Hygiene-Related Oral Disorders

Dental Caries

Prevention

Chapter 14 Outline

- Hygiene-Related Oral Disorders
  - Dental caries
    - Prevention
  - Gingivitis
    - Prevention
  - Tooth hypersensitivity
    - Pathophysiology
    - Treatment

Hygiene-Related Oral Disorders

- Haveles (p. 174)
- Oral disorders are among the most prevalent diseases in American society
- Dental disorders result in 7 million days of lost work each year
- 50% of Americans require oral health care or treatment, and almost 80% have some form of periodontal disease
- 68% of children ages 12 to 17 have experienced tooth decay

Dental Caries

- Haveles (pp. 174-175)
- Approximately 20% of the general population has experienced dental caries
- Dental caries in children has decreased over the past decades
- The decrease is attributed to fluoridation of public water supplies, dentifrices, and mouth rinses, not improved oral hygiene

Prevention

- Haveles (p. 175)
- Good dental plaque control is the key to preventing dental caries
- Reducing the amount and frequency of refined carbohydrates, plaque removal, and fluoride use can reduce the incidence of dental caries
- Antiplaque products aid in the mechanical removal of plaque and slow or inhibit its buildup on teeth

Dental caries is considered to be an infectious disease that affects the calcified tissue of the teeth
- Plaque bacteria generate acid from dietary carbohydrates, causing acid demineralization of tooth enamel
- Carious lesions start slowly on the enamel surface and initially do not produce clinical symptoms
- Once demineralization progresses to dentin, the destruction proceeds at a much faster pace
Prevention

• Two methods are available to remove plaque from the teeth: mechanical and chemical management
  - Mechanical methods include brushing and flossing
  - Chemical methods include specific drug products to prevent or remove plaque buildup

Nonpharmacologic Therapies

• Haveles (p. 175) (Box 14-1)
  - Dietary measures
    • One of the easiest ways to prevent caries is to avoid highly cariogenic foods
    • Foods with higher water content, those that stimulate salivary flow, and foods high in protein are less cariogenic
    • Proteins in dairy products raise pH levels and can inhibit bacterial growth

Nonpharmacologic Therapies

• Haveles (pp. 175-176) (Boxes 14-2, 14-3)
  - Mechanical measures
    • Toothbrushes, floss, oral irrigating devices, and specialty aids are the primary types of plaque removal devices
    • Toothbrushes
      • Both manual and electric toothbrushes are available for plaque removal
      • The proper frequency and method of brushing vary from patient to patient
    • Dental floss
      • Interdental plaque removal can help decrease the incidence of proximal caries, gingival inflammation, and periodontal pocketing

Pharmacologic Therapies

• Haveles (pp. 175-179)
  - Pharmacologic management of plaque and calculus enhances mechanical removal by either acting directly on plaque bacteria or by disrupting plaque so that it can be removed mechanically
  - Fluoride
  - Xylitol
  - Chlorhexidine

Fluoride

• Haveles (pp. 176-179) (Box 14-1)
  - The most commonly used agent to reduce inflammation and remineralize decalcified areas
  - The type and amount of fluoride that a person receives depends on his or her risk for developing caries
    • Those with a low risk only require fluoridated dentifrices
    • Patients considered to have a moderate-to-high risk for caries benefit from professionally applied fluoride products

Fluoride

• Haveles (p. 176)
  - Mechanism of action
    • Fluoride is thought to work by two different means
      • Once incorporated into developing teeth, fluoride systemically reduces the solubility of dental enamel by enhancing the development of fluoridated hydroxyapatite
      • The second action is thought to occur on the individual microorganisms in biofilm
        • Topically applied stannous fluoride (SnF) inhibits bacterial enzyme systems and alters the acid production that would result in demineralization of tooth structure

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Fluoride

- Toxicity
  - Nausea and vomiting have been reported in children who have swallowed some of their fluoride treatment
  - Both acute and chronic toxicity can occur
    - Acute toxicity is a result of overdose and is a medical emergency
    - Chronic toxicity occurs over time and is treated with medical management

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Fluoride

Acute toxicity occurs with a single overdose of fluoride
- Signs and symptoms include nausea, vomiting, diarrhea, intestinal cramping, profuse salivation, black stools, progressive hypotension, and cardiac abnormalities
  - Death can occur as the result of cardiovascular and respiratory collapse
- Immediate treatment is necessary and includes inducing vomiting and binding fluoride in the gastrointestinal (GI) tract to prevent systemic absorption

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Fluoride

- Chronic toxicity
  - Dental fluorosis or mottled tooth enamel is the most common sign of chronic fluoride toxicity during tooth development
    - Color changes in enamel are a result of hypomineralization of tooth enamel
  - Children who drink water with at least 1 ppm of fluoride and ingest fluoride supplements are at risk for developing chronic toxicity
    - Treatment is esthetic and includes bleaching and restorations

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Fluoride

- Haveles (pp. 177-179)
  - Fluoride preparations
    - Can be divided into those applied by the dental hygienist and those applied by the patient
      - Professionally applied fluoride topical agents are sodium fluoride (NaF) and acidulated phosphate fluoride (APF)
      - Patient-applied products include dentifrices, gels, and rinses

Fluoride

- Haveles (pp. 177-179) (Figs. 14-2, 14-3; Table 14-2)
  - Professionally applied fluoride topical agents
    - Both NaF and APF are equally efficacious in preventing caries
      - NaF is recommended when restorations are present because of the damage caused by acids
      - Experts recommend that fluoride products remain in place for 4 minutes
      - The ionic exchange lasts for about 30 minutes
      - Topical fluoride applications only last for approximately 5 to 8 weeks

Annual 4-minutes in-office topical fluoride applications reduce tooth decay in permanent teeth of children living in nonfluoridated areas by 26%
- Clinicians have not proved that 1-minute in-office applications are as effective as the 4-minute applications
- The concentrations of fluoride products varies
  - Products with higher fluoride concentrations are recommended for patients with widespread decay or at increased risk for caries

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Fluoride

- Summary of professionally applied topical agents
  - Topical NaF: available as a viscous gel or foam and is stable in 2% solution—ideal for porcelain or composite restorations or sealants
  - APF 1.23%: acidic pH of 3.5; increasing the acidity of the fluoride increases the uptake of fluoride by tooth enamel
  - SnF₂: available in a two-part rinse; not endorsed by the American Dental Association (ADA)
  - NaF varnish: available for use in the United States as a dentin-desensitizing agent and as a cavity liner

- Patient-applied topical fluoride preparations
  - Dentifrices: nearly 98% of all dentifrices or toothpastes available in the United States contain some form of fluoride
  - Gels: prescription gels that the patient applies at home
  - Rinses: indicated as an adjunct to proper flossing and brushing with a fluoride dentifrice

Xylitol

- Xylitol is a natural product that looks and tastes like sucrose but is not fermented by cariogenic bacteria
- Xylitol has been found to:
  - Reduce levels of Streptococcus mutans in plaque and saliva
  - Inhibit the attachment of biofilm to teeth
  - Prevent the transmission of oral bacteria from mother to child
- Several clinical trials have demonstrated the beneficial effects of chewing xylitol-based gum

Chlorhexidine

- Chlorhexidine gluconate 0.2% is a bis-biguanide local antiinfective used to kill S. mutans bacteria and reduce the harmful effects of biofilm
- Chlorhexidine mouth rinse, 10 ml/day for 2 weeks every 2 to 3 months, is effective in reducing the incidence of caries

Gingivitis

- The result of the accumulation of supragingival bacterial plaque
- Untreated chronic gingivitis can lead to periodontitis
Prevention

- Haveles (p. 180)
  - Prevention of gingivitis depends on calculus prevention and plaque control
  - Many of the same products used to prevent caries are also used to prevent gingivitis
  - Antigingivitis ingredients in dentifrices, mouth rinses, and other plaque removal products include SnF, triclosan, cetylpyridinium chloride, and stabilized SnF

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Prevention

- Haveles (pp. 180-181)
  - Brushing and flossing are the first line of defense in preventing and treating gingivitis
  - Chlorhexidine
  - Essential oils
  - Triclosan

Chlorhexidine

- Haveles (p. 180)
  - Active against both gram-positive and gram-negative bacteria and has some antifungal activity
  - Binds to the bacterial cell membrane and increases its permeability, which results in cell death
  - Not used prophylactically but is used as an adjunct therapy for up to 6 months in persons with periodontal disease
  - The most common adverse effects include tooth and mucosal staining, bitter taste, taste alteration, increased calculus formation, and mucosal irritation

Essential Oils

- Haveles (p. 181)
  - The antigingivitis mouth rinse that contains thymol, menthol, and eucalyptol has been shown to reduce gingivitis and plaque
  - In a recent clinical trial, an essential oil mouth rinse plus brushing and flossing was found to be effective in reducing interproximal bleeding

Triclosan

- Haveles (p. 181)
  - A natural substance that has antibacterial efficacy that reduces plaque and gingivitis
  - Research has shown that triclosan is more effective than fluoridated products in reducing gingivitis
  - No side effects reported and safe to use

Tooth Hypersensitivity

- Haveles (pp. 181-182)
  - Tooth hypersensitivity (dental hyperalgesia [DH]) is characterized by a short, sharp pain that comes from exposed dentin in response to thermal, chemical, or physical stimuli that cannot be attributed to any other type of dental defect or disease
  - Severe attrition and gingival recession as a result of abrasions, erosions, abfraction, and abnormal tooth development can lead to tooth hypersensitivity
  - Tooth bleaching can increase the risk for sensitivity
Pathophysiology

- Haveles (p. 181) (Fig. 14-7)
- Two processes are necessary for the development of DH
  - Dentin must become exposed through the loss of gingival recession or enamel, and the dentin tubules must be open to the oral cavity and the pulp
  - When heat, cold, pressure, or acid touches exposed dentin or reaches an open tubule, fluid flow in the dentinal tubule increases, causing increased stimulation of the nerves and resulting in pain

Pathophysiology

- Dental erosion is a result of both intrinsic and extrinsic acid
  - Extrinsic sources of acid include medication, foods, and drink
  - The most common cause of intrinsic acid production is gastric reflux

Treatment

- Haveles (p. 181)
- Treatment goals are to alter the damage of the tooth surface using the appropriate dentifrice and to stop abrasive toothbrushing practices
  - Choice of therapeutic agent should be based on effectiveness, caries risk, amount of tooth structure present, patient acceptance, cost, and esthetics
  - Desensitizing agents seal the dentin tubules and prevent irritants from stimulating the nerves when topically applied to the dentin

At-Home Therapies

- Haveles (pp. 181-182) (Fig. 14-8; Table 14-5)
- The most common therapy for at-home use is desensitizing toothpaste
  - The vast majority of desensitizing toothpastes contain 5% potassium nitrate
  - Potassium nitrate ions are thought to diffuse along dentin tubules and decrease the excitability of intradental nerves by altering their membrane potential and decreasing repolarization

In-Office Therapies

- Haveles (pp. 181-182) (Fig. 14-9)
- Professionally applied products include fluorides, potassium oxalate, and adhesives and resins
  - Their effects are temporary because they do not adhere to the dentin surface
    - Fluorides: NaF is thought to work by the formulation of insoluble calcium fluoride within the dentin tubules
    - Oxalates: oxalate products reduce dentin permeability and occlude the tubules
    - Adhesives and resins: provide longer-lasting desensitization
      - Include cavity varnishes, bonding agents, and restorative resin materials