Influence of Systemic conditions on the Periodontium

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• Etiology
Systemic conditions may have an effect on:
- Physiological response
- Vascular system
- Inflammatory response
- Immune system
- Tissue repair
What are the potential effects of systemic conditions on periodontium?
• Systemic conditions have the potential to modify the:
  – Susceptibility to disease
  – Plaque microbiota
  – Clinical presentation of periodontal disease
  – Disease progression
  – Response to treatment
• Systemic condition that may have an influence on periodontal diseases includes:
  – Smoking *
  – Diabetes *
  – Osteoporosis
  – Pregnancy
  – HIV infection
  – Leukemia
  – Nutrition
  – Stress
Osteoporosis
• **Osteoporosis:**
  - A disease that causes bones to lose mass and break easily.
  - Osteoporosis means ‘porous bone’
• Osteoporosis can be associated with:
  – Post-menopause (estrogen deficiency)
  – Smoking
  – Low Calcium/vitamin D intake
  – Glucocorticoid use
How does Osteoporosis affect periodontium:

- Weaker Alveolar bone
- Less resistance to periodontal disease
- Tooth loss
• On the other hand, estrogen replacement therapy reduced tooth loss in post-menopausal women
Pregnancy
Pregnancy

- Pregnancy-associated gingivitis
- Pregnancy-associated pyogenic granuloma
• Pregnancy-associated gingivitis:
  – Prevalence: 35%-100%
  – Peak @ 4th to 8th months of gestation and then decrease in the last month of pregnancy
  – Associated with high level of *P. intermedia*
  – High levels of gonadotropins during the 1st trimester and high levels of estrogen & progesterone hormones during the 3rd trimester
• **Characteristic of pregnancy-associated gingivitis:**
  - Pronounced inflammatory response of gingiva
  - Onset is in pregnant women
  - Change in gingival color and contour
  - Increase bleeding upon probing
  - No attachment loss
  - More pronounced in **anterior area**
  - **Interproximal areas** more affected
  - Reversible after child birth
How does estrogen and progesterone affect periodontium?
• mechanisms:
  – Subgingival Plaque Composition
    • Anaerobic-to-aerobic ratio increases
    • Higher concentrations of \textit{P intermedia} (substitutes sex hormone for vitamin K growth factor)
  – Maternal Immunoresponse
    • Depression of cell-mediated immunity
    • Decreased neutrophil chemotaxis
    • Depression of antibody and T cell responses
• mechanisms:
  – Estrogen
    • Increases cellular proliferation in blood vessels (known in the endometrium)
    • Decreases keratinization
  – Progesterone
    • Increases vascular dilation and thus increases permeability (results in edema and accumulation of inflammatory cells)
    • Increases proliferation of newly formed capillaries in gingival tissues (increased bleeding tendency)
    • Alters rate and pattern of collagen production
Pregnancy-associated pyogenic granuloma:
(Pregnancy Granuloma, Pregnancy tumor)

• Located mainly at the maxilla, in particular, anterior vestibular aspect
• Red, pedunculated soft interdental tissue and is often covered with small fibrin spots
Pregnancy-associated pyogenic granuloma:

- Has initial rapid growth and rarely exceed 2 cm
- Bleed easily if disturbed
- Tendency to recur following incomplete removal
- Spontaneous regression postpartum
Puberty
Characteristics of Puberty-Associated Gingivitis

1. Plaque present at the gingival margin.
3. Must be circumpubertal.
4. Change in gingival color.

Characteristics of Puberty Associated Gingivitis

5. Change in gingival contour with possible modification of gingival size.
6. Increased gingival exudate.
7. Bleeding upon probing.
8. Absence of attachment loss.
10. Reversible following puberty.

Clinical manifestations

- Often an exaggerated inflammatory response to plaque and other irritations that would elicit a minor response.

- Inflammation including edema is seen often with a bluish red discoloration.

Clinical Manifestations

- The most frequent manifestation is bleeding at the interdental sites.
- Inflammation usually diminishes as the children approach adulthood.
- The gingiva can completely return to normal by removing the local irritants.
Theories why children experience more gingivitis during puberty

1. Shift in the oral bacterial flora induced by increased amounts of sex hormones promoting more inflammation.
2. Imbalances in sex hormones may alter normal immune system function.
3. High levels of progesterone can increase vascular permeability increasing gingival exudate.
4. Improper oral hygiene leading to plaque build up.
Leukemia
• **Leukemia associated gingivitis:**
  
  – Variable oral manifestations in leukemic patients
    - Significant diagnostic findings
    - Minor tissue changes
  
  – May appear prior to diagnosis or during active treatment

  – Oral Presentation:
    - Gingival Hyperplasia
    - Pale gingiva
    - Ulcerations
    - Persistent bleeding
    - Often painful.
Periodontal Manifestations of leukemia

Gingival hyperplasia with hemorrhage
HIV infection
HIV infection

- Linear gingival erythema
- Necrotizing ulcerative periodontitis (NUP)
HIV infection

• Mixed evidence between severity of periodontitis and CD4+ counts
• **Linear gingival erythema**
  - Erythematous gingival band along gingival margin.
  - Does not respond to plaque/calculus removal
• **Necrotizing ulcerative periodontitis (NUP)**
  – Necrosis an ulceration of coronal part of interdental papilla and/or gingival margins
  – Deep. Crater-like osseous lesions most often located interdentally
  – Pain
  – Mouth malodor (halitosis)
Nutrition
• Malnutrition might influence progression of periodontal disease by affecting:
  – Immune and inflammatory process (vit C, iron)
  – Bone metabolism (Ca, Vit D)
  – Collagen metabolism (Vit C, iron, zinc)
  – Epithelial barrier function (Vit C, folic acid, zinc)
• Calcium intake
  – reduced dietary calcium intake and reduced total serum calcium levels are associated with increased risk for periodontal disease
• Ascorbic acid (Vitamin C) intake
  – Affect collagen metabolism
  – Affect bone formation
  – Increased permeability of the oral mucosa to endotoxins
  – Increase bacterial pathogenicity
  – Essential for microvasculature integrity

• Vitamin C deficiency (scurvy) associated with:
  – Gingival swelling, hemorrhage, retarded wound healing
• **Carbohydrates intake**
  - Carbohydrates increase plaque accumulation on the tooth surface leading to periodontal disease
Stress
Stress

- Studies to date suggest that stress, distress, and inadequate coping are risk indicators for periodontal disease.
- Systemic diseases like diabetes, cardiovascular disease, preterm delivery, and osteoporosis may share stress as a common risk factor.
Questions ?