PLAQUE CONTROL

It is the removal of microbial plaque and the prevention of its accumulation on the teeth and adjacent gingival surfaces.

Goals of Plaque Control

- Retards calculus formation
- Resolution of gingival inflammation
- Preservation of oral health

Plaque Control Approaches

- **Mechanical**
  - Individual
  - Professional
- **Chemical**
  - Individual
  - Professional

Mechanical Plaque Control

- **Toothbrush**: Manual or powered
- **Interdental aids**
  - Dental floss
  - Triangular toothpicks: Handheld, Proxa-pic
  - Brushes: Proxa brush, bottle brushes
  - Yarns, gauze strips, pipe cleaners.
- **Others**
  - Rubber tip stimulator
  - Water irrigators.

Toothbrushes

In **1780**, William Addis designed a toothbrush with a bone handle and hog bristles.

ADA specifications of a toothbrush

The head of the brush should be:

- **1 inch to 11/4 inches** long.
- **2 – 4** rows of bristles.
- **5/16 inch to 3/8 inches** wide.
- **5 – 12 tufts** per row.
- **80 – 86 bristles** per tuft.

Design of toothbrush

- Head
- Handle
- shank

- **Size**: large, medium, small
- **Lateral profile**: Flat, convex, concave, scalloped
- **Bristles:** Natural and Nylon (Synthetic)

Nylon bristles are superior to natural (hog) bristles because of their homogeneity, uniform size, elasticity and fracture resistance. Natural bristles are frayed, softened and become contaminated easily.

Hardness of brush

- **Soft**: 0.007 inches to 0.009 inches, 0.2 mm (No 7, 8, 9)
- **Medium**: 0.010 inches to 0.012 inches, 0.3 mm (No. 10, 11, 12)
- **Hard:** 0.013 inches to 0.014 inches, 0.4 mm (No. 13, 14)
- **Extra hard**: 0.015 inches (No. 15)

Frequency of brushing—Every 12 hours.
Frequency of change of brush—Every 3 months.
Length of brushing time—Initially 10-20 minutes later 3-5 minutes.

Brushing Techniques

- **Horizontal**
  - Reciprocating (Scrub method)
- **Vibratory**
  - Bass Method (Sulcular method)
  - Stillman's method

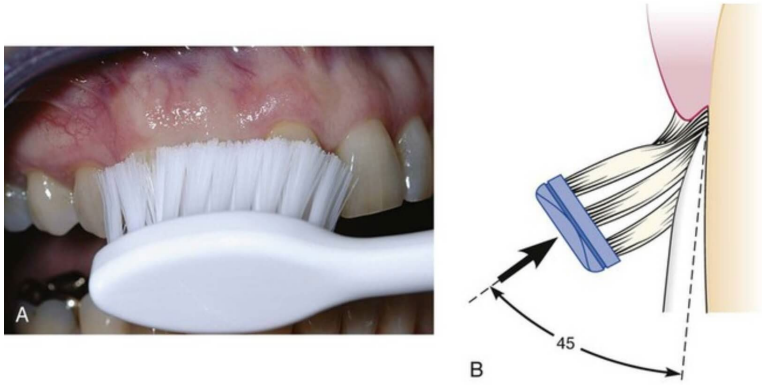
    - Charter's method
- **Vertical sweeping**
    - Rolling stroke
    - Modified bass
    - Modified Stillman's
    - Leonard
    - Smithbell (Physiological technique)
- **Rotary/Circular**
    - Fones

The Bass method

- Intrasulcular method.
- The head of a soft brush is placed parallel to the occlusal plane, with the brush head covering three teeth starting from the most distal tooth in the arch.
- Place the bristles at the gingival margin, at an angle of **45 degrees** to the long axis of the teeth.
- Using short vibratory pressure and back-and-forth motion complete **20 strokes**.
- Lift the brush and move anteriorly and repeat the process on the next 3 teeth.
- The bass technique helps in cleaning of cervical third of the tooth, gingival sulci and interproximal areas.

Modified Bass method

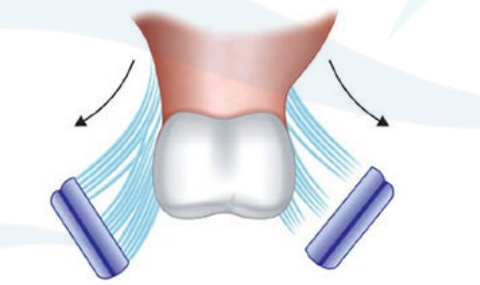
- The first part is the same as the bass method.
- Modification: After completing the vibratory motion in the gingival sulci the bristles are swept downwards occlusally.



Stillman's method

Bristle ends are placed at a **45-degree** angle partly on the gingiva and partly on the cervical portion of the teeth.
It helps to remove soft deposits from the cervical areas.

Modified Stillman's method



The sides of the bristles are pressed against the teeth and gingiva, while moving the brush with short 'back and forth' strokes in a coronal direction

Used for cleaning areas with progressing gingival recession and exposure of root to prevent abrasive tissue destruction.

The Charter's method

- Indications
  - Open dental spaces with missing papilla and exposed root surface
  - With FPD and orthodontic appliances
  - After periodontal surgery
  - Moderate gingival recession
  - Massage and stimulation of marginal and interdental gingiva.
- Brush placed on the tooth with bristles pointing **45-degree** angle to the long axis of the teeth towards the crown.
- Back-and-forth vibratory motion is used for massaging the gingiva.
- Gingival massage increases keratinisation, epithelialisation and blood circulation of the gingiva.

- Advantages: Used in case of receded interdental papilla. It is the Recommended technique for temporary cleaning in wound healing areas after periodontal surgery.

Roll method/Fones technique

- Bristles are directed apically and swept with a rolling motion in an occlusal direction.
- Advantages: easy to learn
- Disadvantages: Limited Plaque removal

Powered toothbrushes – introduced in **1939**.

- **Hawthorne effect**: The effect which occurs when research subjects behave differently because they realize that they are being observed.
- Abrasion or hard tissue damage is mostly due to abrasive dentifrice whereas gingival recession is mostly due to incorrect method of tooth brushing.
- Abrasions are mostly common on maxillary teeth, on the **left** half of the dental arch for **right-handed** individuals.

Summary of conditions and Brushing technique

- **Modified Stillman method** – Gingival recession and root exposure.
- **Charters method** – Patients with healing wounds after surgery
- **Sulcular method** – a most recommended technique for patients with periodontal diseases
- **Bass or sulcular method** – Routine technique in patients with or without periodontal diseases.
- **Roll** – least effective method
- **Scrub technique** – A most common method of brushing
- **Fones method** – A Recommended technique in children

Dentrifices

- Helps in cleaning and polishing of tooth surface
- Available in powder form, pastes and gels.

- The toothpaste has **20-40% abrasives** whereas tooth powders have **95% abrasives**.
- Dentifrices that provide adequate plaque control with minimum abrasion are preferable.
- The abrasive quality of dentifrices affects enamel slightly and is a much greater concern for patients with exposed roots.
- Dentin is abraded **25 times** faster and cementum **35 times** faster than enamel.

Composition of toothpaste

Ingredient	Percentage	Function
$CaCO_3$, $Ca_3(PO_4)_2$, Silicone dioxide, Al_2O_3, Granular Polyvinylchloride	20 -40%	Abrasive
Glycerine, Sorbitol, Mannitol, Propylene glycol.	20-40%	Humectants
Benzoic acid		Preservatives
Synthetic sodium carboxymethyl cellulose		Thickening agents
Water	20-40%	
Sodium lauryl sulphate.	1-2%	Foaming agents /Surfactant/Detergent
Essential oils and Synthetic flavours Saccharine, Sorbitol, Mannitol, peppermint oil, oil of wintergreen.		Flavouring and sweetening agents
Strontium salts, Sodium fluoride, Formalin, Potassium nitrate	Upto 2%	Desensitising agents
Coloring and Preservatives		
Sodium monofluorophosphate,		Anticaries agent

Sodium fluoride, formalin		
Alginates, Carragenans		Binding agent
Pyrophosphate, Triclosan		Antitartar agents

Humectant retains moisture in the dentifrice and prevents the dentifrice from drying and hardening on exposure to air.

Interdental Cleaning Aids

Types of embrasures

Type	Description	Cleaning aid
Type I	▪ The interdental papilla fills up the embrasure. ▪ Tight contact and intact papillae.	Dental floss
Type II	▪ Moderate papillary recession is seen. ▪ Concave interproximal surfaces.	Wood tips, miniature interdental brushes. proxa brush
Type III	▪ Complete loss of papilla. ▪ Interdental gingiva is tightly bound to the underlying bone	Unitufted brushes

Dental floss

Types

- Twisted or non-twisted
- Bonded or non-bonded
- Waxed or unwaxed
- Thick or Thin

Waxed floss will leave a coating on interproximal surfaces to which debris may stick.

Thick floss may cause difficulty to floss in tight contact areas.

Spermaceti is obtained from the sperm whale. It is mainly used as a coating for dental floss.

Two frequently used flossing methods are the spool and circle (loop) methods.

Spool technique:

It is recommended for teenagers and adults who have acquired the level of neuromuscular coordination and mental maturity to use floss.

Loop/ Circle technique:

This method is particularly suited for children as well as adults with less nimble hands or handicaps such as poor muscular coordination or arthritis.

Oral irrigating devices

- Oral irrigating devices disrupt and detoxify bacterial plaque.
- They effectively clean the non-adherent bacteria and debris in periodontal pockets.
- Water and dilute chlorhexidine can be used as irrigating agents.

- **Stim-u-dent** is a soft triangular toothpick used to stimulate the papillary gingiva in the **anterior region of the mouth.**
- **Perioaid** is a toothpick with a handle. It can be used to clean the sulcus, periodontal pockets and furcations**.**

Chemical Plaque Control

Uses

- After periodontal surgery
- In poorly motivated patients
- Medically compromised patients
- Prophylactic rinse during scaling
- In gingival enlargements
- In patients with fixed appliances
- Mentally and physically handicapped persons.

Classification of Antimicrobial Agents

Depending on antimicrobial efficacy and substantivity

Generation	Description	Examples
First generation	▪ Reduces plaque scores by 20 to 50 percent.	Antibiotics, quaternary ammonium

	▪ Efficacy is limited by their poor retention in the oral cavity. ▪ Used 4 to 6 times daily	compounds, phenols and sanguinarine
Second generation	▪ Reduces plaque scores by 70 to 90 percent. ▪ Retained longer in the oral cavity or tissues. ▪ Used 1 to 2 times daily	Bisbiguanides.
Third generation	Effective against specific periodontopathic organisms	

According to chemicals used for supragingival plaque control

Addy's classification

- **Antibiotics**: Penicillin, Vancomycin, Kanamycin, Erythromycin, Spiramycin, Metronidazole
- **Enzymes:** Mucinase, Protease, Lipase, Amylase, Elastase, Lactoperoxidase, Hypothiocynase, Mutanase
- **Quaternary ammonium compounds:** Cetylpyridinium chloride, Benzethonium chloride, Benzalkonium chloride, Domiphen bromide
- **Bisbiguanides**: Chlorhexidine, Alexidine, Octenidine or Bispyridines
- **Metallic salts:** Copper, Tin, Zinc
- **Herbal extracts**: Sanguinarine
- **Fluorides:** Strontium Fluoride
- **Oxygenating agents**: Hydrogen peroxide
- **Phenolic compounds**: Thymol, Menthol, Eucalyptol
- **Other antiseptics**: Iodine, Povidone iodine, Sodium hypochlorite, Hexetidine, Triclosan.

According to purpose

- **Preventive agents**—which affect the development of supragingival plaque.
- **Therapeutic agents**—which are directed against subgingival plaque.
    - Specific

- Non-specific

Bisbiguanides (Chlorhexidine)

- It has a broad spectrum of antibacterial activity.
- Chlorhexidine inhibits **gram +ve, gram –ve, organisms** and yeasts.
- In relatively high concentrations, Chlorhexidine is bactericidal but low concentrations may be bacteriostatic to susceptible bacteria.
- In high concentrations, chlorhexidine penetrates the cell and causes precipitation of the cytoplasm.
- Chlorhexidine chemically is **diguanidohexane** with pronounced antiseptic properties.
- Daily rinses with **10ml. of 0.2% aqueous solution** of chlorhexidine effectively inhibit the development of plaque, calculus and gingivitis.
- The minimum concentration of chlorhexidine needed to inhibit plaque is **0.12%.**
- Peridex, perioguard: Prescription solution of 0.12% chlorhexidine.
- Minimum concentration of chlorhexidine needed to inhibit plaque: **0.72%**

Indications and use

- Adjunct to mechanical oral hygiene.
- During the postsurgical period
- Improves healing after routine oral surgical procedures
- Post-operative management of immediate denture construction
- Patients wearing fixed orthodontic appliances or intermaxillary fixation devices.
- Handicapped patients
- Patients with drug-induced gingival overgrowth.
- Medically compromised patients

Disadvantages/unwanted effects

- Extrinsic staining of teeth (Brown staining of teeth, tongue, silicate, resin restorations).
- Painful, desquamative lesions on the oral mucosa may be associated with a burning sensation.
- Impaired taste sensation.
- Parotid swelling

Antiplaque mouthwashes: Chlorhexidine, Cetyl pyridine, Essential oil, Sanguinarine, Sodium benzoate (pre-brushing mouth rinse)

Essential Oil Rinse

- Effective in reducing plaque and gingival scores.
- Contains thymol, eucalyptol, menthol and methylsalicylate
- **Listerine** – commercially available essential oil rinse.

Disclosing Agents

Disclosing agents stain bacterial deposits on teeth, tongue and gingiva. They help in the education and motivation of the patients.

- **Erythrosine dye**: common disclosing agent
- **Bismark brown** - The plaque component of the Ramjford index uses this solution.
- **Two-tone Solution** containing FDC green and red- Stains mature plaque green and immature plaque red.
- Mercurochrome
- Malachite Green
- **Plaque lite system**: Available as wafers/tablets or solutions.

The glycoprotein of the pellicle gets stained with disclosing solution.

The Chemotherapeutic Agents Used in Local Drug Delivery System

- **Actisite**- Tetracycline containing fibres
- **Atridox- 10%** doxycycline

- **Periocline And Arestin** - **2%** minocycline
- **Periochip** – A small chip containing **2.5mg**. of chlorhexidine.
- **Size of Periochip** - **4 × 5 × 0.35mm**
- Periochip takes **7-10 days** to biodegrade.

Full Mouth Disinfection Concept

- Full mouth debridement (scaling and root planning) completed within **24 hour** period.
- The tongue is brushed with **1% chlorhexidine gel** for **1 min**
- The mouth is rinsed with **0.2% chlorhexidine** solution for **2 min**.
- Periodontal pockets are irrigated with **1% chlorhexidine** solution.