Study Models

Dentalelle Tutoring

Impressions

- Dental impressions produce a replica of your teeth and oral tissue. A metal or plastic "horseshoe" shaped tray is chosen to fit either the upper or lower teeth and gums comfortably. A thick liquid materials such as alginate or polyvinyl siloxane is dispensed into the tray. It is then placed onto either the upper or lower teeth so it covers the entire dental arch including the roof of the mouth for an upper impression, and the floor of the mouth and under the tongue for lower impression.
- After a present amount of time, the material sets and become a solid rubber mass. The tray is removed from the mouth and is then sent to the clinic laboratory or dental laboratory for further processing. Stone is poured into the hardened impression and when set a dental cast is produced.

How To

- Start by selecting a tray size that is slightly larger than arch.
- • Fluff or aerate the Jeltrate powder before dispensing. Pour measured amount of water into a clean mixing bowl and then add powder. This method is how we learned is school However it is not very practical when setting up for procedures ahead of time.
- • The number of recommended scoops depends on the procedure and size of the tray.
- • Fill scoop with powder, tap side with spatula then level off do not pack powder to tightly in scoop you will have to much powder to water ratio for mix.
- • Two scoops are generally used for full arch impressions. Measure the matching amount of water with cup provided.
- • The higher the water temperature the faster the impression material will set up. Use cooler water to allow more working time.
- • If hand-mixing, rapidly mix alginate with a spatula, pressing the mixture against the side of the bowl. Mixing time is approximately1 minute. At this point, the mix should be a smooth, creamy consistency that does not fall off spatula.
- • Collect alginate from sides of bowl with spatula and place the impression material evenly in the tray.
- • Set time is three minutes from start of mix. Fast set alginate is two minutes.
- • It is recommended to wipe alginate on occlusal surfaces before seating tray to help prevent occurrence of trapping bubbles in impression.

Mandibular Impression

- For taking lower impressions the operator's position should be at 8 to 9 o'clock, your elbow. Should be the same height as the patients shoulders.
- • Take the impression from in front of the patient. Roll it in the mouth one side then the other, seat in a even motion pulling lips out around the tray, once seated, ask patient to lift their tongue, hold tray with your fingers until material is set.
- • To remove tray pull out the cheeks to break seal, protect the opposing teeth , snap it out rolling it out the same as you put it in one side then the other.
- • You should have a lip roll and all of the teeth and no bubbles in the impression.
- • Wrap impression in a wet paper towel until you can pour it up.
- Spray the impression with a disinfectant and drain, before pouring with stone or plaster.

Maxillary

- For taking upper impressions the operator's position should be at 9 or 12 o'clock if you are right handed and dental chair should be raised so you are not bending over.
- • Standing behind the patient enter with one corner of tray, seat posterior first then roll anterior. Ask patient to breath thru their nose and till chin down. Hold with finger till set.
- • Once set, retract cheeks to loosen and roll out.
- • make sure there are no voids in impression material.
- • Wrap in a wet paper towel.
- Spray the impression with a disinfectant and drain, before pouring with stone or plaster.
- Do not allow the disinfectant to lay in the impression longer than the recommended "kill time" as the solution can distort the alginate.
- **For best results, the model should be poured within 30 minutes after the impression is obtained prevent distortion.**

Impression Materials

- **Vinyl-polyether Hybrids**
- This new class of impression material combines properties from addition silicone and polyether impression materials. SENN is supplied as a 2-paste auto mixing system and contains a polymer with polyether and siloxane (e.g., addition silicone) groups that will combine elements and benefits of both impression materials.
- They are supplied as putty, heavy, medium, and wash materials. An additional benefit is that they do not have the bitter taste of polyether materials and have a pleasant spearmint flavor. These hybrid materials may represent the blend of hydrophilicity and hydrophobicity necessary to improve impression making by wetting the tooth well and pouring easily for cast fabrication.

Polyether

- Polyether impression materials are supplied as a base (containing moderate length polyether.
- In 2000, polyvinylsiloxane putty impression materials became the most rigid impression material (i.e., highest strain in compression). In 2005, the newest polyether impression materials were introduced.

Polyvinylsiloxane

- Polyvinylsiloxane (PVS), or addition reaction silicones, were introduced in the 1970s as a **2-paste system** (i.e., a base and a catalyst). The base paste contains a polydimethylsiloxane polymer in which some terminal methyl groups are replaced by silane groups, coloring, and silica filler. The catalyst paste contains a pre-polymer in which some terminal methyl groups are replaced by vinyl groups, a chloroplatinic acid catalyst, fillers, and colorants. When the 2 pastes are mixed, an addition reaction occurs between the silane and the vinyl groups, producing a cross-linked silicone rubber.
- Although meeting many of the criteria for an ideal impression material,. Cosmetic grade surfactants arepolyvinylsiloxanes are hydrophobic now added to improve wetting of the impression material; combining this with lower viscosity wash materials has resulted in reduced remakes.
- Addition silicone impression materials mixed while wearing latex gloves set slowly, if at all.
- For the best results, do not mix putty impression materials while wearing latex gloves; instead, use vinyl gloves.

Pouring Dental Stones

- Measure out the recommended amount of cold water from the dental stone package with a graduated cylinder. Pour water into the rubber mixing bowl.
- **Add dental stone package to water.**
- Mix the dental stone and water with a metal spatula firmly against the inner part of the rubber mixing bowl until you achieve a thick, but fluid-like consistency (takes about 20 seconds).
- Turn on dental vibrator machine. Place the rubber mixing bowl with dental stone mixture on top of the vibrator. Air bubbles will initially appear in the mixture. Vibrate the mixture until the air bubbles become fewer and smaller in number.
- Place the alginate impression on the dental vibrating machine. With the metal spatula, add a small amount of dental stone, enough to cover the tip of the spatula to the most posterior aspect (right or left side) of the alginate impression. Allow the dental stone to slowly flow through all the indented occlusal surfaces inside the impression while you rotate the impression on the dental vibrator to remove additional air bubbles that will come to the surface.
- Add larger amounts for dental stone to fill up the alginate impression, once the occlusal surfaces have been carefully covered. Briefly place the impression on the vibrator for 2 to 3 seconds to ensure the dental stone is evenly distributed in the alginate impression.
- Leave the dental stone model undisturbed for 45 to 60 minutes until the material completely sets.
- Separate dental stone model from alginate impression.

Disinfecting the Lab

- There is ample documentation of the transfer of microorganisms onto and into impressions. Organisms can also move into dental casts. Some of these organisms can remain viable for up to 7 days. Again, wearing of proper PPE is required. Incorrect handling of contaminated impressions and casts offers the opportunity for transmission of microorganisms.[1-3]

- **There are several steps for properly disinfecting dental impressions:[1-3]**
- After removal from the oral cavity, rinse impressions under running tap water and shake gently to remove adherent water; sometimes soft, camel-hair brushes can help remove debris;
- disinfect impressions using an intermediate-level, EPA-registered disinfectant for the contact time recommended by the manufacturer (usually about 15 minutes);
- after the proper exposure time, the impressions are rinsed under running tap water and gently shaken to remove adherent water; and
- properly disinfected and dried impressions are ready for pouring.

Rinsing

- Rinsing helps in the removal of adherent microorganisms. Immersion helps ensure complete contact between all impression surfaces and disinfectant. Immersion can occur in glass beakers, plastic containers, and even zipper-seal bags. Unless specifically approved for reuse, germicides are single-use solutions.[1-3]
- Some types of impression materials are sensitive to immersion. Careful selection of disinfectants is required.
- Spraying has several advantages. Spraying is the treatment of choice for some impression types; it uses less disinfectant and often is the same disinfectant that a practice uses for environmental surface disinfection. Spraying is technique sensitive. Disinfectant must contact all impression surfaces. Spraying also releases disinfectant into the air, thus increasing the chance of personal exposure. Most disinfectants (except glutaraldehydes) are appropriate for spraying.[2] Disinfection of impression materials is an area of continuing research.
- Disinfection in certain types of chemical solutions harms some impression materials. Other types of disinfectants are safe to use on the same impression materials. Research indicates that variations in response within a given type of impression material (eg, alginate) can occur de-pending on the manufacturer.[2]

Chart →

Table. Impression Materials and Disinfectant Choices.*

Impression Material	Disinfecting Agent
Alginate	iodophors and dilute sodium hypochlorite solutions
Compound	iodophors and dilute sodium hypochlorite solutions
Polyether	iodophors,# complex phenolics,# and dilute sodium hypochlorite solutions
Polysulfide	iodophors, complex phenolics,$ and dilute sodium hypochlorite solutions
Reversible Hydrocolloid	iodophors and dilute sodium hypochlorite solutions
Silicone	iodophors, complex phenolics,$ and dilute sodium hypochlorite solutions
ZOE Impression Paste	iodophors

*Modified from Reference 3.
#Use with caution; material is sensitive to immersion. Consult manufacturers' recommendations.
$Prepared according to the manufacturers' recommendations.

Cast →

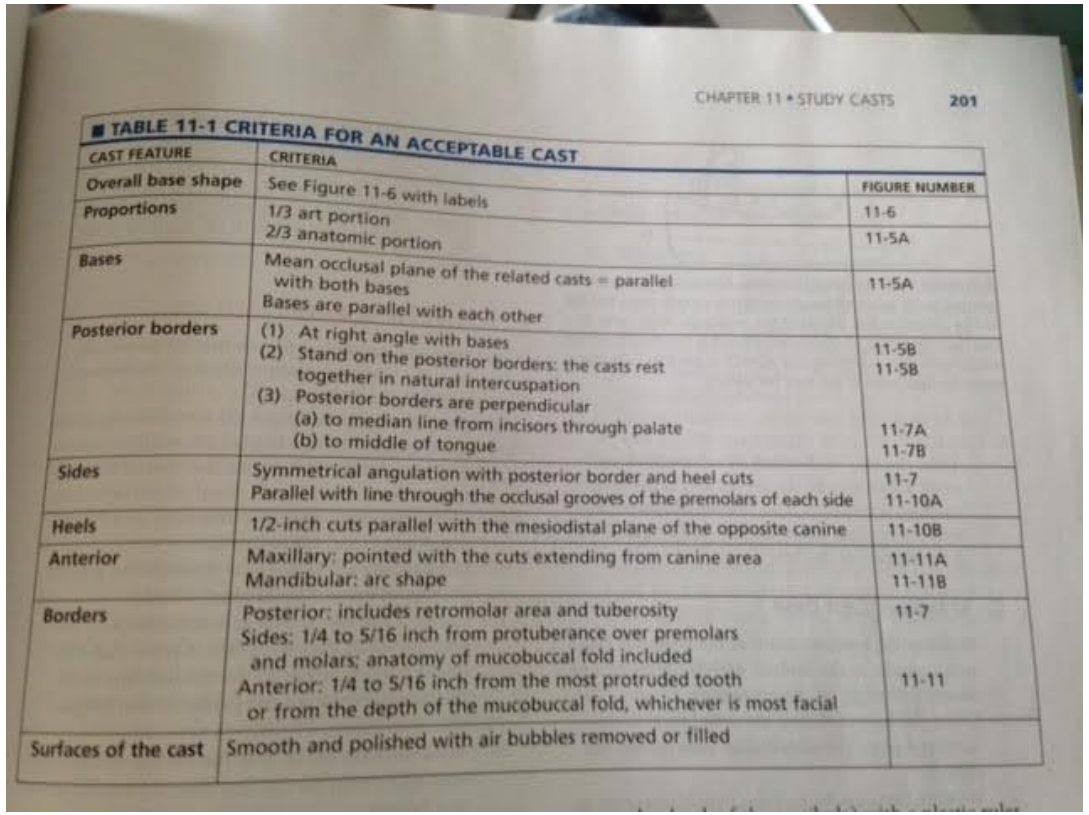

TABLE 11-1 CRITERIA FOR AN ACCEPTABLE CAST

CAST FEATURE	CRITERIA	FIGURE NUMBER
Overall base shape	See Figure 11-6 with labels	11-6
Proportions	1/3 art portion 2/3 anatomic portion	11-5A
Bases	Mean occlusal plane of the related casts = parallel with both bases Bases are parallel with each other	11-5A
Posterior borders	(1) At right angle with bases (2) Stand on the posterior borders: the casts rest together in natural intercuspation (3) Posterior borders are perpendicular (a) to median line from incisors through palate (b) to middle of tongue	11-5B 11-5B 11-7A 11-7B
Sides	Symmetrical angulation with posterior border and heel cuts Parallel with line through the occlusal grooves of the premolars of each side	11-7 11-10A
Heels	1/2-inch cuts parallel with the mesiodistal plane of the opposite canine	11-10B
Anterior	Maxillary: pointed with the cuts extending from canine area Mandibular: arc shape	11-11A 11-11B
Borders	Posterior: includes retromolar area and tuberosity Sides: 1/4 to 5/16 inch from protuberance over premolars and molars; anatomy of mucobuccal fold included Anterior: 1/4 to 5/16 inch from the most protruded tooth or from the depth of the mucobuccal fold, whichever is most facial	11-7 11-11
Surfaces of the cast	Smooth and polished with air bubbles removed or filled	

What can happen

- **Tearing/rough surfaces:** Rough occlusal and/or incisal surfaces, tearing on the margin of the preparation, and poor lamination between the tray material and wash can be due to a number of causes. To avoid these issues, pay close attention to your retraction technique. In appropriate cases, consider using the two-cord technique. Additionally, pay close attention to the recommendations for the material's oral working time, and set a timer to ensure the tray is left in the mouth for the full set time.
- **Tight crowns:** This problem can be caused by early removal of the impression tray from the mouth, a poor bond of the material to the tray, or seating an impression tray with material that is partially set. Again, closely follow the recommended working and setting times, and always use a VPS tray adhesive according to instructions.

  Short crowns: Trays with weak or low walls can provide insufficient support during impressioning, leading to short crowns. To address this issue, use custom or inflexible trays — preferably metal. Short crowns can also be due to teeth coming into contact with the tray, so instruct patients before seating and confirm that teeth do not touch the tray.

Continued

- **Voids:** As dentists know, voids are one of the most common impressioning issues. On the margin of an impression, voids can compromise the restoration's fit and function. If you experience this issue, your syringe technique may need improvement. Use a stirring motion while syringing, making sure to keep the syringe tip immersed to avoid trapping air. Alternately, air may become inadvertently incorporated in the syringe when loading. To avoid this, front load the syringe by inserting the mix tip directly into the syringe and forcing the plunger backwards. When voids occur on occlusal surfaces, they can lead to problems with articulation of stone models. In this instance, moisture is frequently the cause of the problem, whether it is present in the sulcus or pooled on occlusal surfaces. To counter this issue, monitor for pools of water or saliva before inserting the impression tray. Control bleeding, and use the two-cord retraction technique and/or hemostatic agents in appropriate cases.

- **Tray seating:** The tray seating step presents the possibility for a number of errors.
- If *ledges* are an issue, try not to seat the tray too rapidly. Position the tray before seating, and use a slow, steady, vertical seating motion. *Drags* can result when the tray is placed and seated in one motion. They can also occur when teeth rebound off the tray and slide into position. Similar to the technique for avoiding ledges, seat the tray slowly after carefully positioning it in the mouth, and avoid contact of teeth with the tray.
- Both *rocking crowns and slanted or wavy teeth* can be caused by tray movement after seating. Use passive pressure on the tray to immobilize it for the full recommended oral set time.

Continued

- **Bite registration:** When excessive occlusal adjustment is necessary for restorations, poor interocclusal records are likely a factor. To combat this, use a dimensionally stable bite registration material, and ensure it is trimmed properly. Additionally, monitor patients to confirm they do not move during the procedure.

  Surface inhibition: If the surface of the impression material is not set, tacky to the touch, and visually resembles the surface of an orange peel, a number of factors may be the culprit. The impression material may have been exposed to air-inhibited methacrylates or residues from custom temporary materials.

- Avoid this problem by waiting to fabricate the temporary crown until after the final impression has been made and using an alcohol wipe to remove the air-inhibited layer on any composites, adhesives, or core buildups in the impressioning area.

Biofilm

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What is Biofilm

- A biofilm is a well organized, cooperating community of microorganisms.[5,6] The slime layer that forms on rocks in streams is a classic example of a biofilm. So is the plaque that forms in the oral cavity. Biofilms are everywhere in nature. They form under fluid conditions. It is estimated over 95 percent of bacteria existing in nature are in biofilms.[6] Sometimes biofilms are seen as positive, such as their use for detoxification of waste water and sewage. More often biofilms provide a challenge for humans.[3,6]
- The slime layer that forms in dental unit water lines is an example familiar to most dental professionals. Biofilms can also be found lining oil pipelines, fish tanks, indwelling catheters, internal implants, contact lenses, and prosthetic devices.

Properties

- **Basic Biofilm Properties**
- Cooperating community of various types of microorganisms
- Microorganisms are arranged in microcolonies with channels between the microcolonies
- Microcolonies are surrounded by protective matrix
- Differing environments within the microcolonies in the biofilm
- Microbial gene expression differs when microorganisms are in a biofilm
- Microorganisms have primitive communication system
- Microorganisms in biofilm are resistant to antibiotics, antimicrobials, and host response

Matrix

- The biofilm matrix is penetrated by fluid channels that conduct the flow of nutrients, waste products, enzymes, metabolites, and oxygen. The microcolonies within the biofilm have micro environments with differing pH's, nutrient availability, and oxygen concentrations.
- The bacteria in a biofilm use a communication system termed quorum sensing that involves sending out chemical signals. These chemical signals trigger the bacteria to produce potentially harmful proteins and enzymes, virulence factors that help the intraoral biofilm bypass host defense systems.

How to Control Biofilms

- **Control of nutrients**
- addition of base-generating nutrients (arginine)
- reduction of GCF flow through anti-inflammatory agents
- inhibition of key microbial enzymes

- **Control of biofilm pH**
- sugar substitutes
- antimicrobial agents
- fluoride
- stimulate base production

- **Control of redox potential**redox agents
- oxygenating agents

- **Other strategies**
- interfere with communication networks
- prevent colonization of selected organisms
- enzymes to dissolve matrix of biofilm
- replace pathogens with a less virulent strain
- photoactivation of microorganisms

What is Plaque

- Plaque consists of microorganisms and extracellular matrix.
- The microorganisms that form the biofilm are mainly Streptococcus mutans and anaerobes, with the composition varying by location in the mouth. Examples of such anaerobes include fusobacterium and actinobacteria.
- The extracellular matrix contains proteins, long chain polysaccharides and lipids.
- The microorganisms present in dental plaque are all naturally present in the oral cavity, and are normally harmless**. However, failure to remove plaque by regular tooth brushing means that they are allowed to build up in a thick layer. Those microorganisms nearest the tooth surface ferment dietary sucrose; it is in this state that they start to produce acids.**

- **Acids released from dental plaque lead to demineralization** of the adjacent tooth surface, and consequently to dental caries. Saliva is also unable to penetrate the build-up of plaque and thus cannot act to neutralize the acid produced by the bacteria and remineralize the tooth surface.
- They also cause irritation of the gums around the teeth that could lead to gingivitis, periodontal disease and tooth loss.
- Plaque build up can also become mineralized and form calculus (tartar).

Tooth Deposits

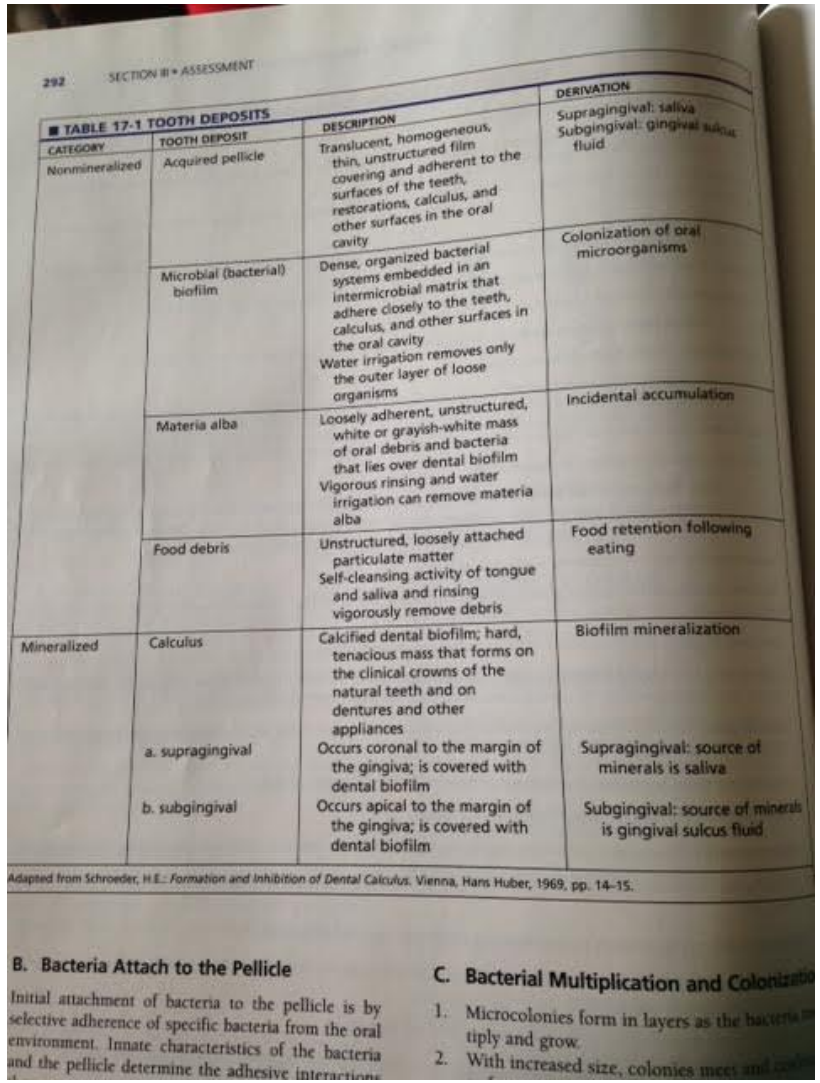

TABLE 17-1 TOOTH DEPOSITS

CATEGORY	TOOTH DEPOSIT	DESCRIPTION	DERIVATION
Nonmineralized	Acquired pellicle	Translucent, homogeneous, thin, unstructured film covering and adherent to the surfaces of the teeth, restorations, calculus, and other surfaces in the oral cavity	Supragingival: saliva Subgingival: gingival sulcus fluid
	Microbial (bacterial) biofilm	Dense, organized bacterial systems embedded in an intermicrobial matrix that adhere closely to the teeth, calculus, and other surfaces in the oral cavity Water irrigation removes only the outer layer of loose organisms	Colonization of oral microorganisms
	Materia alba	Loosely adherent, unstructured, white or grayish-white mass of oral debris and bacteria that lies over dental biofilm Vigorous rinsing and water irrigation can remove materia alba	Incidental accumulation
	Food debris	Unstructured, loosely attached particulate matter Self-cleansing activity of tongue and saliva and rinsing vigorously remove debris	Food retention following eating
Mineralized	Calculus	Calcified dental biofilm; hard, tenacious mass that forms on the clinical crowns of the natural teeth and on dentures and other appliances	Biofilm mineralization
	a. supragingival	Occurs coronal to the margin of the gingiva; is covered with dental biofilm	Supragingival: source of minerals is saliva
	b. subgingival	Occurs apical to the margin of the gingiva; is covered with dental biofilm	Subgingival: source of minerals is gingival sulcus fluid

Adapted from Schroeder, H.E.: *Formation and Inhibition of Dental Calculus*. Vienna, Hans Huber, 1969, pp. 14–15.

B. Bacteria Attach to the Pellicle

Initial attachment of bacteria to the pellicle is by selective adherence of specific bacteria from the oral environment. Innate characteristics of the bacteria and the pellicle determine the adhesive interactions

C. Bacterial Multiplication and Colonizat

1. Microcolonies form in layers as the bacteria tiply and grow.
2. With increased size, colonies meet and

Dental Caries

- A tooth disease caused by the complex interaction of food, especially starches and sugars, with the bacteria that form dental plaque. The term also refers to the tooth cavities that result from the disease. Plaque bacteria produce acids that cause demineralization of enamel and enzymes that attack the protein component of the tooth. This process, if untreated, ultimately leads to the formation of deep cavities and bacterial infection of the pulp chamber, which contains blood vessels and nerves.
- The development of dental caries in a debilitated patient is a concern because of the danger that infections of the teeth or gingival tissues may spread to the rest of the body. In addition, teeth that are decayed or painful inhibit mastication and can lead to dietary changes, which may in turn cause nutritional and digestive disorders.
- Dental caries may be prevented by a reduction in the frequency of sugar consumption, use of dental floss between the teeth, regular brushing of the teeth with a fluoridated toothpaste, drinking of fluoridated water, topical application of fluorides to the teeth, and removal of plaque and calculus by a dental hygienist.
- Treatment of dental caries includes removal of the decayed material and restoration of the surface of the affected tooth with a silver amalgam or other restorative material. If the cavity has reached the pulp chamber, it may be necessary to remove the pulp tissues to alleviate pain, prevent the spread of infection to the rest of the body, and allow the continued use of the tooth.
- Alternatively, the entire tooth may be extracted. Kinds of dental caries include arrested dental caries, incipient dental caries, pit and fissure cavity, primary dental caries, secondary dental caries, smooth surface cavity.

Materia Alba

- A white cheeselike accumulation of food debris, microorganisms, desquamated epithelial cells, and blood cells deposited around the teeth at the gumline.

Chlorhexidine

- Chlorhexidine is often used as an active ingredient in mouthwash designed to reduce dental plaque and oral bacteria.
- It has been shown to have an immediate bactericidal action and a prolonged bacteriostatic action due to adsorption onto the pellicle-coated enamel surface.
- If it is not deactivated, chlorhexidine lasts longer in the mouth than other mouthwashes, which is partly why it is to be preferred over other treatments for gingivitis.
- To treat periodontal pockets equal or greater than 5 mm, chlorhexidine is also available in high concentration (36%) in a gelatine-chip.

Continued

- Continued use of products containing chlorhexidine for long periods can cause stains on teeth, tongue, and gingiva, also on silicate and resin restorations; prolonged use can also reduce bitter and salty taste sensations – this latter symptom can be reversed by ceasing use of chlorhexidine.
- The brownish discoloration of teeth and tongue is due to the disintegration of bacterial membranes, leading to the denaturation of bacterial proteins. Mouthwashes containing chlorhexidine which stain teeth less than the classic solution have been developed, many of which contain chelated zinc.
- According to the prescribing information, chlorhexidine gluconate has not been proven to reduce subgingival calculus and in some studies actually increased deposits.[citation needed] When combined with xylitol, a synergistic effect has been observed to enhance efficacy. Chlorhexidine's role in preventing tooth decay (dental caries) is controversial and "the clinical data are not convincing".

- Chlorhexidine is neutralized by common toothpaste additives such as sodium lauryl sulfate and sodium monofluorophosphate. Although data are limited, to maximize effectiveness, it may be best to keep more than a 30-minute interval between brushing and using the mouthwash, "cautiously close to 2 hours after brushing".

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- Clinical Practice of the Dental Hygienist
- Darby and Walsh