Tooth Restorations
Cosmetic Dentistry

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Patient Preparation and Procedure Area:

Perhaps the most common dental visit is the appointment for examination and prevention, but the restoration of teeth is the most common treatment associated with the dental office. The purpose of a dental restoration is to do the following:

- Remove the carious lesion.
- Prepare the site for a restorative material of choice with the needed bases and liners.
- Restore the tooth to its normal function and esthetic appearance.

Choice of the procedure and the materials used depend on the condition and site of the tooth involved.

Dental caries are classified according to their position and degree of decay, examination and prevention.

Isolation of the Operative Site

The operative site must be isolated throughout the restoring process, from before tooth preparation through the final polishing stage. Site isolation provides for better viewing and a drier climate for the proper use of dental materials. Oral evacuation by a dryfield illuminator or saliva ejector and the assistants' evacuation tip remove saliva and cooling water from handpieces. Cotton rolls in various lengths or those placed in cotton roll holders may be applied to strategic sites to control fluids. Absorbent pads may be situated over the parotid gland in the cheek to absorb the flow of saliva.

Isolation helps to control the tongue interference common among young Patients and nervous patients, and it also helps prevent an aspiration or swallowing of small dental items, such as crowns, clamps, and amalgam debris. To assure total tooth isolation, a dental dam may be applied.

Dental Dam

A dental dam is a material placed on the teeth for certain dental procedures. The dental dam serves two main functions:

Isolation: the tooth or teeth to receive treatment are isolated and exposed for the procedure, presenting better viewing and access.

Barrier control: the dam material protects against infection, damage from caustic materials, and accidents to adjacent tissues.

Items needed for placement of the dental dam are noted, pictured, and explained, Endodontics. After the dam is prepared and placed into the mouth, the following steps are taken to ensure proper protection:

1. Place the ligature. Small pieces of floss or dam material are placed into the proximal areas to assist with control and retention of the dam material in the mouth.
2. Invert the material. This seals the edges of the dam material to the tooth surface and prevents moisture from escaping into the work area.
3. Stabilize the dam clamp. Ligatures, softened wax, or other materials may be placed about the dam clamp to assist the dam clamp in maintaining a firm seating.

Also, quick dams, lip and check retractors, props, and absorbent pads are available to the dentist for isolating a site that does not require controlling moisture and maintaining a sterile field, such as endodontic preparations. These dams are smaller, with or without a frame, and are set into the mouth. They are used mostly for a single tooth prep or for general isolation.

Preparation of the Restorative Site

Each caries-affected tooth requires special attention. The method, procedure, and choice of restorative materials for this affected tooth must be custom planned and adapted. The basic protocol for returning a decayed tooth to a restorative level involves three steps:

1. Remove caries and perform debridement, by the use of rotary burs or diamonds in handpieces, abrasion, laser, or mechanical methods, and with hand instrumentation.
2. Prepare tooth form to receive and retain restorative materials.
3. Finish and refine the tooth walls and surfaces in preparation to receive the restorative material

To obtain the proper forms, preparations must be made in the axial wall, which receive its name from the surface wall involved

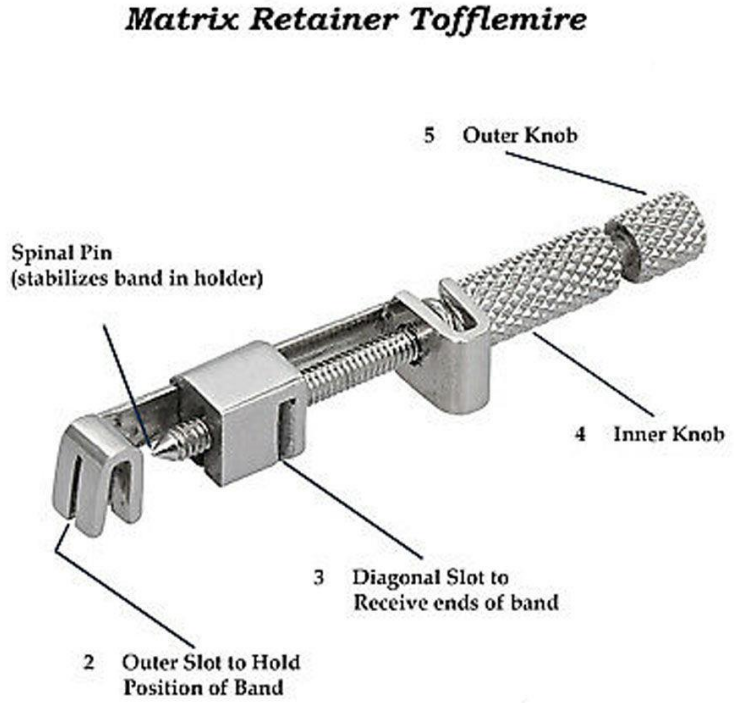
Examples are distal, buccal, lingual, mesial, labial, gingival, and pulpal. When two walls meet, they form a line angle, such as a distoocclusal restoration. If the pulpal wall is involved with the two axial walls, a point angle is formed, and three surfaces are involved, such as distobuccopulpal. Tooth preparations include several prep forms:

- Outline form: tooth cuts used to prepare the size, shape, and placement of restoration.
- Convenience form: the cut of tooth material necessary for access to complete the cavity preparation.
- Retention form: undercut of the walls to provide a mechanical hold of the restorative material.
- Resistance form: preparation cuts to ensure that the restored natural tooth can withstand trauma and pressure use of the tooth.

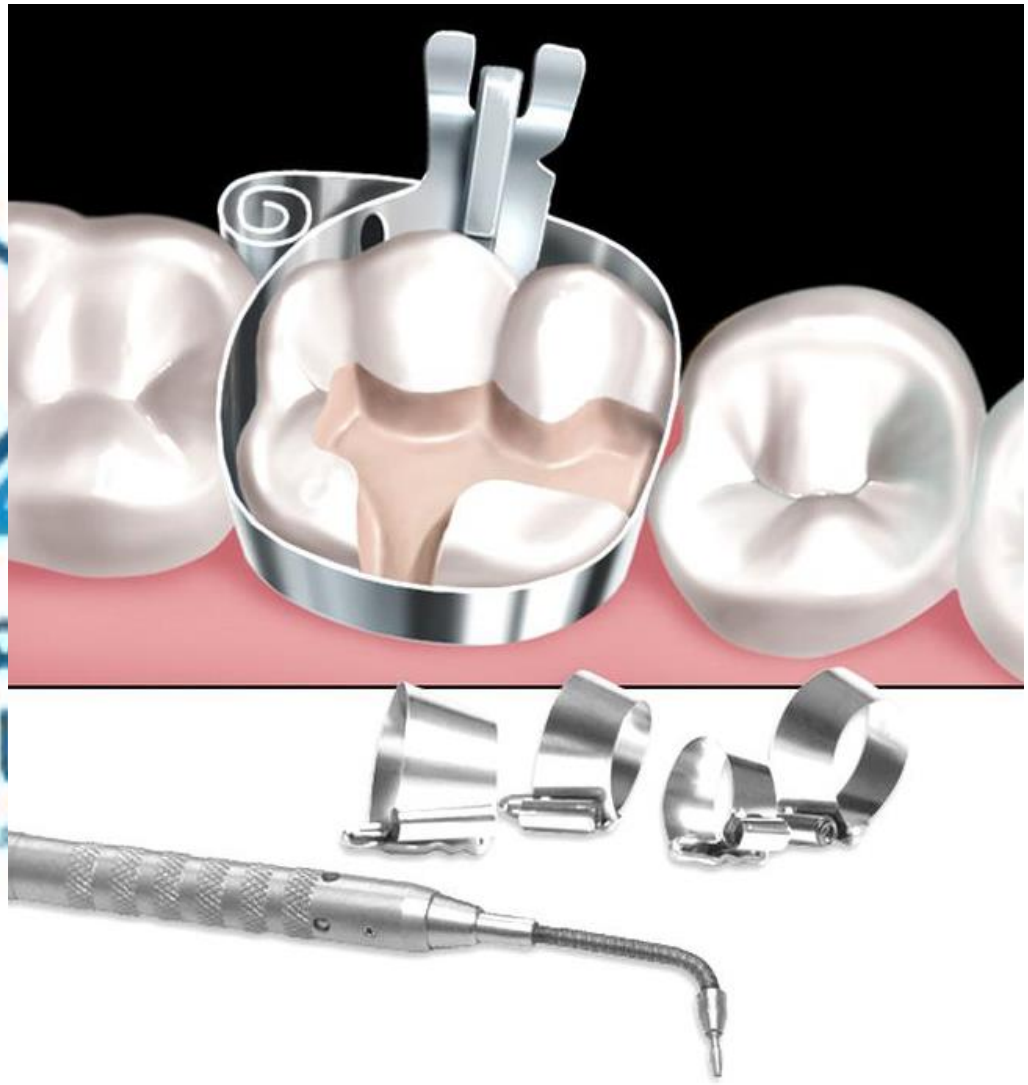
Matrix Placement

After a tooth wall has been removed in a tooth preparation, it must be replaced. To hold the shape and form of the original wall and to prevent an **overhang** of restorative material, the dentist may use a **matrix**:

Tofflemire matrix: a retainer device and assorted stainless steel bands to fit and be tightened around the tooth. Wedges made of wood, resin, or celluloid for passage of ultraviolet light are placed at the base of the matrix to stabilize and provide **embrasure** areas with nearby teeth.



AutoMatrix: presized, cone-shaped circle bands with locking ends that are tightened and locked after being placed on the tooth; visibility may be better because no retainer is necessary to hold the band.



T-strips: stainless steel strips that are shaped like a T. the strip is circled with the T ends flopped over to retain the shape and hold the band on the tooth. Wedges are also used to provide embrasure space and stabilization. T-strips are commonly used in pediatric dentistry.

Ivory retainer/sectional matrix: these systems are used mostly on posterior teeth. The strip does not circle the tooth but only replaces a wall. The retainer holds a stainless steel strip that is placed between the prep and the contact wall of the adjacent tooth. The strip is tightened, and a wedge is used for space and to assist with retention.

V3 system or spring clamp matrices: the artificial wall band is set into a special forceps, carried into the mouth, placed around the preparation, and released to grasp and hold the matrix against the prep; wedges are placed in the embrasure for support, stabilization, and to maintain cervix space.

Mylar matrix strips and crown forms: used with anterior or tooth-shaped materials. The strips are placed around the tooth restoration and held in place by a clip or finger pressure until the restoration is set or light cured. Crown forms are filled with restorative material and placed on the preparation until the material has set.

Cements, Liners, and Base Materials

Each dental material is chosen for its unique characteristic. Some materials may be used as a luting agent, pulp capping, base, or core buildup depending on which consistency is prepared. Some materials are obtained in a powder liquid, two-paste, capsule, light, or self-cure ability. The selection of a particular ,material is determined by the preparation site, involvement, and physical makeup of the prepared tooth. Manufacturer's instructions for dosage, preparation, and use should be carefully followed. Among several popular material choices for protecting or preparing or materials are:

Varnish: copal or resin gum in a suspension of organic solvents; used to cover the cut edges of tooth surfaces and seal against leaking under all restorations except composites and resins. Universal varnish that does not contain the organic solvents may be used under all restorations.

Liner: thin coating that provides a barrier against chemical irritation; usually a varnish material or a liquid suspension of calcium hydroxide or glass ionomer cement.

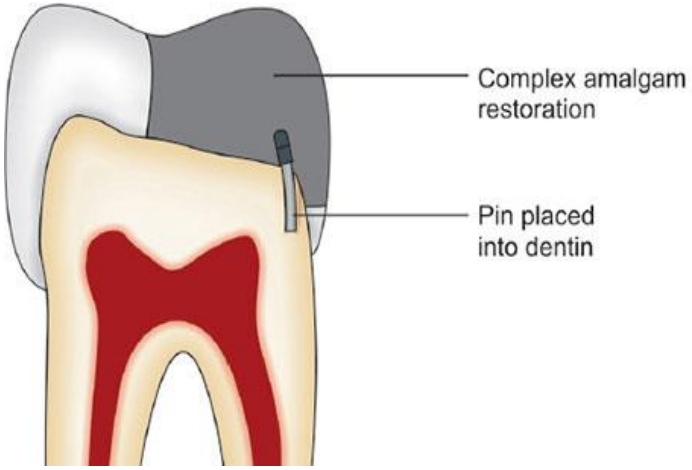
Acid etchant: phosphoric acid solution used to prepare the cavity margins to provide retention for the bonding and restorative materials. Etching makes the enamel surface more porous, creating enamel tags, and removes the smear layer of bacterial and tooth debris matter. When prepared, the enamel looks chalky white.

Bonding agent: material used to unite some restorative agents to the tooth surface and underlying materials; may be self-curing liquids or light-cured.

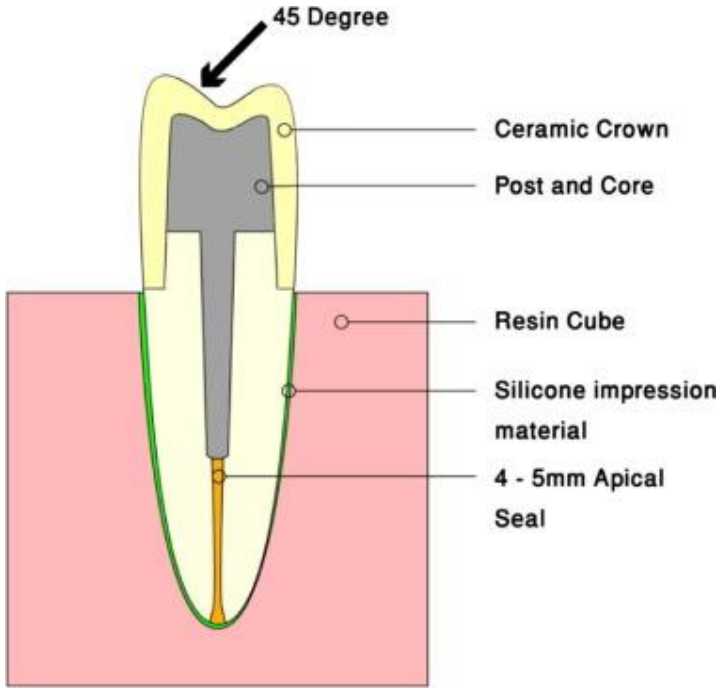
Base: barrier against chemical irritation. Bases will also provide thermal isolation, resist condensation forces, and are able to be contoured and shaped. A base may be calcium hydroxide, zinc-oxide eugenol (ZOE), or ZOE with ethoxybenzoic acid (EBA) added for strength, zinc phosphate, polycarboxylate, or glass ionomer. Each has its own characteristics.

Cement: a thicker material that can be used as a temporary or permanent restorative material; for example, glass ionomer cement may serve as a cement or a restoration material; self-cured or light-cured. Cements also may be used to retain pins or posts in a deep preparation.

Retention pin: metallic pin that is cemented into a drilled hole in the tooth prep. The exposed end of the pin will be incorporated into the restorative material.



Core post: titanium/stainless steel posts of various sizes that are cemented into the pulpal canal of an endodonticly treated tooth. A core buildup of restorative material is placed over the extending post end. All pin placements are drilled and cemented into place before applying a matrix.



Purposes of Submaterials

Some materials are placed into cavity preparations prior to the restorative material of choice. These liners, bases, and cements are chosen for a specific purpose, such as the following:

Insulation: prevents transfer of heat, stress force.

Palliative: soothing; encourages growth or reparative dentin also called **tertiary** dentin.

Protective: preparation seal or temporary restoration between treatments visits.

Cementation: used to permanently unite or restore shape and purpose; also may be used to cement retention pins into the preparation.

Laminated: materials applied in thin layers to the tooth surface; may be cemented or light activated for permanency.

Restoration Placement Terminology

Terms specific to the preparation, handling, insertion, or use of cementing and restorative agents include the following:

Manipulation: preparation and handling during use; each material requires a different method.

Homogeneous: describes a uniform mixture; some materials, such as cements, have to be blended.

Trituration: the mechanical blending and mixing of the mercury and alloy materials, also called **amalgamation**, the chemical act of blending the alloy and mercury mix for an amalgam restoration. This procedure is usually accomplished in a machine called an **amalgamator**.

Polymerization: transforming material from a plastic shape to hard substance through a curing process either automatically or using a light-source method.

Bonding: using acid materials called **etchants**; may be used to prepare a tooth surface for attaching to another material.

Restorative Materials

A variety of materials and procedures are used in restoring the affected tooth to normal function, use, and beauty.

An **amalgam** is a blend of various powdered alloy metals and liquid mercury mixed into a plastic form that soon hardens.

Amalgam is available in color-coded, single, double, or triple dose premeasured capsules.

The choice of the dental alloy composition depends on the qualities of the material the dentist wants to use.

Other relevant terms are:

Cement: plastic material that can unite or bond materials. The choice of cement depends on the solubility (capability of being dissolved), **viscosity** (sticky or gummy), and **adhesive** (sticky or adhering) quality of the material.

Composite: resin material used in dental restorations; supplied in **macrofilled** (large particles), **microfilled** (small particles), and **hybrid** (mixed particles) and may be purchased in paste, syringe, or single dose capsules. Composites may be self-cured or light-cured, tintable.

Gold foil: foil sheet of gold material that is **annealed** (placed in a flame for a heat treatment to purify)to a clean and prepared surface for condensation into the prepared restorative site. Gold is also supplied in mat or powder form for direct insertion into tooth prep.

Veneer: thin resin composite or porcelain surface shields that are cemented or bonded onto the facial surface of a tooth.

Finishing Methods:

After the tooth has been prepared and has received the liner and bases as needed, the restorative material has to be inserted, condensed, and preliminarily carved. The matrix and dental dam is removed, and the final carving, articulation check, and polishing are completed. Several terms are specific to this procedure:

Increment: (increase or addition)small amounts or doses of the materials that are placed into the preparation unit filled.

Condensation: (to make thick) the changed preparation as a result of the condenser or plugger instruments packing down the material into the preparation.

Carving: instrument shaping and cutting of condensed material to resemble original anatomical tooth surface.

Burnish: to smooth the restoration surfaces toward the margins. Matrix strips may be burnished or rubbed into the proper shape.

Articulating paper: colored strip of paper used to test results of the restored bite. The articulating paper is placed on the occlusal surfaces, and the patient bites down. When the paper is removed, the high spots are indicated by the marks that appear with carbon or colored traces to indicate where refinement is needed.

Cosmetic Dentistry

Definition of Cosmetic Dentistry and Related Area

Beyond maintenance and reconstruction of the oral cavity, the modern dental patient desires an esthetic appearance. People seek dental care to improve their looks and turn to their dentist for cosmetic restorations and esthetic correction of diseased tissues, stains, genetic imperfections, accidents, and other maladies of the mouth.

Athough most cosmetic dentistry procedures can be completed by the dentist, some require a team consisting of the dentist and other dental personnel such as a prosthodontist, oral surgeon, periodontist, and dental laboratory technician. Cosmetic techniques offered to improve patients' esthetic appearance and restore or provide a functional use include tooth whitening, bonding, veneer application, cosmetic restoration, periodontal adjustment, implants, and tooth movement. Major repair and reconstruction of the mouth and facial structures are covered, Oral and Maxillofacial Surgery.

Smile Makeover

The first thing that comes to mind in cosmetic dentistry is a beautiful smile. Two terms for cosmetic mouth dentistry are *smile makeover*, the desire for an esthetic appearance and *full mouth reconstruction*, the need for repair for maladies from birth, disease, or dental-health issues. Some of the needs and treatments used in cosmetic dentistry are:

Tooth appearance: darker, rough-surface, pitted teeth may receive bleaching, whitening, resin surface application, veneer coverings, or crowns.

Spacing and alignment: (diastemas)gaps in front teeth, peg-shaped teeth, overlapping teeth, and out-of-line teeth may receive bonding, veneers, crowns, surgical frenectomies, and orthodontic care.

Smile harmony and balance: chipped teeth, gummy smiles, tooth length, and uneven papillae may receive bonding, surgical contouring, or gingival augmentation.

Missing and decayed teeth: may receive restorations, inlays, onlays, crowns, implants, bridges, or partial dentures.

Commercial smile enhancer: sometimes called "Hollywood Smile" has been developed for total cosmetic use. **Snap-on Smile** is a full arch covering that can be placed on and off the teeth by the patient to offer immediate good looks. The dentist will take an immpression and send it to the laboratory where a flexible, beautiful cover is prepared for the patient to use when the occasion calls for an improved appearance or as desired. No tooth constructive or curative dentistry is performed. It is the patient's option when to wear the tooth covering.

Tooth whitening

The most common cosmetic procedure is the whitening or lightening of tooth surfaces. Aging, chemically stained teeth, such as the tetracycline brown band line, and genetic disposition are causes of intrinsic stain. Personal diet may cause teeth to look dark and unattractive with extrinsic stain. Whitening or bleaching of teeth surfaces can be completed in the dental office, at home, or a combination.

Bleaching of teeth, as defined by the FDA, is the whitening of teeth beyond their natural color, such as lessening of brown bands, while tooth whitening is the restoration of natural tooth color.

At the start of the procedure, the patient's present shade of tooth is photographed, recorded, and will be compared to the new shade after the lightening

Relevant terms to tooth whitening are:

Shade guide: handheld device with assorted and numbered tooth-shaded forms that are compared to the incisal two-thirds of the patient's incisors.

Model impression: a reproduction of the patient's teeth is made into a plaster/stone study model.

Tray fabrication: a plastic tray is made to fit the study model cast .

Gingival isolation: painting or covering the patient's gingival areas with a liquid dam material to isolate the tissues from chemical damage.

Tooth bleaching: techniques and equipment vary according to the degree of lightening desired and the manufacturer's recommendations and instructions that differ in chemical strengths and application methods. The basic methods are:

Acid brush: 35% phosphoric acid solution applied to surfaces. The solution remains on the surface 15 seconds and then rinsed off; refreshened and reapplied up to three times as needed.

Tray method: gel or paste-filled tray placed into the mouth over cleaned tooth surfaces

Gel application: a whitening gel containing a hydrogen peroxide or carbamide peroxide formula is applied directly to cleaned, isolated tooth surfaces, and may or may not be activated by bleaching, laser, or curing lights, as specified by the manufacturer; may be refreshed and reapplied as needed.

Laser activation: isolation of tissues, cleansing of tooth surfaces, and application of protective tissue covering and bleaching gel. Laser-light application for approximately an hour gives accelerated and more penetrating activation of the chemical gel material.

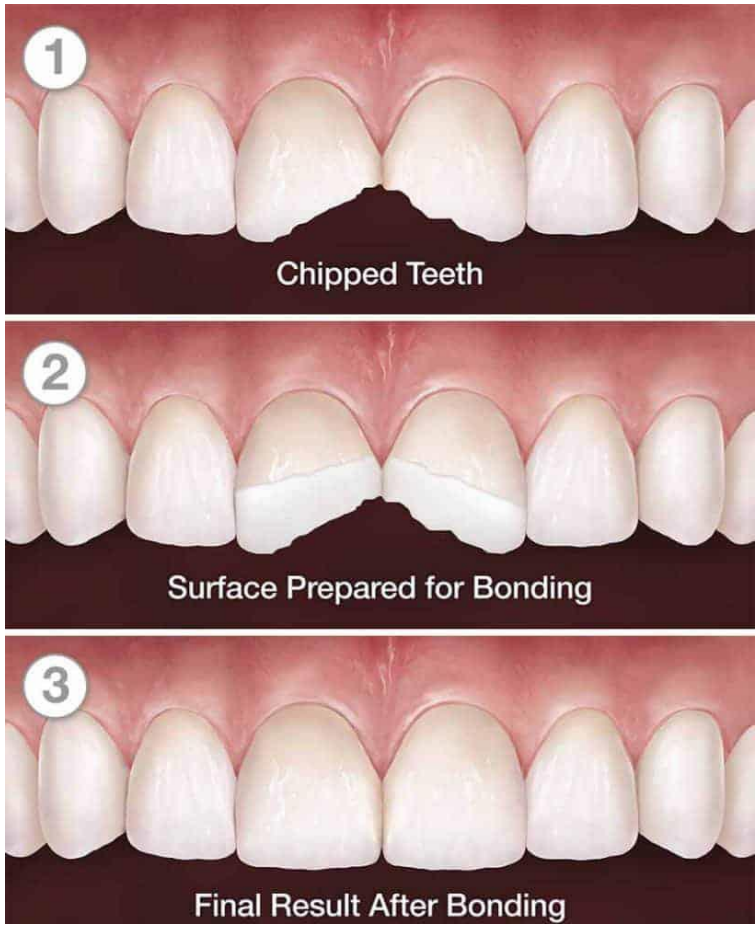
Tooth desensitization: following bleaching, a desensitizing liquid, paste, or gel applied to tooth surfaces seals dentin tubules to minimize discomfort. Some formulas that also deter some sensitivity and remineralize the tooth include fluoride, calcium, and phosphate.

Tooth Bonding and Veneer Application

Tooth bonding and veneer application are alternatives to tooth whitening, particularly if the tooth surfaces are excessively stained or have other irregularities such as open space, broken edges, pitted surfaces, and misshaped teeth.

Tooth Bonding

Tooth bonding involves applying a composite material that is mixed to a pliable dough form, applying it to a prepared tooth surface, and sculpting it into a tooth shape. The composite shade is chosen to match the existing tooth surface. The tooth is prepared by removing any present decay, followed by an abrasive roughening, and a gel etch. The surface is primed, the composite material is applied in layers, and the material is activated by a curing light. When shaped and finished, the composite is smoothed and polished.



Veneer

In a veneer application, a thin fabricated resin or porcelain cover is applied to the prepared tooth surface. Along with covering stained and affected teeth, the shape or color of the tooth may be altered. Depending on the severity and preparation needs of the teeth, veneers, also called laminates, can be applied using either of two methods:

Direct veneer application:

methods that can usually be completed in one visit include:

- Similar to tooth bonding, a resin material is applied to tooth surfaces that have been roughened by air abrasion or rotary burs and wheels. The plastic material is cemented directly on the surface, and then smoothed and polished.
- laminates can be made at the initial first visit with the use of a CAD/CAM technology. These laminates are prepared immediately, thereby eliminating the return second visit.
- Lumineers, or other premanufactures. "no prep" veneer coatings can also be applied to facial tooth surfaces that need little or no surface removal.

Indirect veneer application:

The first visit, the teeth are prepared by removing a small amount (0.5 mm to 1.0 mm) of enamel tissue. An impression is taken for fabrication of the porcelain veneers or laminates and sent to the laboratory. The dentist may or may not apply a temporary cover to last between visits. At the second visit, the teeth are cleaned, acid etched, and primed to receive the new laminates that are cemented on the tooth surface and light cured to set up. The porcelain veneers are cleaned and polished. Porcelain veneers usually are longer lasting and more expensive.

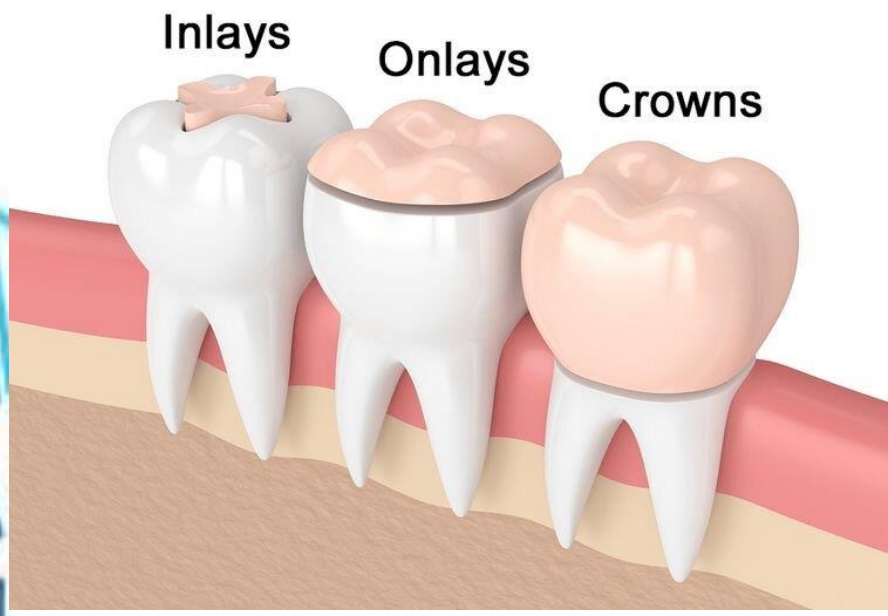
Cosmetic Tooth Restorations

Tooth restoration are completed using materials that resemble enamel tissue. Older amalgam fillings can be replaced using composite material to give the whole mouth a natural look. Restorative procedures include:

Tooth restoration: prepared tooth receiving white composite restorative material, instead of metallic amalgam or gold; replacement of existing amalgam fillings with composite.

Inlay: a solid-casted restoration, involving some occlusal and proximal surfaces, that is cemented into a tooth preparation.

Onlay: a solid-casted restoration that covers some occlusal tooth cusp and side wall area and is cemented onto the prepared site.



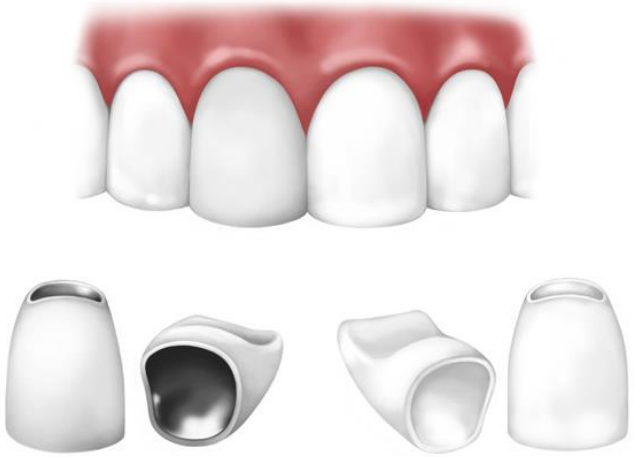
Tooth crowns: covering the crown surfaces of the tooth with artificial coverings. The type of crown applied depends on the extent of the tooth repair and is named by the area involved:

Full crown: cast or milled restoration covering the entire crown area of a tooth.

Three-quarter crown: cast or milled restoration covering all surfaces except the facial view.

Porcelain fused to metal crown(PFM): full cast crown restoration with porcelain facing on exposed areas for cosmetic appearance.

Jacket crown: thin metal cover with a porcelain facing for an anterior tooth.



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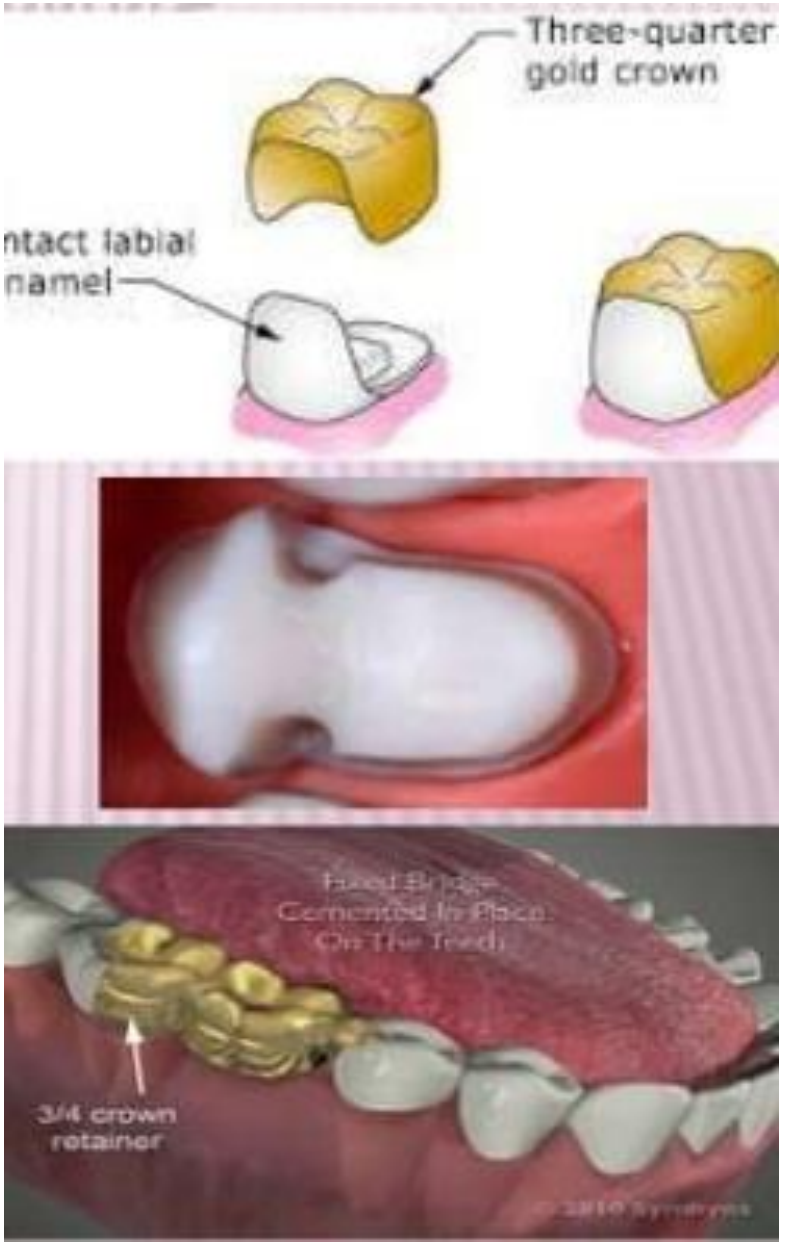


Periodontal Tissue Surgery

Periodontal plastic surgery, also termed mucogingival surgery, can be performed as a treatment for diseased tissue or as a method to enhance the patient's smile.

Esthetic gingival tissue surgery in cosmetic dentistry is used to either reduce or augment the gingiva as needed. Some examples and treatment of gingival cosmetic maladies are discussed next.

Gingival Reduction

- In gingival reduction, excessive gingival tissue is removed by laser, periodontal knives, or bipolar electrosurgery.
- Depending on the case severity or the amount of tissue area involved, most gingival adjustments are completed with local anesthesia in a single visit.
- Occasionally, some bone reduction or augmentation may be required, which will require deeper anesthesia and surgical intervention.

Reduction is used for the following:

Crown lengthening: exposing more tooth surface to eliminate a "gummy smile".

Gingival contouring: removing excessive tissue to obtain symmetry of the gingival crest.

Exposing unerupted teeth: removal of coronal tissue to expose tooth surface.

Enlarged labial frenum: condition where thick or enlarged labial frenum presents tissue growth between the mesial of central incisors, causing a space gap. A frenectomy will permit teeth to grow back together with minor tooth bracing.

Gingival Augmentation

Gingival augmentation builds up or reconstructs the gingiva to repair or replace tissue where needed. It involves the following:

Soft tissue grafting: transplanting mouth tissue from nearby gingival tissue or from the palate area to other sites.

Gingival recession: restoring the gingival crest to a natural height.

Pocket depth reduction: eliminating the pocket area restoring the gingiva.

Exposed roots covering: replacing gingival tissue over exposed roots.

Ridge augmentation: building up gingiva and bone tissue in collapsed areas resulting from tooth extraction.

Dental Implants:

dental implants are titanium fixtures that are surgically installed in the jawbone and used to stabilize or serve as an anchor for a tooth, an appliance, or a denture. they may be used as an alternative to a fixed bridge or in areas where tooth replacement requires stability.

placement of an implant often requires a team cooperation of several specialists, such as an oral surgeon, a prosthodontist , and perhaps a periodontist.

Implant are surgically installed and remain in place for three to six months while the appliance and bone unite in a process called **osseointegration**. they are then uncovered, and the artificial device is attached.

Terms related to implants are:

root from implant-endoosseous: screw- type device that is screwed into the alveolar bone; used for a single tooth or post implant.

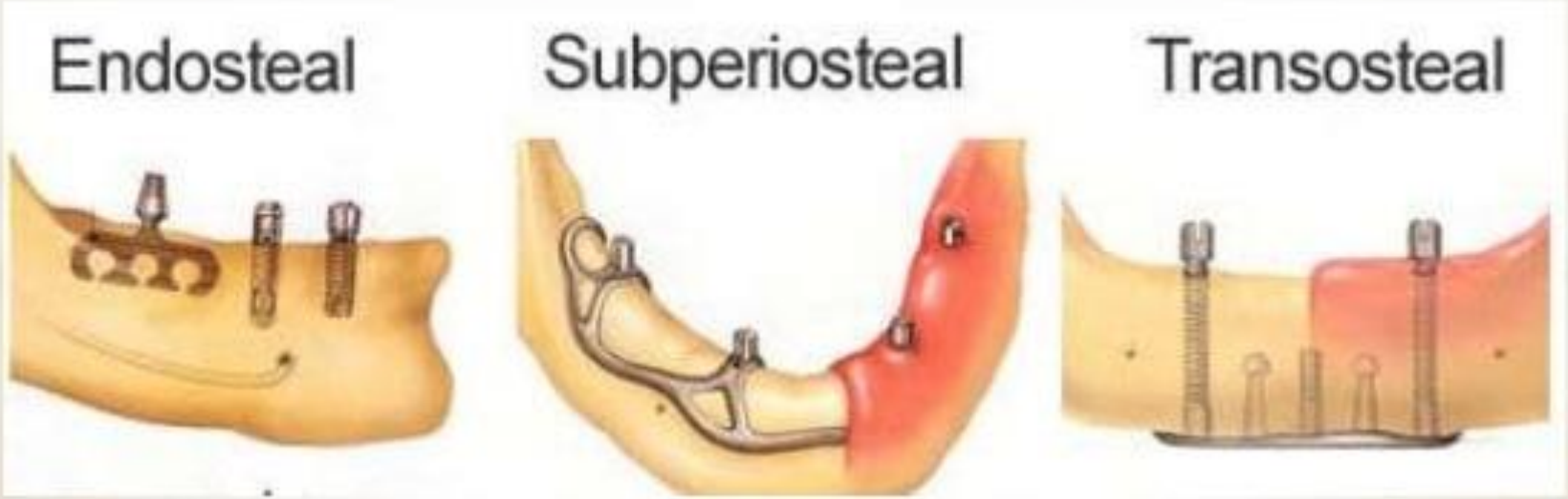
plate from implant; used for the narrow jawbone ; flat- plate style.

subperiosteal implant: implant plate or frame extending through the jawbone, placed under the periodontium, and stabilized on the mandible bone. It is used when bone height or width is insufficient; rests on top of the bone.

transosteal implant: larger plate stabilized on the lower border of the mandibular bone with posts extending through the gingiva; used to anchor prostheses in difficult situations.

*Implant Types

* Subperiosteal
* Transosteal
* Endosteal → plate form(blade vent)
  → Root form



Accelerated Orthodontic Treatment:

AOO treatment is a surgical orthodontic approach requiring a team of specialists trained in this procedure. it is a multiple- step process where the teeth are aligned and bounded, sometimes after rectification (selective removal of interproximal tooth tissue of multiple teeth) that provides space for tooth movement. this slimming or narrowing of teeth eliminates the need for extraction. A week after banding, the patient`s gingiva is incised to expose the alveolar bone where a surgical drill places holes or removes bone tissue in the alveolar crest to demineralize the bone, causing a condition called osteopenia. A bone graft material mixed with an antibiotic is placed on the site, and the gingiva is replaced and sutured into place.

While the bone is in a weakened stage, movement progresses rapidly. Return visits and banding readjustments are more frequent than with the normal orthodontic treatment, and the retainers are worn for six months or so after the bands have been removed , allowing total remineralization to finish.

Other cosmetic applications for orthodontic treatment include the following:

Invisalign ™: an orthodontic polyurethane tray method for tooth alignment using a series of clear, preformed, custom trays that apply pressure for tooth movement. Trays must be worn 20-22 hours per day, and when movement is finished, they must be worn at night. the trays are frequently changed (every two weeks) as movement or relignement occurs.

orthodontic enamoplasty: removing small amounts of enamel walls to acquire enough room to cause a slight correction movement; usually performed in a small area or trouble spot.

lingual banding: placement of brackets and bands on the lingual tooth surfaces so they are not easily viewed.