <140 mg/dL
- HbA₁C (4-6%): <7% in controlled patients
- HbA₁C >8%: Uncontrolled Diabetes in the past 2-3 months

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48. Sugar Values & Dental Management

Sugar Values & Dental Management

The Well Controlled Patient:

- FBS: < 125 mg/ dL
- PP: < 140 mg/ dL
- HbA₁C: < 7%
- Use Maximum 2 carpules of:
  - Epinephrine - Lidocaine with 1:100,000
  or
  - Epinephrine - Prilocaine HCL with 1:200,000
  or
  - Epinephrine - Bupivacaine with 1:200,000 epinephrine

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Sugar Values & Dental Management

The Moderately Controlled Patient:
- FBS: 125-140 mg / dL
- PP: 140-200 mg / dL
- HbA1C: Between 7-8%

- Use Maximum 2 carpules of Prilocaine or Bupivacaine only

- Use the full dose of Antibiotics when needed, following major procedures or for management of infection

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Sugar Values & Dental Management

The Uncontrolled Patient:
- FBS: > 140 mg / dL
- PP: > 200 mg / dL
- HbA1C: > 8%

- Treat ONLY ACUTE dental infections
- Use Mepivacaine without epinephrine ONLY
- Use low dose antibiotics for 3 / 5 / 7 to promote healing

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51. Uncontrolled DM: Management

Uncontrolled DM: Management

• DELAY dental treatment in the absence of dental emergency

• Control the Diabetes FIRST in such a patient

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52. Hepatic Serology and LFTs

Hepatic Serology and LFTs

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53. Viral Hepatitis

**Viral Hepatitis**

*Water/Food Borne*
- Hepatitis A: 2-6 weeks
- Hepatitis E: 2-9 weeks

*Blood Borne*
- Hepatitis B: 2-6 months
- Hepatitis C: 15-150 days
- Hepatitis D: Unlimited (restricted by Hep. B)

*Hepatitis A and E are the “acute” types of hepatitis*  
*Hepatitis B, C, D are the “chronic” types of Hepatitis*

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54. Liver Function Tests: Enzymes

**Liver Function Tests: Enzymes**

- **Serum Glutamic - Pyruvic Transaminase (SGPT or ALT):**
  - Specifically associated with the liver cells only
  - SGPT / ALT levels increase with liver “cell inflammation”

- **Serum Glutamic - Oxaloacetic Transaminase (SGOT / AST):**
  - Associated with: Liver, Brain and Heart tissues
  - SGOT / AST is associated with “cell necrosis”

- **Serum Gamma – Glutamyl Transferase (SGGT):**
  - Associated with: Alcoholism or Biliary stasis

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Liver Function Tests (LFTs)

<table>
<thead>
<tr>
<th>LFT Components</th>
<th>Hepatitis Pattern</th>
<th>Cirrhosis Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Protein</td>
<td>Normal</td>
<td>↓</td>
</tr>
<tr>
<td>Albumin</td>
<td>Normal</td>
<td>↓</td>
</tr>
<tr>
<td>Globulin</td>
<td>Normal</td>
<td>↑</td>
</tr>
<tr>
<td>A/G ratio</td>
<td>&gt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Alkaline Phosphatase</td>
<td>Elevated 1.2 times normal</td>
<td>Elevated 1.2 times normal</td>
</tr>
<tr>
<td>ALT (SGPT)</td>
<td>Values increased into the thousands</td>
<td>ALT, AST are increased up to a maximum of 300 IU</td>
</tr>
<tr>
<td>AST (SGOT)</td>
<td>Values increased into the thousands, but ALT is always &gt; than AST</td>
<td>Never greater than 300 IU AST is always &gt; than ALT</td>
</tr>
</tbody>
</table>

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Liver Function Tests

<table>
<thead>
<tr>
<th>LFT Components</th>
<th>Hepatitis Pattern</th>
<th>Cirrhosis Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGT/ (SGGT)</td>
<td>Increased with alcoholic Hepatitis or biliary stasis</td>
<td>Increased with alcoholic Cirrhosis or biliary Cirrhosis</td>
</tr>
<tr>
<td></td>
<td>Normal if the Hepatitis is due to other causes.</td>
<td>Normal if the cirrhosis is due to other causes</td>
</tr>
<tr>
<td>Total Bilirubin</td>
<td>Normal or increased</td>
<td>Normal or increased</td>
</tr>
<tr>
<td>Bilirubin-D</td>
<td>Bilirubin- D is &gt; bilirubin- I in most cases</td>
<td>Bilirubin-I is &gt; bilirubin-D in most cases</td>
</tr>
</tbody>
</table>

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HIV/AIDS Tests

The following Laboratory Tests must be evaluated:

- CBC with platelet count & WBC Diff.
- CD4 count and viral load
- LFTs and Hepatic Serology
- PT / INR

Assess the labs before proceeding with Dentistry

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59. HIV/AIDS Tests: CD4 & Viral Load

**HIV/AIDS Tests: CD₄ & Viral Load**

- CD₄ counts and HIV RNA load are of greatest clinical significance for efficient monitoring of the HIV infection.

- The CD₄ count provides an estimate of the patient’s immune system status.

- CD₄ counts are also used to determine a patient’s response to therapy.

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60. Viral Load

**VIRAL LOAD**

- HIV RNA level is a strong predictor of disease progression.

- Undetectable Viral Load: HIV RNA levels are below 50 / 75 copies / mL

- Serial HIV RNAs are done at an interval of 3 months.

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61. HIV/AIDS Dental Aspects

HIV/AIDS Dental Aspects

- Treat the patient as a “normal” patient if WBC count is normal
- Calculate the ANC if the patient has Leukopenia
- The Patient is hospitalized when the ANC is < 500 cells/mm³
- Oral infection symptoms & signs are usually masked in severe neutropenia
- Fever may be the only indication of an infection

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62. HIV/AIDS: Mild / Mod. Neutropenia

HIV/AIDS: Mild / Mod. Neutropenia

- Patients with Mild or Moderate Neutropenia can have Major or Minor dental procedures
- ORAL, CIDAL or STATIC antibiotics can be prescribed
- With moderate Neutropenia (ANC: 500-1,000 cells/mm³): Premedicate as per AHA guidelines for ALL procedures
- With Mild Neutropenia (ANC: 1,000-1,500 cells/mm³): Premedicate for major procedures only

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HIV/AIDS: Mild / Mod. Neutropenia

- Additionally use antibiotics for 3-5 days following major dental procedures with mild & moderate Neutropenia

- Evaluate LFTs & PT/INR prior to Dentistry in patients with an H/O Liver disease & patients undergoing major Dental surgery

- Note: Always have the patient use a non alcoholic mouth rinse prior to ANY Dentistry and PARTICULARLY in the presence of Leukopenia

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