Dental Training

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Content:

- Basic Dentistry
- Material Basics
- Properties & Testing

Basic Dentistry

Basic Dentistry

- Dental Anatomy
- Dental Problems
- Dental Restorative Procedures
- Endodontic Procedures
- Pedodontic Procedures
- Prosthodontic Procedures
- Esthetic Dentistry
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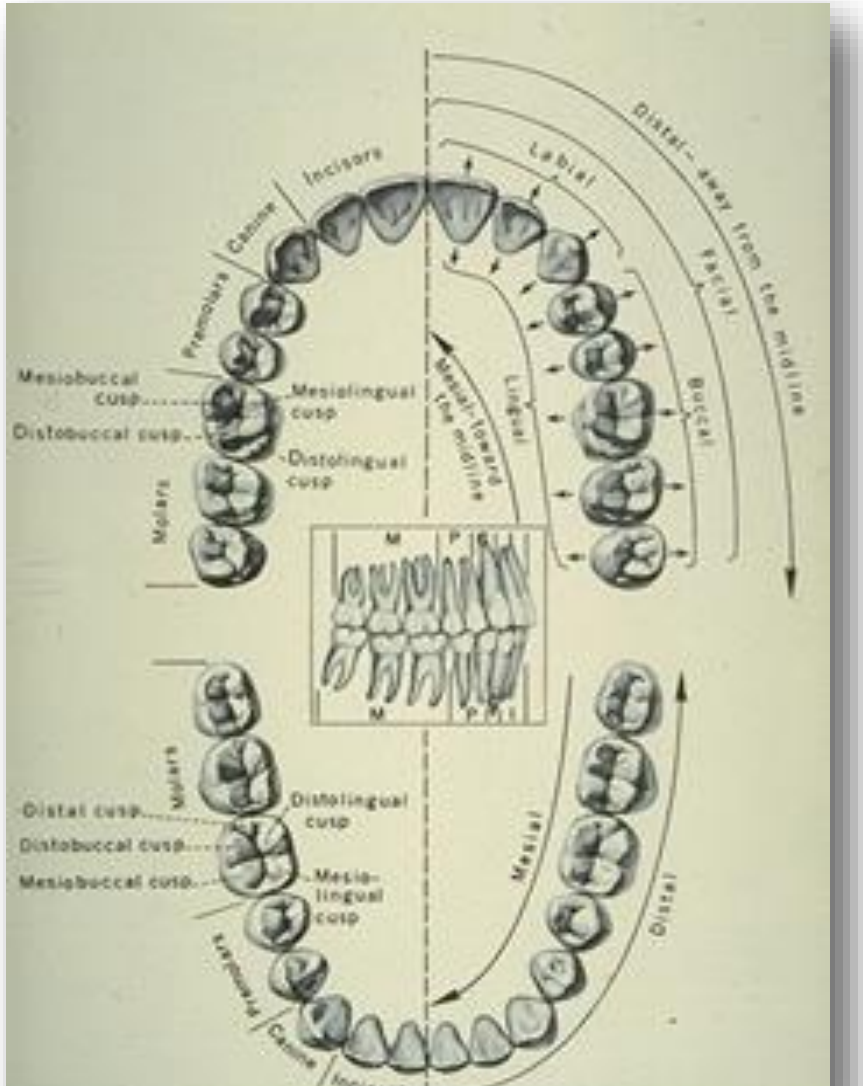
Dental Anatomy

Because dentists not only work on teeth but also communicate about them, all teeth, tooth surfaces, preparations and procedures have specific names. In this chapter the nomenclature in relation to anatomy and tooth preparations is discussed. In some cases several terms are offered, in the dental field there are still differences between universities and countries when it comes to the teaching of dentistry. In order to work in the dental field you should be familiar with all these terms.



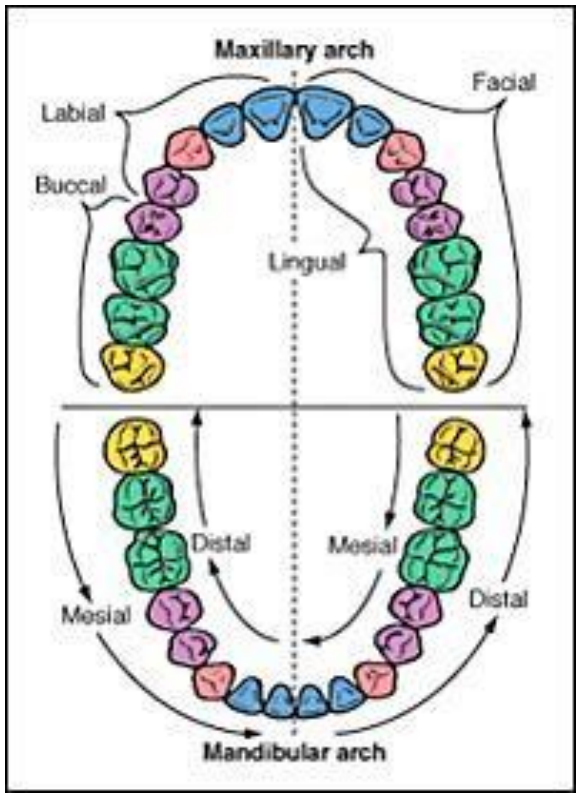
For easy recognition teeth are divided between the jaws or arches, the maxilla or upper jaw, and the mandible or lower jaw. They are also divided across the mid-line or median, forming left and right, thus creating 4 quadrants. They are numbered clockwise from 1 to 4 when facing the patient. So the patient's upper right quadrant is 1st, the upper left is 2nd, the lower left is 3rd and the lower right is the 4th quadrant. In each quadrant the adult has 8 teeth; 2 incisors (1 central and 1 lateral), 1 canine or cuspid, 2 premolars or bicuspids (so named because they have two cusps) and 3 molars. In the FDI numbering system they are numbered from 1-8 starting at the mid-line. Each tooth therefore has its own number and quadrant number, making it possible to identify each tooth by a two digit number. Tooth 13 is the upper right canine in the first quadrant. Tooth 47 is the lower right second molar in the 4th quadrant, etc.

Numbering in quadrants as you look at the patient, according FDI:

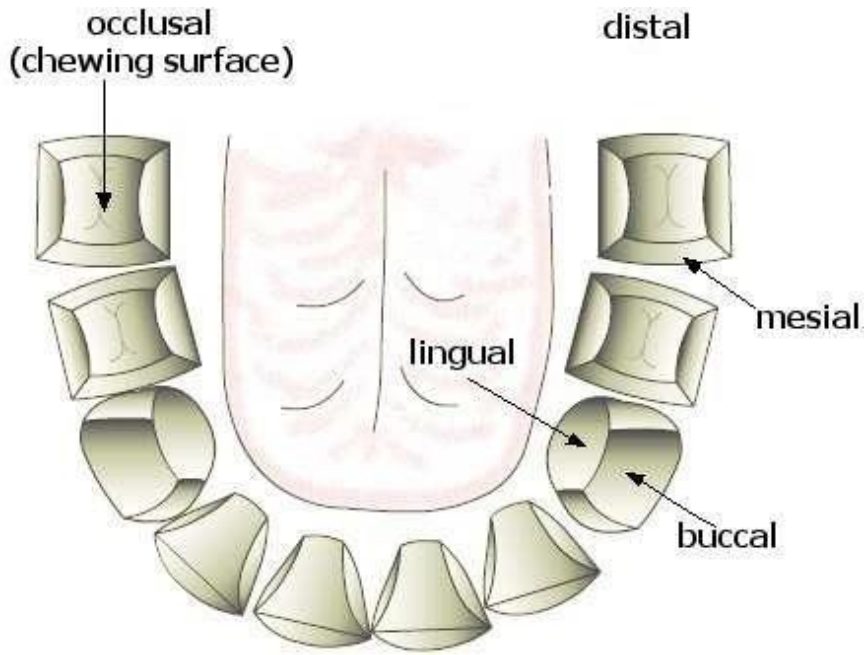
18	17	16	15	14	13	12	11	|	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	|	31	32	33	34	35	36	37	38

The primary dentition (also called baby, milk or deciduous teeth), has a total of 20 teeth, 5 per quadrant. There are no premolars and only 2 molars. In the permanent dentition the premolars erupt in the place of primary molars. The quadrants in the primary dentition are numbered 5-8 according the same rules as for the permanent teeth.

55	54	53	52	51	|	61	62	63	64	65
85	84	83	82	18	|	71	72	73	74	75



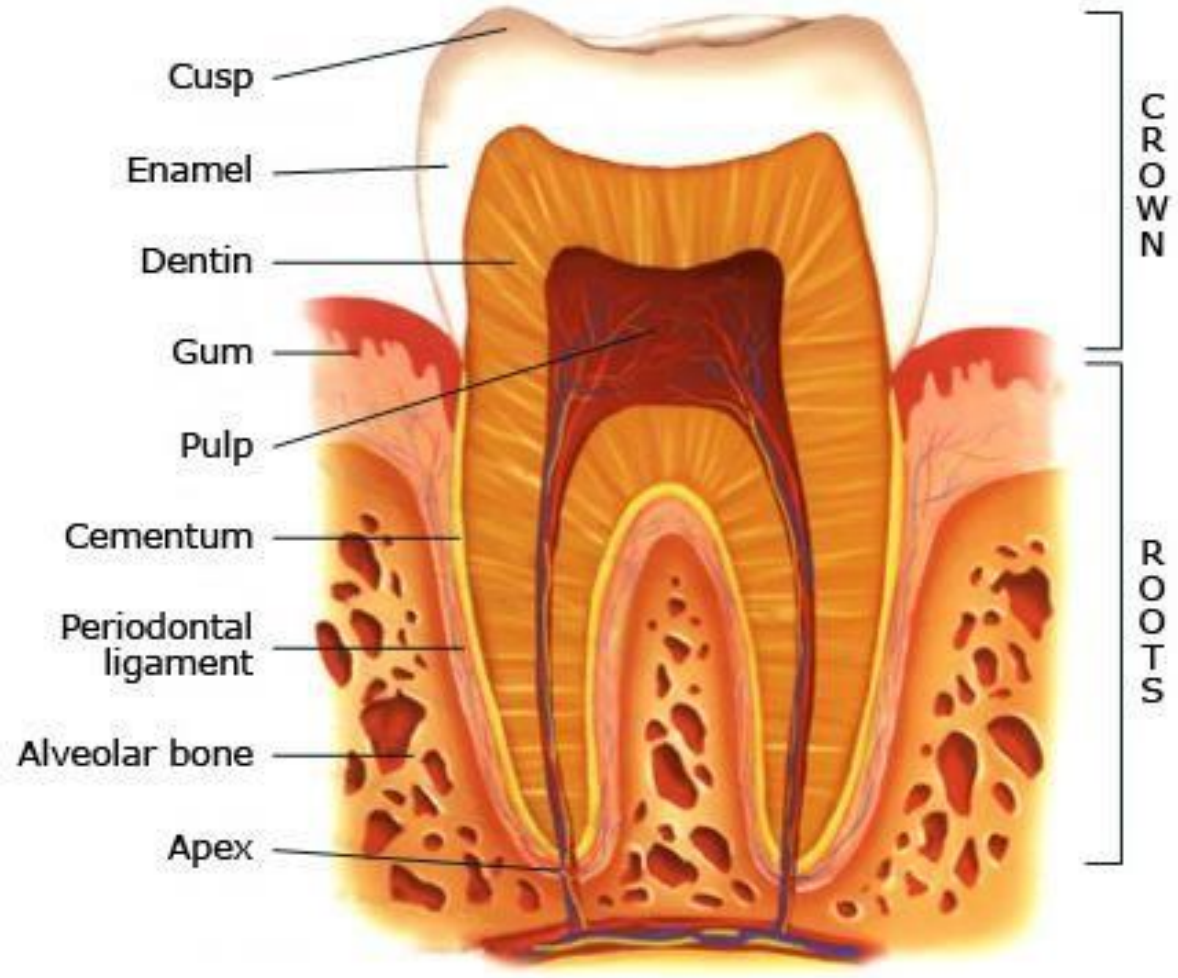
The surfaces of teeth facing adjoining teeth in the same dental arch, are called proximal surfaces (aproximal, interdental). The proximal surfaces may be either mesial or distal, depending on their relation to the median line of the face. The proximal surfaces which, following the arch of teeth, face the mid-line, are called mesial surfaces. Those proximal surfaces that face the opposite way, i.e. towards the back of the arch, are called distal surfaces. The contact area is where the mesial and distal proximal surfaces contact each other.



In the maxilla lingual is sometimes called palatal.
In the anterior buccal is called labial

In the anterior teeth (from canine to canine) the surfaces touching the lips (labia) are the labial surfaces, in the posterior teeth these outside surfaces touch the cheek (buccus) and are called buccal surfaces. The surfaces on the inside of the tooth arch are called palatal in the upper jaw, and lingual in the lower jaw. Lastly, the chewing surfaces of the posterior teeth, premolars and molars, are called the occlusal surfaces. So every tooth has a name and number and every tooth surface can be identified by a single name.

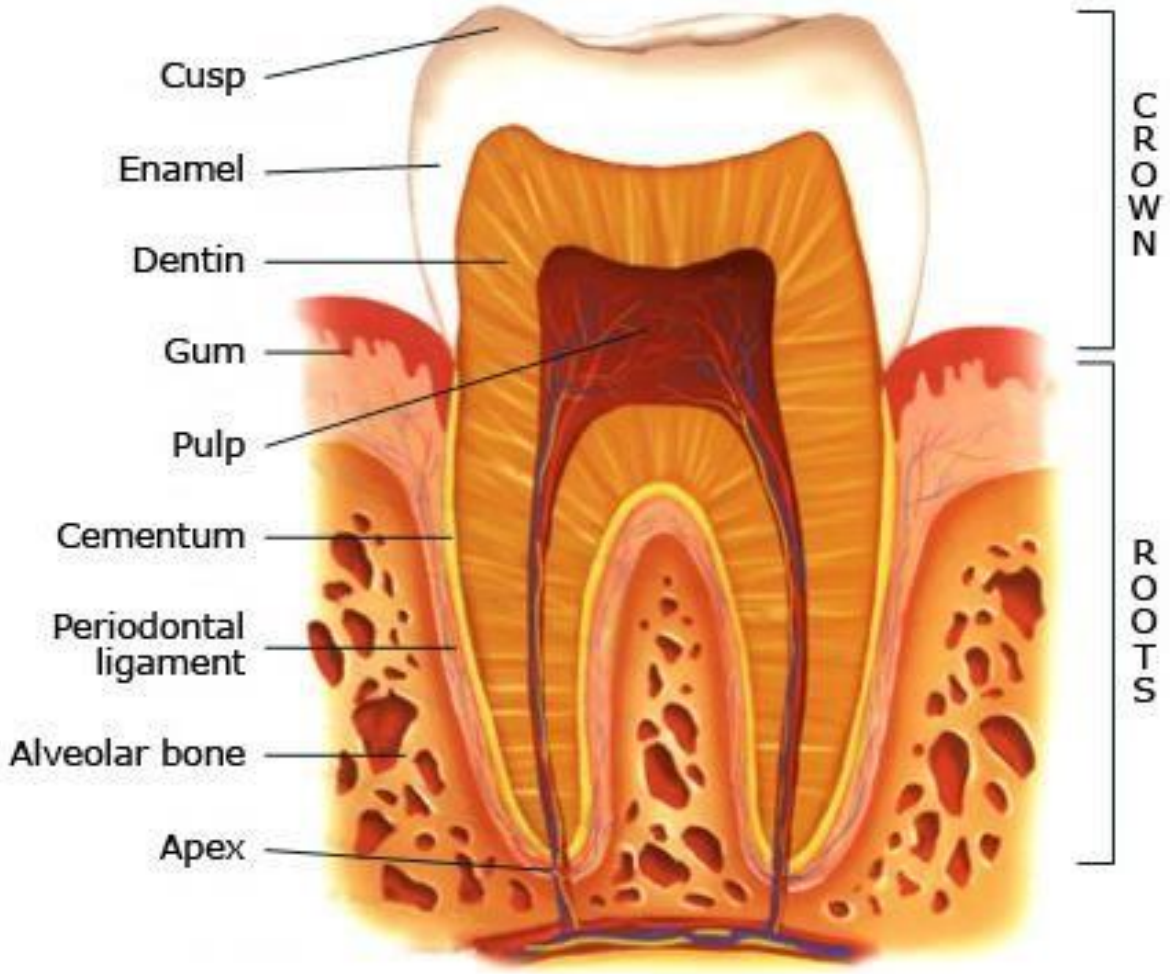
Dental Anatomy



For further definition of tooth components the anatomy of the teeth becomes important. The visible part of the tooth above the gingiva (gum) is called the crown or coronal part of the tooth. The part beneath the gingiva is the root. The cervix (neck) of the tooth is the area where crown and root meet. Covering the outside visible surface of the tooth is enamel, an inorganic mineralized material. In the enamel structure, pits and fissures and cusps are present in the posterior area, and incisal edges in the anterior teeth.

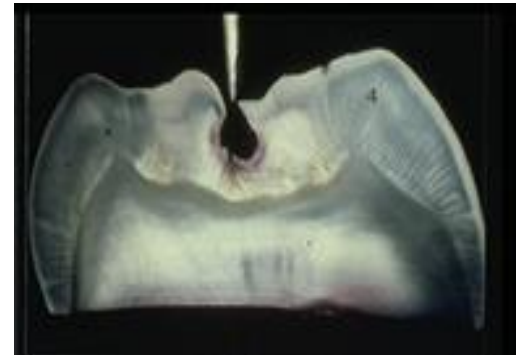
The majority of the tooth is made up of dentin, containing organic material such as collagen fibers and inorganic such as calcium hydroxyapatite crystals. In dentin we find dentin canals (tubules), leading from the pulp outwards. The pulp contains the nerve and blood vessels that enter the tooth through the apex (root opening) in the root. In the pulp we also find the odontoblasts or dentin forming cells.

Dental Anatomy



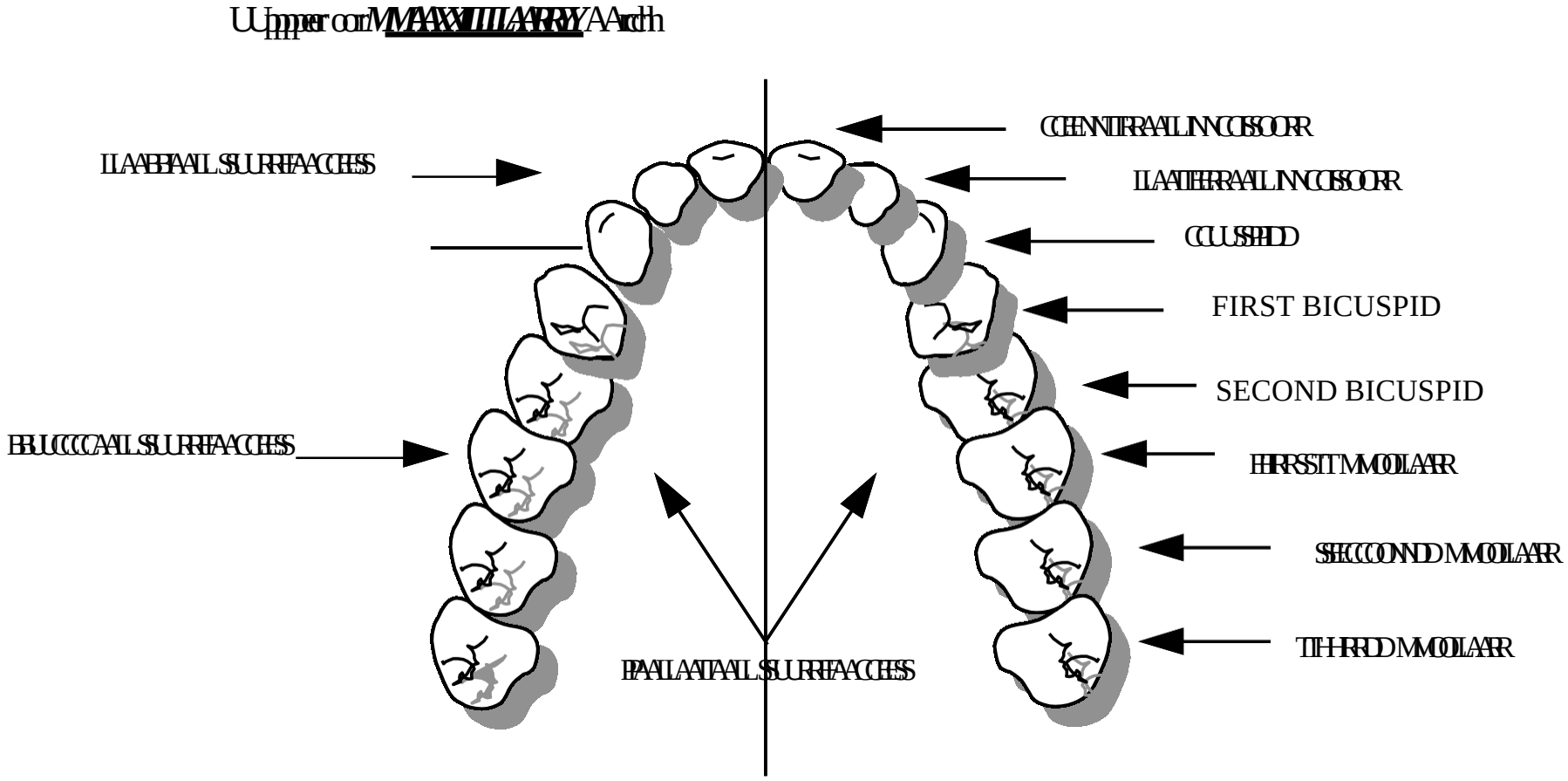
The tooth is held in the jaw by the periodontal membrane which provides a slightly elastic junction between root cementum (a type of dentin) and bone. Tooth surfaces are named according to their location on the tooth. The root area is divided into apical, middle (body) and cervical.

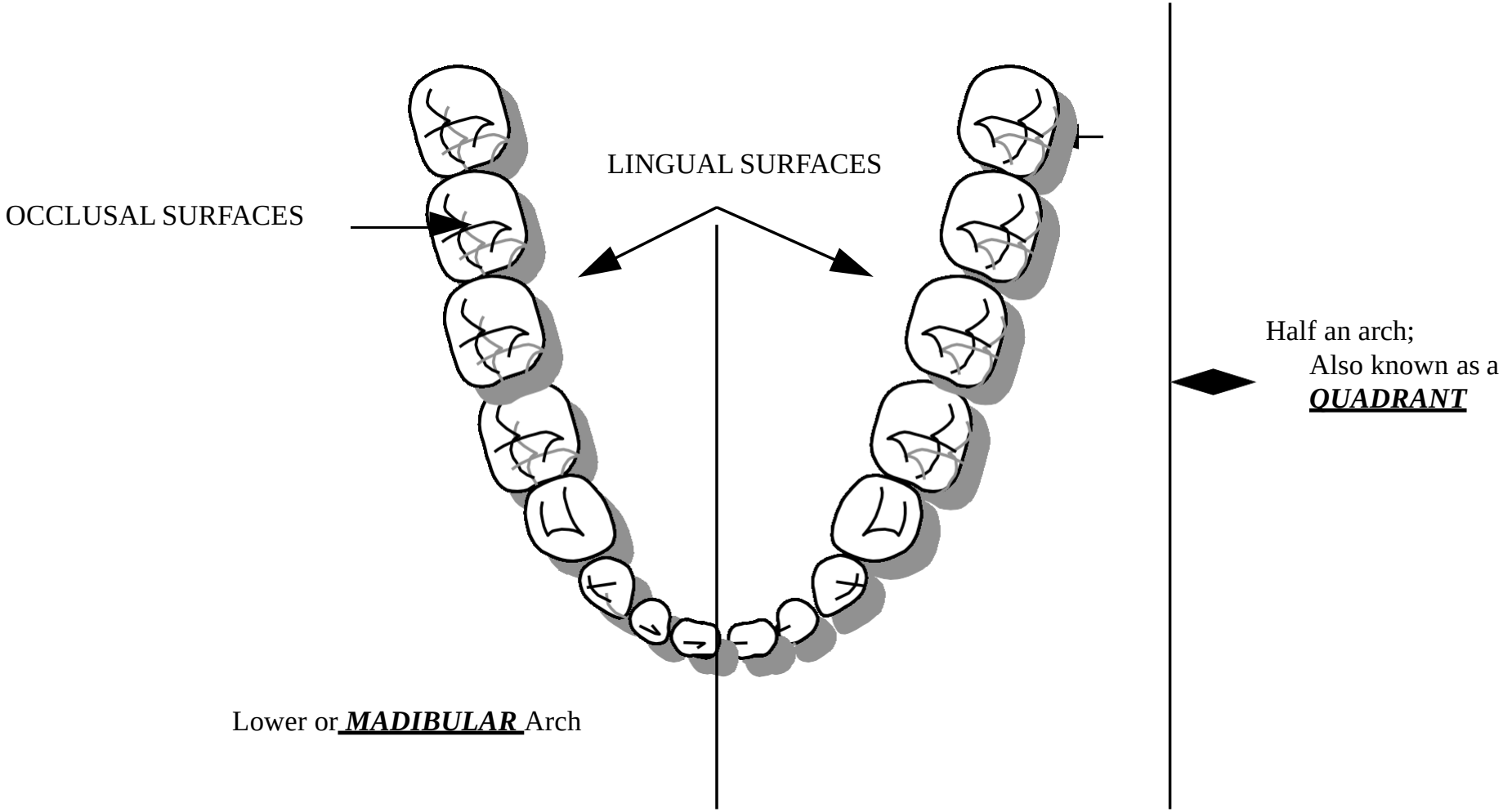
In the anterior region the areas of the crown are called cervical, middle (body) and incisal, in the posterior they are cervical, middle (body) and occlusal.



Fissures can play an important role in development of caries

Every area of the human dentition can be named. So on what surfaces of which tooth is this cavity located?


CENTRAL INCISOR
LATERAL INCISOR
CUSPID
FIRST BICUSPID
SECOND BICUSPID
FIRST MOLAR
SECOND MOLAR
THIRD MOLAR

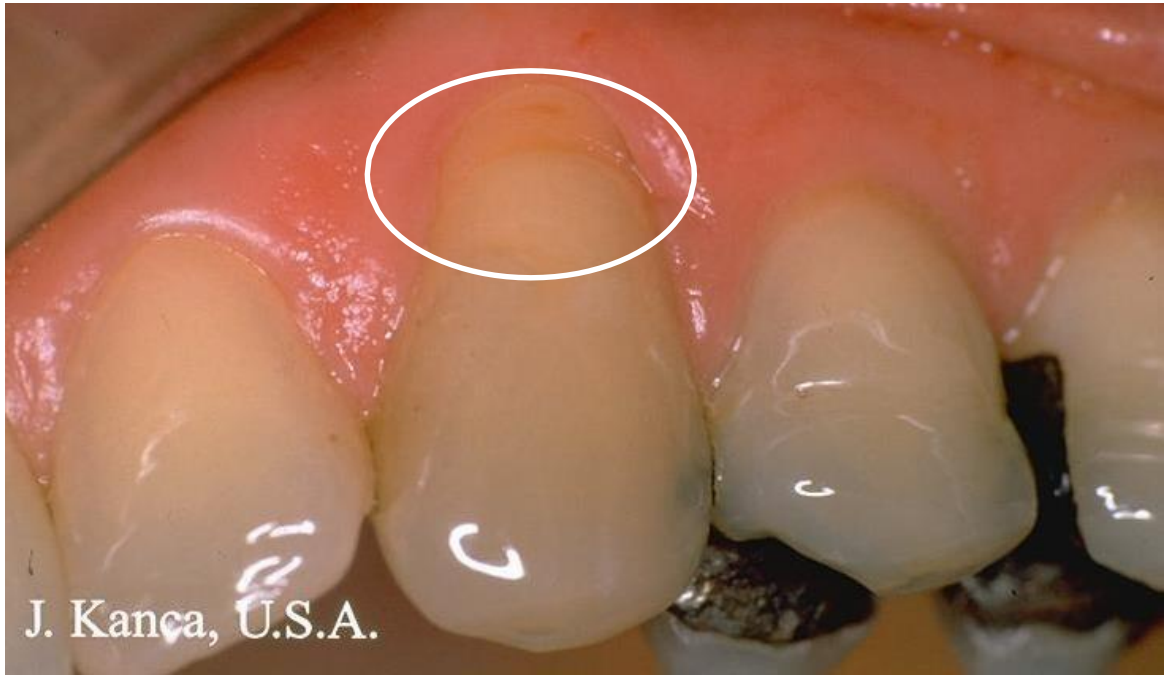

OCCLUSAL SURFACES
LINGUAL SURFACES
Half an arch;
Also known as a
QUADRANT
Lower or MADIBULAR Arch

Dental Problems

Courtesy dr. G. Ordzhonikidze

Of all the dental conditions caries is probably the most common. Bacteria, mostly mutans streptococci, accumulate and multiply on difficult to reach areas of the tooth. Where there is poor oral hygiene they prosper and multiply, especially in the presence of fermentable sugars. In doing so they produce acids that can break down human enamel. This process can be continuous, and caries that is left untreated can lead to inflammation of the pulp and eventually bone infections of the jaw (the fat face we still see in cartoons). Caries affects all age groups.

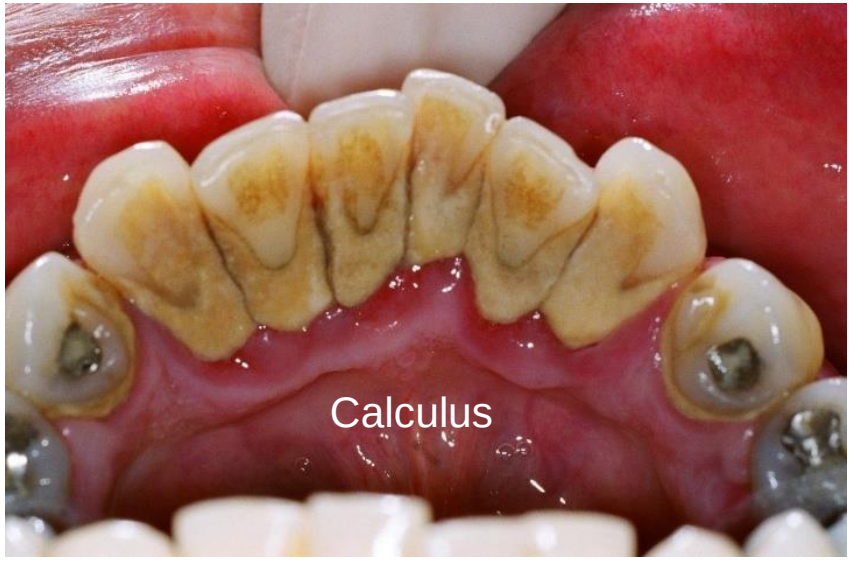
Normally caries can be treated by removal of the affected tissues and placing a restorative material. In children it often means that also superficial pulp tissue needs to be removed (pulpotomy) as it is usually infected. In adults a deep caries lesion extending into the pulp usually means that complete removal of the pulp (pulpectomy) is necessary. A specific form of caries is so-called root caries. With advancing age of patients this form of caries is tending to be seen more widely.



Another condition that can affect the root area is cervical erosion. This defect can vary from superficial to deep lesions, large or small, but is usually not carious. The exposed dentin can be sensitive, but it can also be hyper calcified and insensitive (sclerotic dentin). Although it has been thought for a long time that acids and abrasion are the cause of these lesions, nowadays it is generally accepted that abfraction is also a contributing cause of cervical erosions.

Due to discrepancies in the occlusion (the way teeth in opposing arches fit together in function) the tooth can be slightly deflected and bent in function. This causes stresses in the cervical area that can lead to cervical erosions. The presence of acids and/or strong abrasive tooth brushing techniques can help speed up this phenomenon.

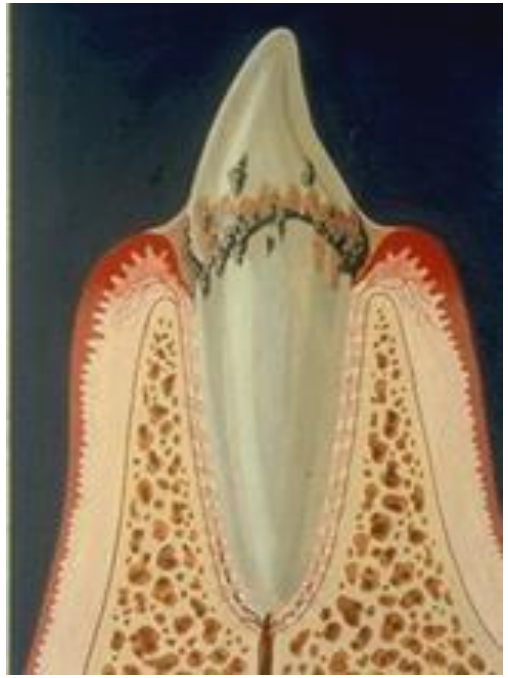
Dental Problems



Periodontal diseases which involve the periodontium or tissues surrounding the tooth are the next large group of dental problems. Perio problems probably account for more than half of all lost or extracted teeth.

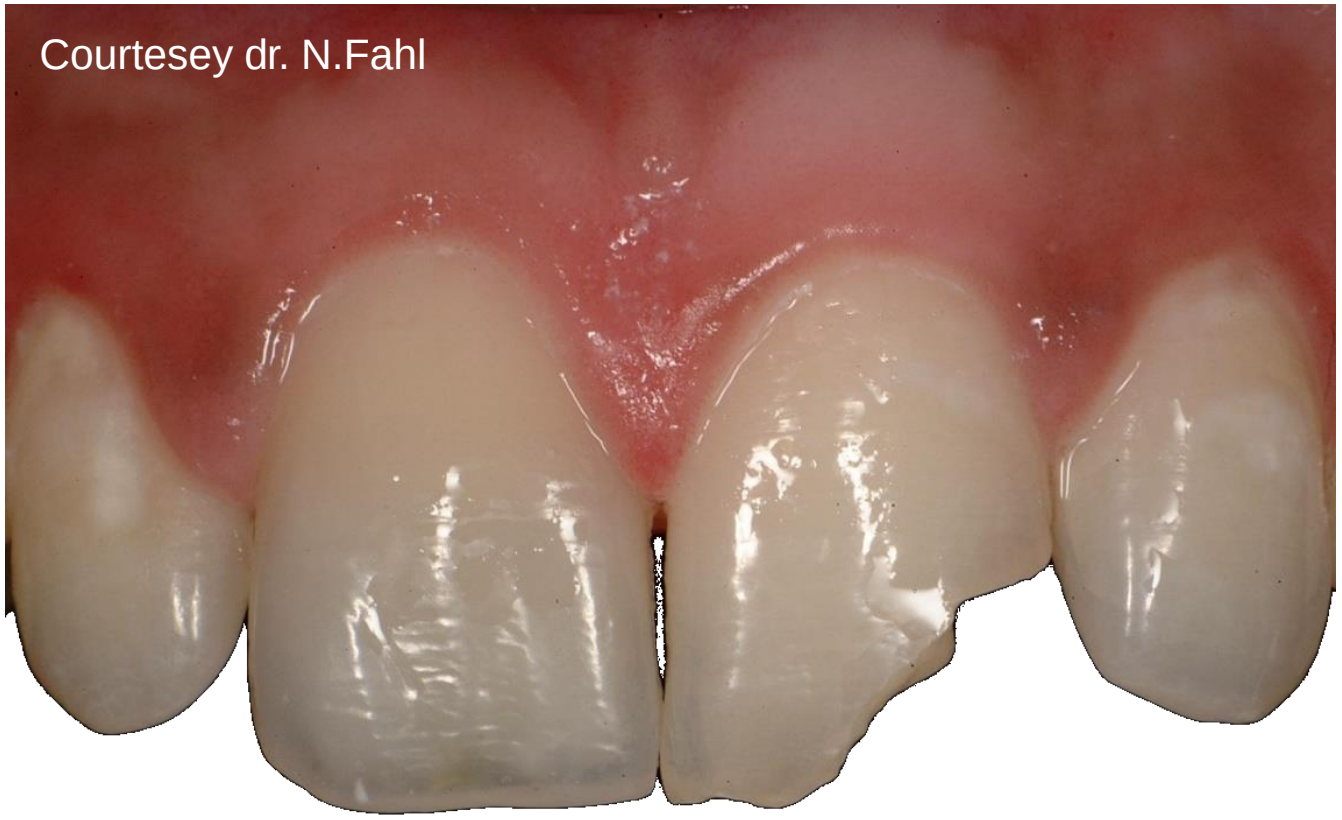
In many cases the problem starts because of bad or insufficient oral hygiene, although bacterial periodontitis in the presence of good oral hygiene is also known. The process generally begins with dental plaque, an organic residue on the tooth. When this is not properly removed, it can calcify and cause calculus. This irritates the gums causing recession which exacerbates the problem.

Calculus & early periodontitis



Extensive periodontitis, pockets and bone resorption

Left untreated the slowly continuing loss of soft tissue, and later bone, leads to mobility and can ultimately cause the loss of teeth. A good way to teach children proper oral hygiene is by using plaque indicator tablets. These clearly show the amount of plaque left after brushing and help to motivate the child to brush more effectively.



The next obvious dental problem is that caused by trauma. The most common case is injury to the front teeth resulting in fractures. Nowadays this can be successfully treated by means of a bonded composite restoration.
In the posterior area fractures can also occur. In most of these cases it is a result of a weakened cusp due to a large non-bonded (amalgam) restoration, resulting in the usually unexpected loss of a cusp.

Various forms of tooth abrasion create another category of dental problems. This can be caused by habits such as tooth clenching or by bruxism (the compulsory grinding of teeth, mostly at night). With bruxism entire teeth can be worn away. The natural aging process can also cause tooth wear. In the past these problems were usually overcome with complete crowns or dentures, nowadays direct restorative techniques are frequently successful. However tooth surface loss can be extremely difficult to treat in the late stages.

Incisal abrasion and tooth loss

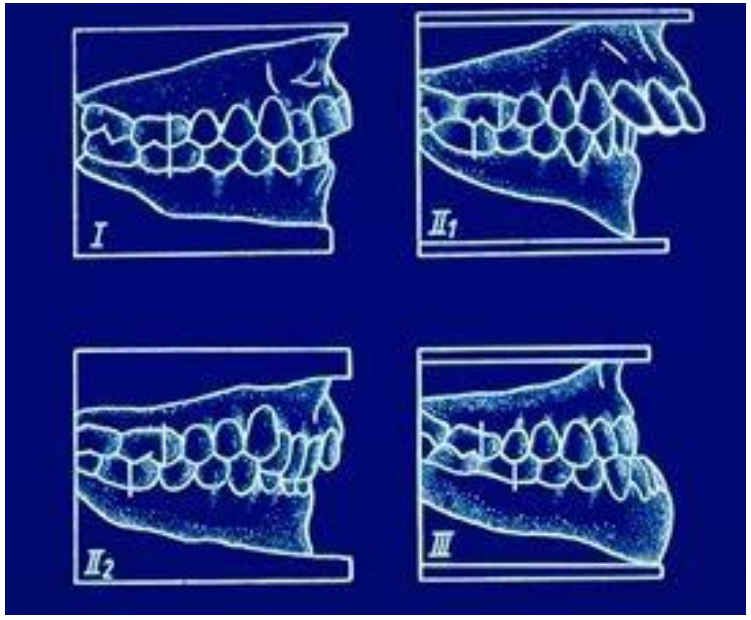
Central diastema before and after treatment with composite, courtesy dr. P.Monteiro

During tooth development problems can arise. One of the most common is the so-called diastema. This is a wide space between teeth, usually between the two central incisors. If a diastema creates esthetic problems it can be easily corrected with orthodontic and/or direct composite techniques or bonded porcelain veneers.

Teeth can also be malpositioned in the arch, be absent (agenetic) or malformed. Orthodontic treatment and esthetic dentistry can have very positive results in these kinds of cases.

Rotated incisor

Dental Problems



Orthodontic classes

Sometimes a jaw is too small for the number of teeth that will erupt. This is called ‘crowding’, usually resulting in badly aligned teeth. Other problems that can occur are where teeth and jaw formation are abnormal and, in many cases poorly functional.

Tooth crowding in the upper jaw

Deep bites and open bites are the most commonly noted problems in this respect, but there are a variety of occlusal and orthodontic problems that will need corrections.

Basic Dentistry

Amelogenesis imperfecta & open bite

Sometimes teeth develop in correct alignment, but either the enamel, dentin or both does not properly form. In the case of enamel this is called amelogenesis imperfecta (picture), in the case of dentin, dentinogenesis imperfecta.

Lastly tetracycline staining (discoloration) should be mentioned. When this antibiotic is used in children it can affect unerupted teeth still developing in the jaw resulting in unsightly discoloration of teeth. Modern dentistry with is successful in improving the esthetics in these cases.

Basic Dentistry

1. What is the name of the lower jaw?
2. How many teeth are there in a normal adult dentition?
3. Which teeth do not exist in the primary dentition?
4. What is the name of the chewing surface of molars?
5. What is the name of the cutting edge of teeth 11, 12, 21 and 22
6. Describe tooth 34; describe tooth 75.
7. What is the surface on the inside of the mouth alongside tooth 11 called?
8. What is the surface on the inside of the mouth alongside tooth 31 called?
9. What is meant by labial and by buccal ?
10. What is the difference between interproximal and proximal

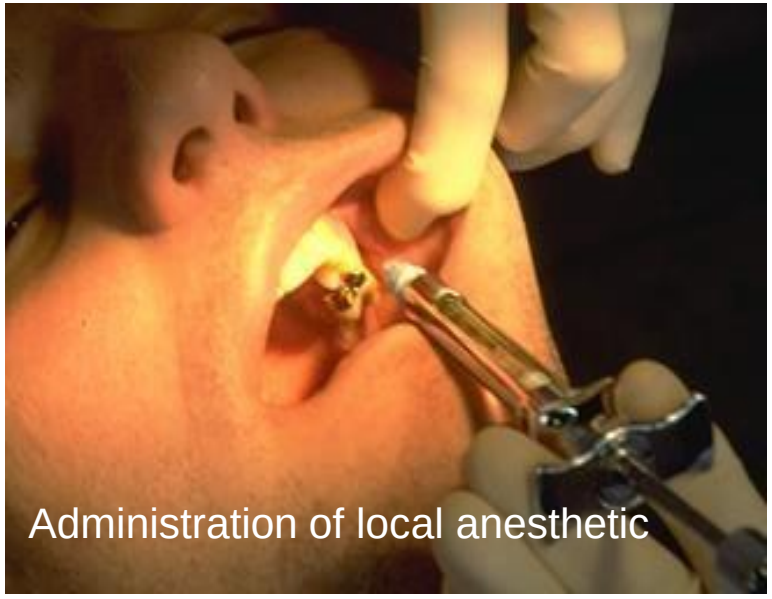
11. What is the cervix of the tooth?
12. What is the apex of the tooth?
13. What are the main differences between enamel and dentin?
14. What is root caries and why is it considered to be an increasing problem?
15. Name three causes of cervical erosion.
16. How does periodontitis develop?
17. In what way can a restoration worsen or improve periodontal problems?
18. What is bruxism, and how can it create a different long term result for restorations?
19. What is amelogenesis imperfecta?
20. Draw a permanent molar and its components

Dental Restorative Procedures


X-ray, loss of bone & tooth

Mirror and probe are still the most widely used instruments to determine dental disease, usually in conjunction with radiographs (x-rays) which give information about the presence or extent of caries and bone loss. If caries is found and the defect is not too extensive the dentist can repair this by means of a direct restoration with dental composite, glass ionomer, compomer or amalgam.

Also combinations of materials are possible (sandwich restoration). If the defect is large a crown may be placed, sometimes after a core build-up has first been made. Where missing teeth need replacement either a bridge or implants can be used. If the pulp is infected an endodontic treatment (treatment of the pulp) will be needed. In the worst case teeth can be extracted. Many posterior caries problems may be prevented by the use of sealants. Selective dentistry to correct esthetic discrepancies is also popular. This chapter describes techniques; more specific information can be found in the materials section.


Administration of local anesthetic

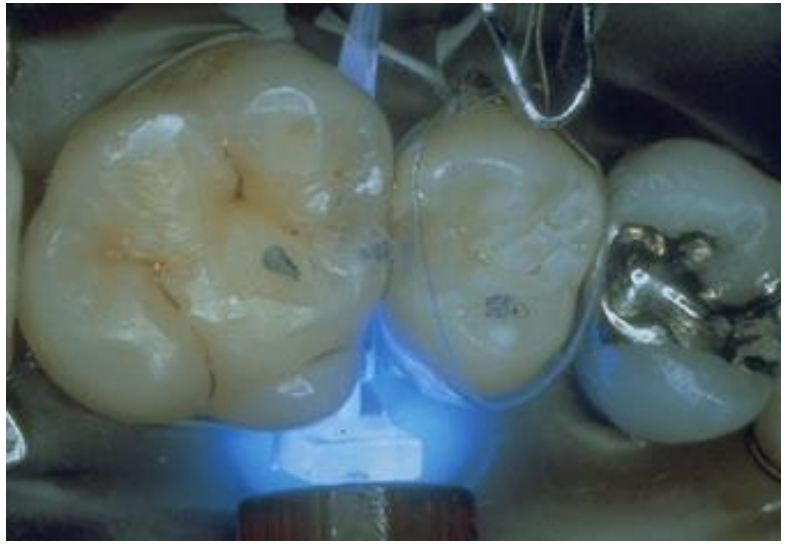
Before the start of any procedure the teeth are usually thoroughly cleaned with a mixture of water and pumice (prophylaxis). In many countries local anesthesia is routinely given before the start of any procedure that involves cutting tooth tissue.

The five types of cavities are illustrated here and named for easy identification.

These classes of cavity are used to describe the cavity type. For direct bonded restorations only the carious tissue needs to be removed and minimal removal of sound tooth tissue is usually needed to obtain adequate cavity form.

For composites the use of rubber dam is still highly recommended to optimally isolate the treatment area from the rest of the mouth. For posterior composite restorations the occlusal contact points with the antagonist (opposing) tooth should be checked before applying the rubber dam. Ideally the preparation should be made in such a way that the cavity margins are not placed in the occlusal contact area. When the rubber dam is in place, diamond or tungsten carbid burs are used in the high speed hand piece to remove caries and to do the majority of the preparation.

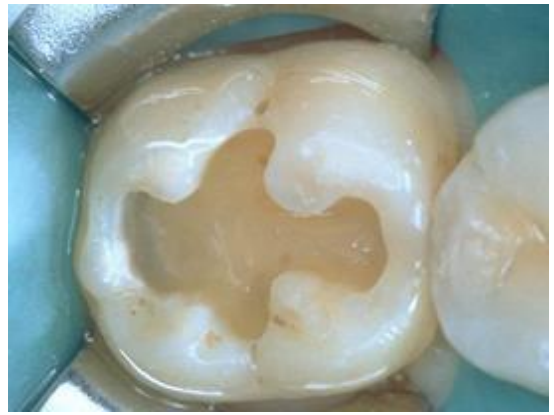
Afterwards finer instruments can be used to eliminate the remaining carious tissue and to prepare the tooth to receive the restorative material. Low speed burs or hand instruments may be used for this. With composites in anterior teeth the final preparation should include a bevel on the enamel-cavity margin to help enhance color match, bonding and sealing. This does not apply to the occlusal area in posterior teeth, where a butt joint cavity margin is recommended (i.e. no bevel is made).

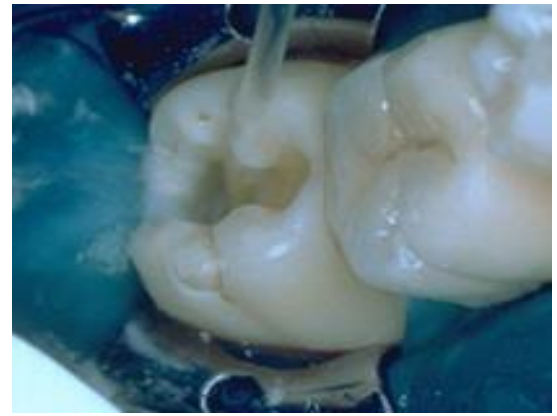


Various matrix bands can be used to facilitate the placement of composite. For light curing composites sometimes transparent plastic matrices are used to optimize polymerization. In the posterior region many dentists still prefer to use metal matrix bands because they hold their shape better, which means that a good contact point is easier to make. Firm wedging is usually a key to getting good contact points in posterior composite restorations. The use of light conducting wedges may further improve the interproximal polymerization.

However, the amount of light actually coming through these wedges is limited and some dentist prefer the handling of wooden wedges as compared to plastic light conducting wedges. The final stage of composite restoration placement consists of properly contouring the restoration and polishing it to a high luster. With the introduction of light curing composites some years ago this process has been made a lot easier compared with chemical curing composites. In posterior and palatal anterior composite restorations the final step should be to check the occlusion with articulation paper to make sure the restoration is not too high in the bite.

Dental Restorative

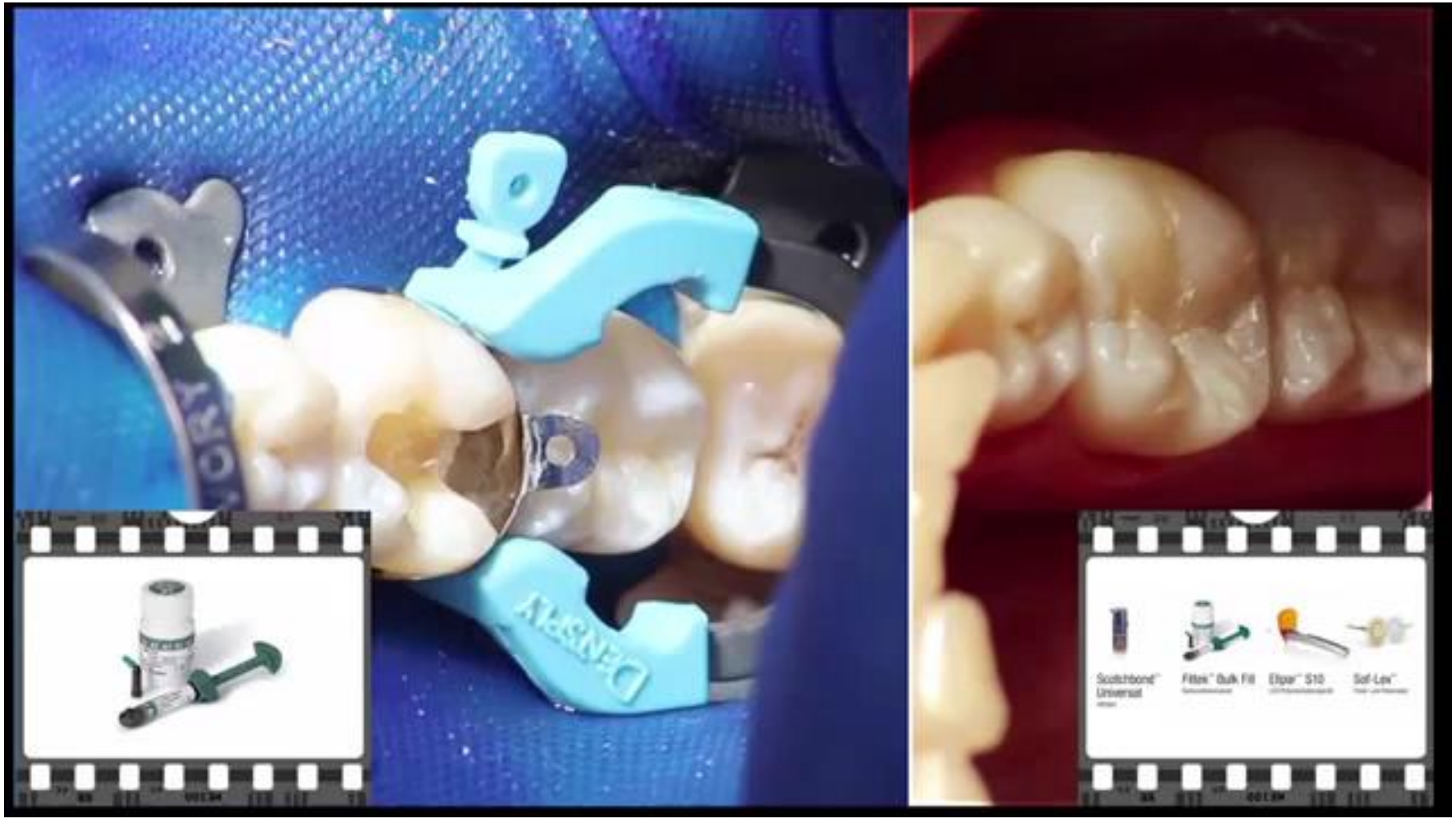




Clinical case by dr. R.Lowe

Basic Dentistry

Dental Restorative



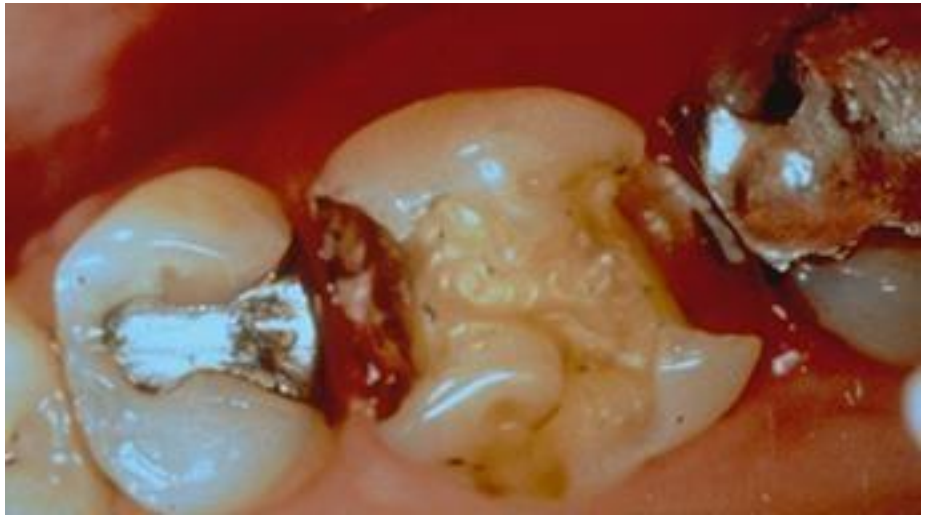


Posterior composite restorations are technique sensitive to place. Deep interproximal boxes make isolation difficult, proper contact points have to be established and the composite materials shrink on polymerization. With indirect composites most of these problems are dealt with outside the mouth. These indirect techniques are becoming increasingly popular, replacing gold and semi-precious metals.The procedure seems simple, but care should be taken when bonding the restoration in place. With a proper adhesive bond and a luting composite, this technique proves adequate and seems to give longer lasting results than porcelain inlays. The margins of porcelain inlays seem to be subject to deterioration and chipping over time.

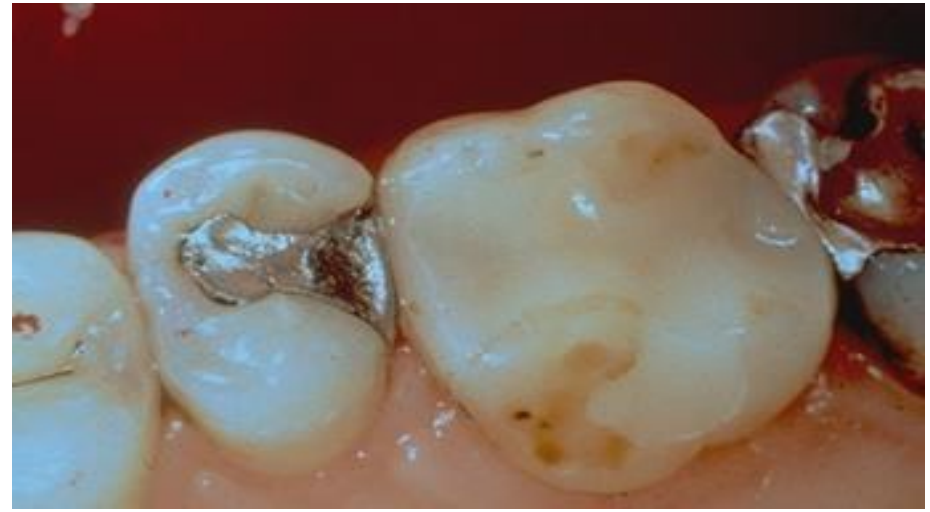
Clinical case by dr. P.Miara

As with composites, glass ionomer materials can be bonded to tooth structure. The cavity preparation for using these materials is largely the same as for composite.

The main difference is inherent in the nature of the glass ionomer; they are a powder-liquid mix creating an acid-base reaction with release of fluoride ions as a by-product. The expected positive contribution of fluoride to oral health has led to the use of glass ionomer materials in patients with poor oral health or at risk of recurrent caries. All glass iono-mers are self bonding by nature, in resin-modified glass ionomer materials the bonding mechanism is less susceptible to moisture contamination during placement.



Glass ionomer materials are very suitable for difficult situations. However, they cannot withstand heavy occlusal forces (from chewing) in the permanent dentition and most probably the long term esthetics will be somewhat less than those of composites.



For this reason the sandwich restoration has become popular. First a base of glass ionomer is placed and the occlusal layer of the restoration is made of composite. This combines the tolerance and protection of glass ionomer with the esthetics, durability and wear resistance of composites. We speak of closed sandwich restorations when the glass ionomer is not in contact with the oral cavity and open sandwich restorations when it is in contact with the oral cavity.

Clinical case by dr. J. van Dijken

In the posterior part of the mouth sandwich restorations should have the contact point in composite. The layer of composite should be at least 2mm. thick. In open posterior sandwich restorations resin modified glass ionomer rather than traditional glass ionomer should be used because the weaker conventional glass ionomers tend to erode.

In anterior areas resin-modified glass ionomer can be used as a base after removal of caries and old restorations. On the palatal side of the cavity the material can be left uncovered to have maximum effect of the characteristics if it is clear of the bite. The labial aspect is veneered with a composite for an optimum and long lasting esthetic result.

Clinical case by prof. N.Bichacho

The combination of composite and glass ionomer characteristics in the sandwich restoration is an appealing one. However not every dentist is prepared to spend the time needed to carry out the various steps involved. Compomers were introduced as a material that combines the characteristics of both **comp**osite and glass ion**omer** in one new type of restorative material. Originally received with some skepticism, compomers have found a place in modern dentistry. Although not necessarily as esthetic as composite, and not releasing as much fluoride as genuine glass ionomers, they are easy to use and appealing in daily use and are mostly used in children. They handle much like composites and can be used with adhesives or the specific compomer primers. Over the last years their popularity has declined and they are mostly only used for dentistry on children nowadays.

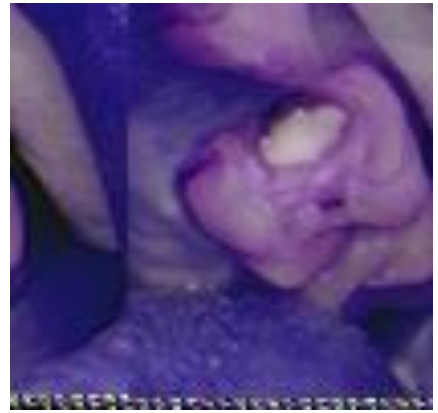
The amalgam restoration can be considered to be the grand-father of modern dental materials. With improvements over time this silver/tin/ mercury alloy has functioned for over 150 years. The biggest advantage of this material is that it is less technique sensitive than composite.

For this reason the material still has a place in dentistry today. The biggest disadvantages are the mercury content that can cause (occupational) health problems and environmental concerns and the fact that the material is non-adhesive and non-esthetic. Strict cavity designs are necessary. Dr. Black's motto "extension for prevention" has been a dogma for decades, sacrificing a lot of healthy tooth tissue and still teeth often fail due to tooth fracture.

Also the use of retentive pins, not necessary for composite restorations, is popular when making large amalgam restorations. Amalgams need a liner or base to protect the pulp against thermal, mechanical and bacterial insults. Furthermore amalgams should not be stressed immediately after they are placed; they take about 24 hours to fully set and a few weeks to create an adequate cavity seal. The introduction of adhesive systems that can bond amalgam has created new treatment possibilities for this material by reducing early microleakage. Unfortunately the steps necessary to produce a bonded amalgam restoration seem to be an obstacle to the widespread use of this technique.

Dental Restorative

Amalgam removed



LC liner

Acid Etching

Adhesive activator

Adhesive primer

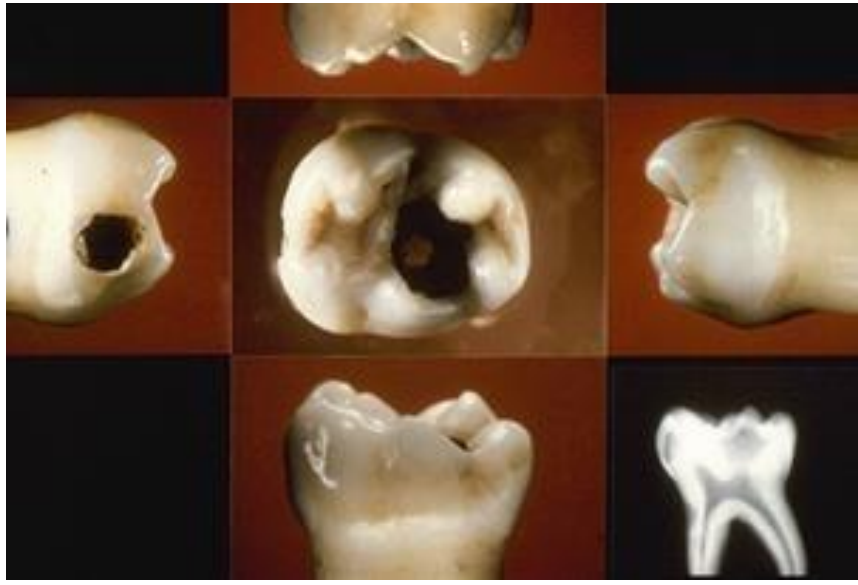
Adhesive

Amalgam application

Bonded amalgam

Clinical case by dr. P Lowe

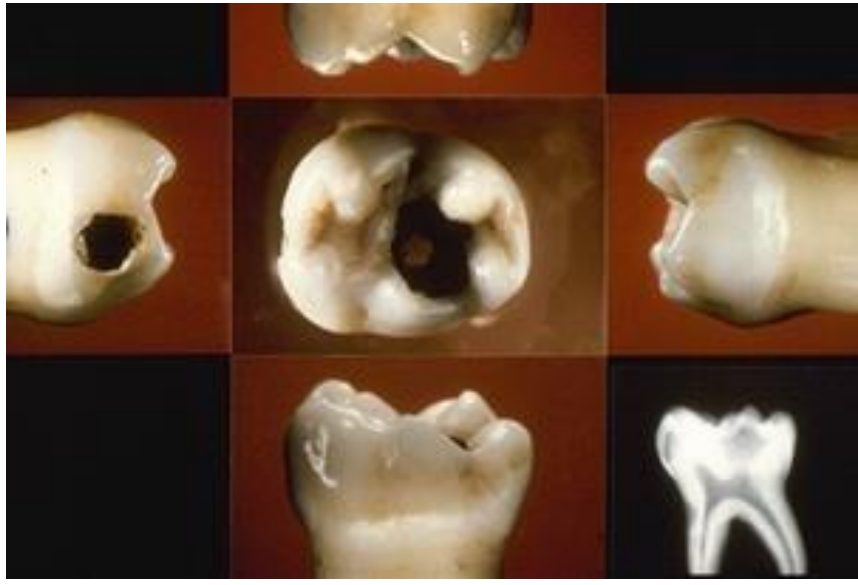
Endodontic Procedures



Untreated or insufficiently treated caries will ultimately reach the pulp. The subsequent infection can lead to tissue degeneration and pulp necrosis. Infected or necrotic pulp tissue has to be removed to prevent further damage to the body (such as bone infection and fistula formation). In pulpectomy the entire pulp is removed using endo files.

The shape of the root canal and the presence of possible root bifurcation make this a complicated process. Radiographs are frequently taken to monitor the results of this process. After the pulp has been removed there is direct access to the bone through the apex of the root. Because of this these procedures must be carried out under as sterile conditions as possible (certainly rubber dam). Afterwards the apex and root are sealed using endodontic sealing paste and gutta percha. The success of the treatment is dependent on adequate closure of the apex.

Sometimes a temporary restoration is placed until proper root apical healing can be established. Only then is a permanent restoration completed. In primary teeth a partial pulp amputation is sometimes performed, a so-called pulpotomy. In this case the contents of the pulp chamber are removed and the tissues in the root canals are left intact. These root canals must be sealed to allow healing. The formation of reparative dentin plays an important role after accidental pulp exposures.



Accidental pulp exposure is usually caused by a micro-exposure when removing deep caries (usually indicated by bleeding). In these cases direct coverage of the pulp exposure is often possible if the tooth is vital and no previous pulpal problems have been noted. Healing should then take place with closure of the pulp exposure by formation of reparative dentin.

After succesful treatment the root canal needs to be restored, either direct or indirect. When there is not a lot of coronal structure left for a core build-up, often a root canal post is used to secure a core build-up.
Glass fiber posts as shown in the pictures are popular as they can be placed direct without the need for an extra impressions or waiting for work from a dental laboratory. They are bonded in place by resin materials, and the availability of self adhesive resin cements has helped increase the popularity by very simple placement techniques.

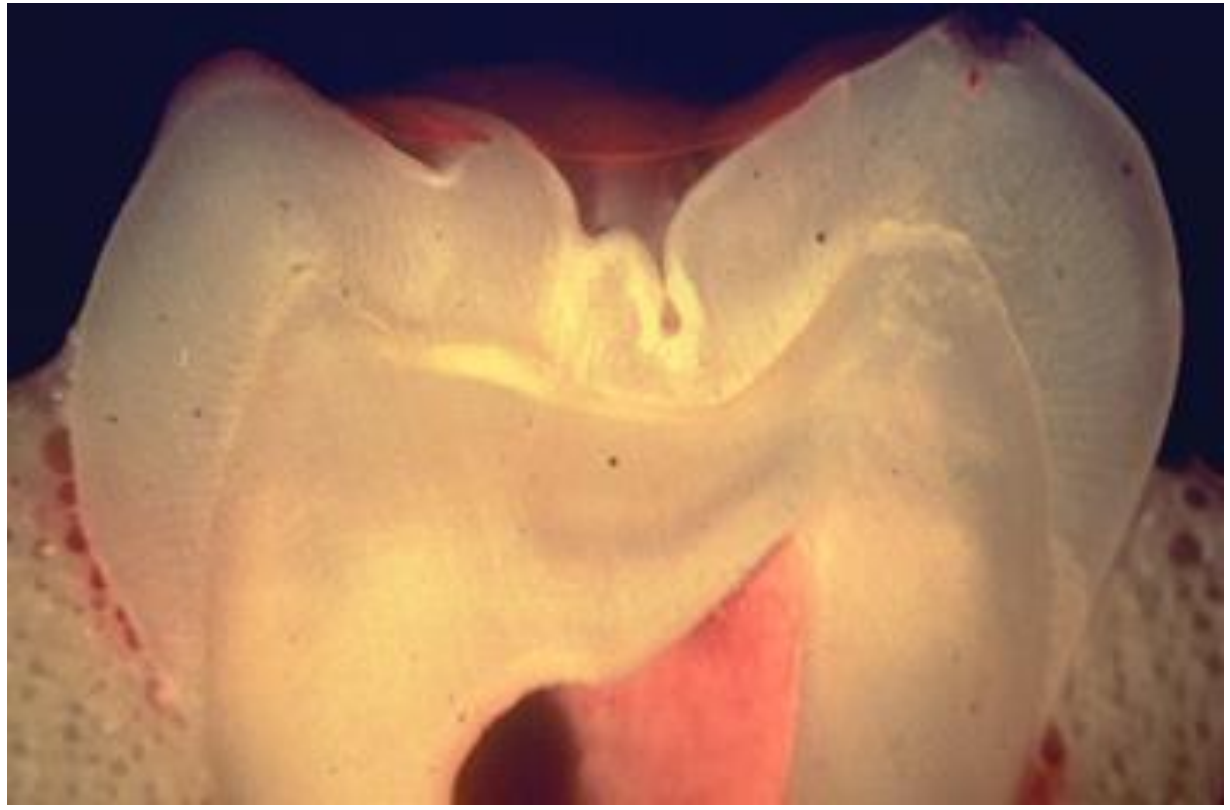
Pedodontic Procedures


Conventional varnish

Tooth decay by caries is a long process. Rather then waiting for it to develop a high dose of fluoride can be applied to suspected areas to stop demineralization and trigger remineralization. This is more pleasant that a fluoride gel tray application.

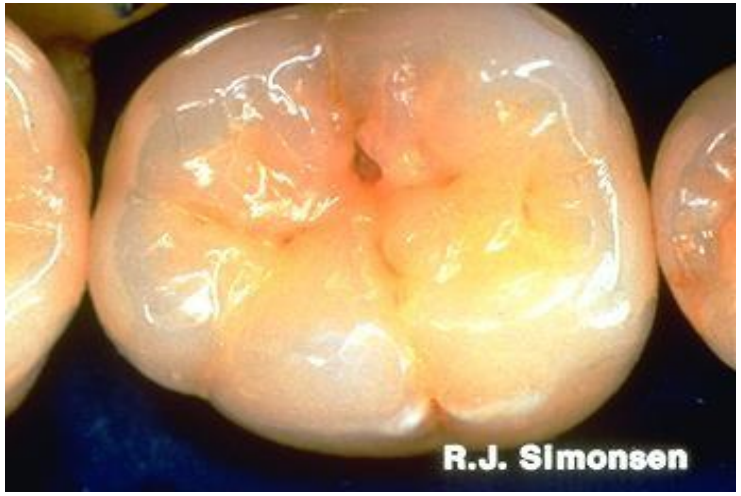

Clinpro White Varnish with TCP

Conventional varnishes were yellow/brown and young patients do not like them. The 3M ESPE White Varnish with tri-calcium phosphates has a more pleasant color and is more functional because of the TCP. After one to two days the varnish disappears with normal brushing, but the protection continues. The treatment is generally repeated every 6 months, every 3 months for children with very high caries risk.

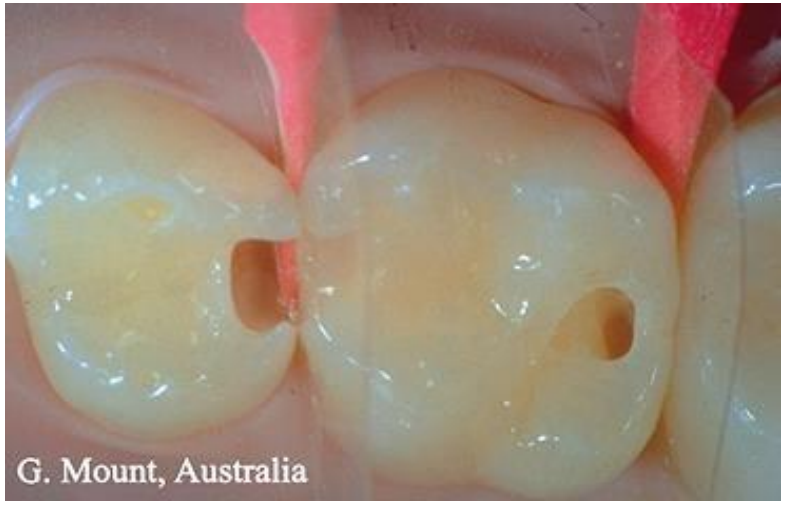


Fissures in molars and premolars are often irregular. When their morphology makes them impossible to clean carious lesion can develop. There is over 20 years of clinical evidence that the simple and fast application of a fissure sealant is an effective way to reduce the risk of caries in this types of fissures. Sealants should be applied in susceptible teeth immediately after eruption.

Sealants should be checked at regular intervals. The peripheral areas of the sealant will wear away, but marginal integrity should be maintained. Where there are defects in the sealant or excessive wear the procedure can be repeated, adding new material. Properly applied and controlled, sealants can last more than 15 years (see picture), providing cost effective, clinically proven caries prevention.

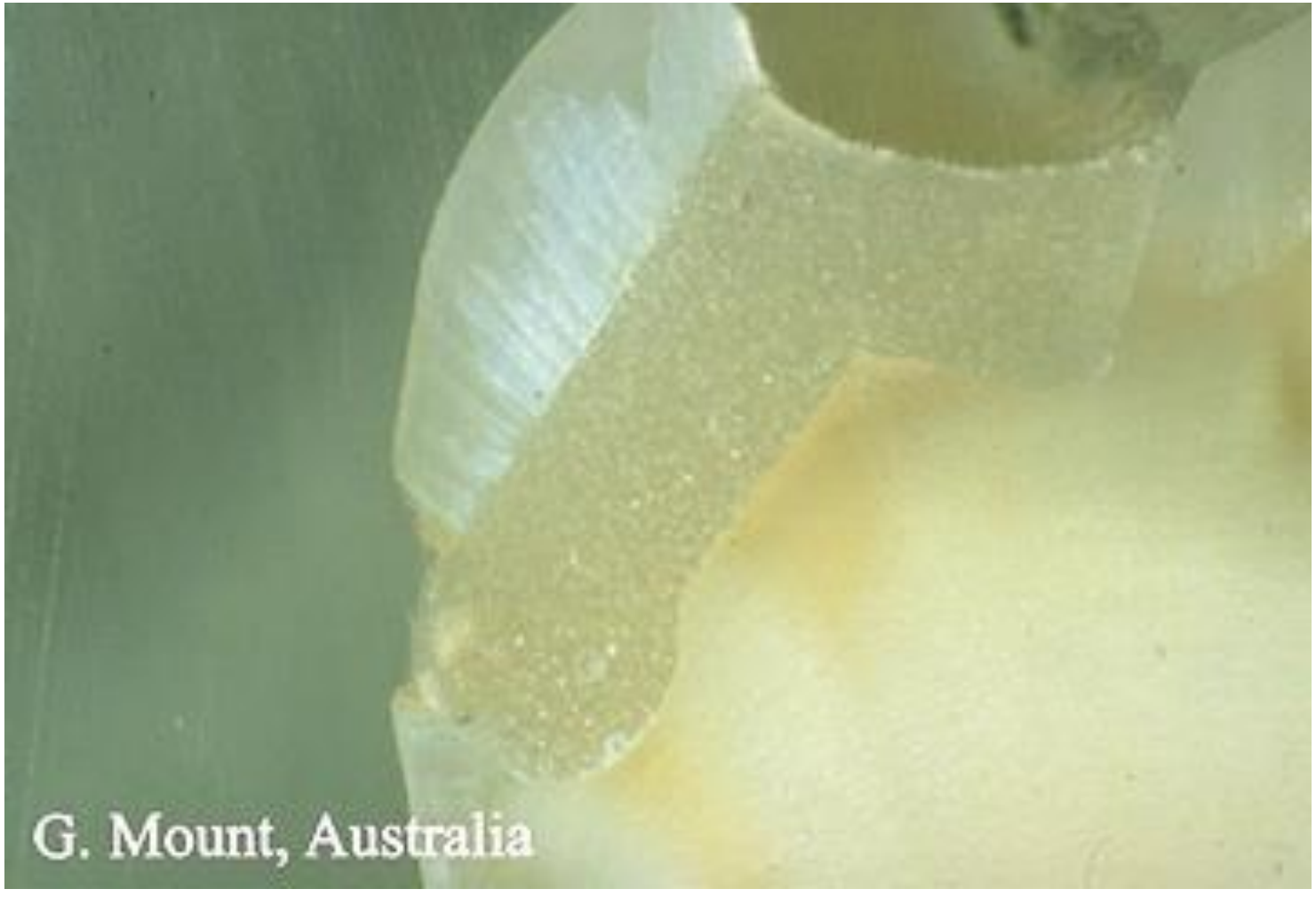


The preventive resin restoration is indicated when a small carious lesion is present, or suspected. It is a logical continuation of sealants to prevent further decay.



For mesial or distal interproximal caries a conventional Class II cavity is usually prepared. Access is achieved by opening from the occlusal area, then cutting away the mesial or distal marginal ridge and removing the interproximal caries.

The so-called tunnel preparation is sometimes used as a technique to save healthy tooth tissue. The preparation is made from the occlusal, but the marginal ridge is left intact. The cavity is prepared like a tunnel. Care should be taken not to damage the adjacent tooth and for this a matrix band is usually inserted. This technique is considered to be controversial. The narrow opening and the shape of the cavity make it very difficult to ensure that all caries is effectively removed. Secondary caries and fractures of the marginal ridge have been reported in the literature.



The technique has evolved to overcome these problems, more tooth tissue being removed internally (the internal preparation technique). This technique has not been widely adopted, it tends to weaken the marginal ridge.

Another technique, mainly popular in Scandinavia, is the mini-preparation. Only a minimal occlusal cavity is prepared and glass ionomer material is ‘injected’ into this very small cavity.

Usually crowns are considered to be an indirect treatment, but the use of long lasting preformed stainless steel crowns should be considered as a direct restorative treatment alternative in many cases. In children the stainless steel crown has proven to be easier and faster to place then amalgam, and is usually retained until exfoliation of the tooth. Minimal occlusal and interproximal reduction is required to make the anatomically formed stainless steel crowns ‘snap’ over the preparation. In adults, the stainless steel crown can be a useful intermediate treatment stage between restorative (composite or amalgam) and placement of an indirect crown.

Prosthodontic Procedures

Cast metal post – Dr. P.Pissis

At a certain point defects in teeth become too large to restore with direct treatment methods. This usually means that a crown is indicated. When a lot of tooth tissue has been removed because of decay and preparation needs, a core build-up should first be made. In some cases this is done by making an impression of the root canal (quite often such a tooth also needs endodontic treatment before a crown is prepared). In the dental laboratory a cast post is then produced, which is cemented in place by the dentist. Direct core build-up is another option.

After preparation an impression is made (negative). In the impression a stone model is cast (positive). On this model a lab technician produces an indirect restoration. The total process involves many steps that each undergo different dimensional changes. Everything has to be well calibrated and this is the reasons dentists are usually slow to make changes in their crown and bridge procedures.

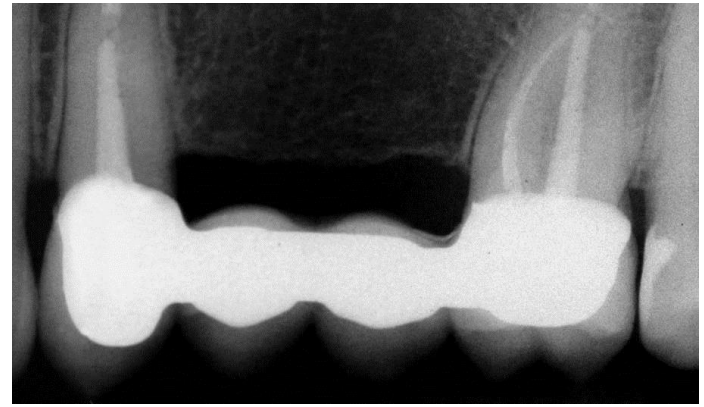
Direct core build-ups are a good treatment option. Traditionally this is done with either amalgam or composite, but resin-modified glass ionomers have become popular for this purpose.



It is not always apparent whether a tooth that should receive a crown is strong and stable enough to support one. Resin-modified glass ionomer restorative material can be used as a long term provisional restoration to evaluate if a tooth is strong enough to support a crown or bridge. The fluoride release enhances the survival rate and afterwards the material can be prepared to accept a crown.

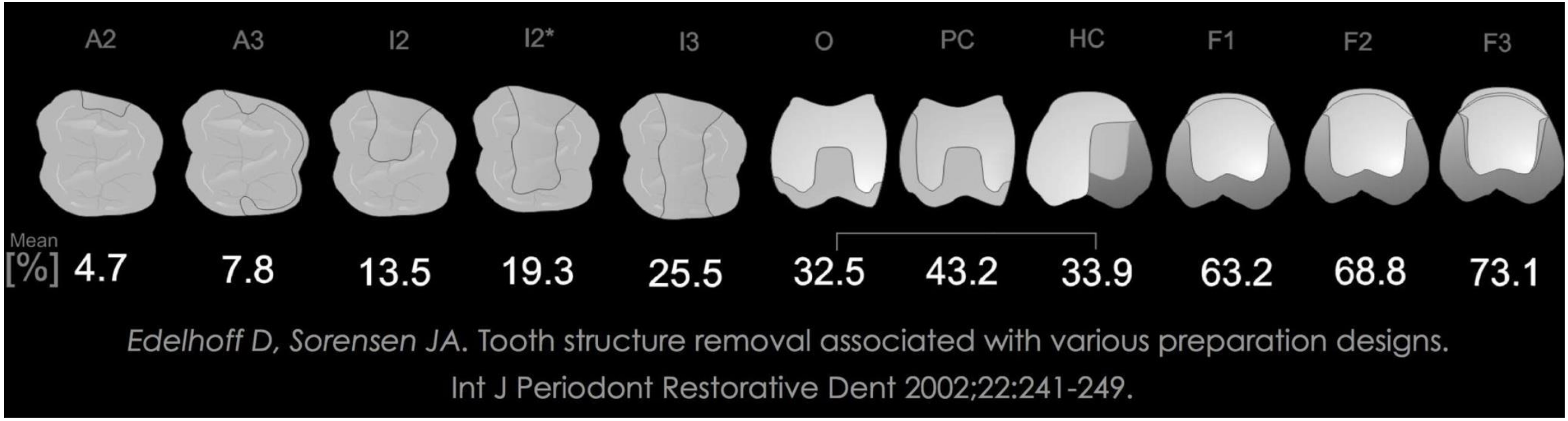
Clinical case by dr. A.Thisen

A crown is full, indirect coverage of a single tooth. We speak of bridges when the space from a missing tooth is restored with a pontic attached to crowns on adjacent teeth. Traditionally crowns were made of a gold alloy, but nowadays porcelain, porcelain fused to metal , zirconium oxide and resin are popular materials. Crowns and bridges were traditionally cemented.



This is a 4 unit zirconium-oxide bridge with a two unit pontic – it is well made and difficult to see where teeth are missing. On the right radiograph it is more clear. Below picture shows the zirconia coping of the bridge.

Clinical case by dr. U.Belser

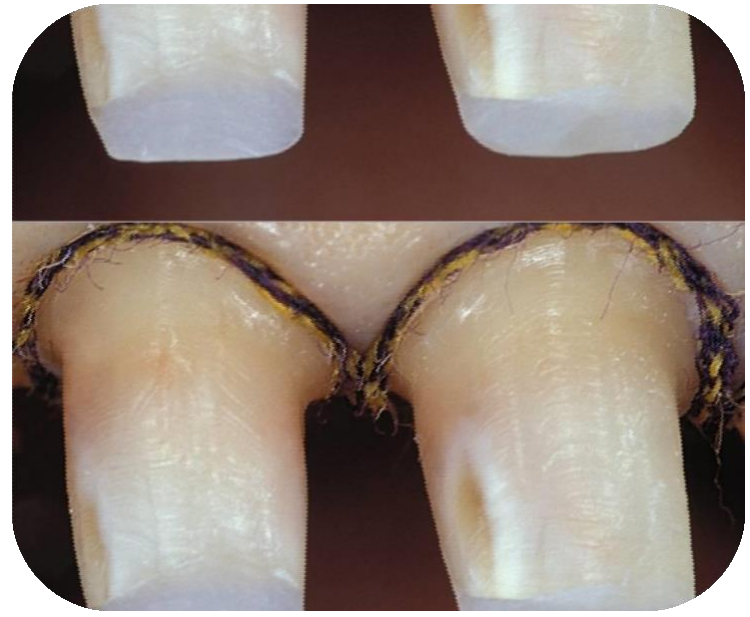


To allow for enough thickness of the crown walls and space for the cement, quite a lot of healthy tooth tissue has to be sacrificed – up to 73% according to research. Originally inlays and onlays were designed to minimize preparation by only preparing intra-coronal or extra coronal well above the gingiva.
Good bonding systems and new porcelain materials have now made bonded bridges, crowns , veneers, inlays and onlays possible, retaining more healthy tooth tissue. By bonding crowns it also becomes possible to make crowns on preparations that are otherwise un-retentive and very difficult to crown.

Maryland bridges or adhesive bridges are designed to be bonded to the abutment teeth of a bridge preparation. A minimum preparation of the adjacent teeth is performed, locking the etch bridge in lingo-buccal and cervical directions.

The Maryland bridge is bonded in place by bonding a composite resin system to the fitting surfaces of the etched metal of the bridge. Generally, adhesive bridges function better in the anterior part of the mouth than in the posterior part.

Clinical case by dr.M.Nicastro



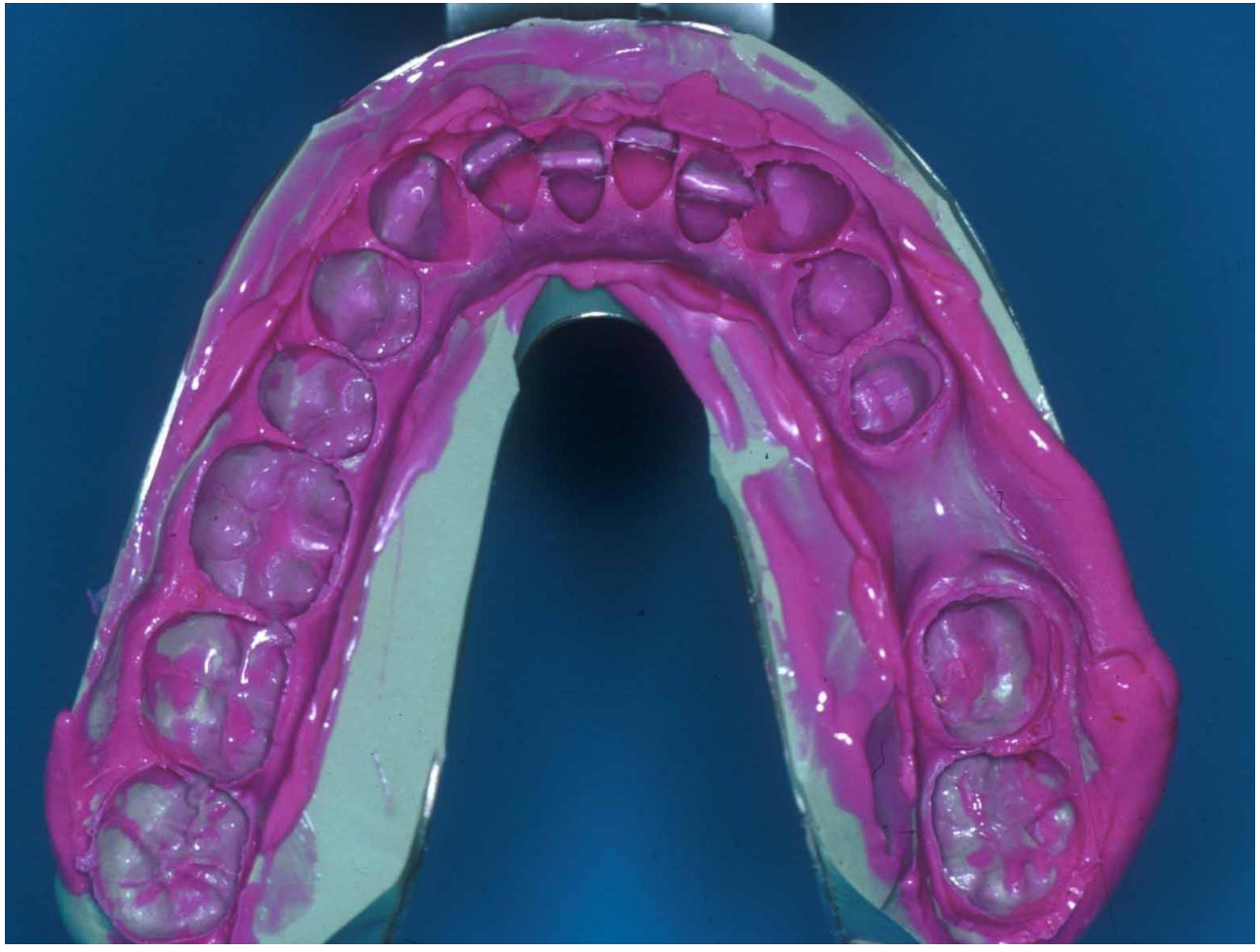
Before starting to make a crown the tooth and gingiva should be stable. Sometimes as on the left picture this means endodontic or periodontal treatment is needed first. After completing the preparations and before taking the impression, a retraction cord is often inserted into the sulcus to stop bleeding and provide access to the margin.

Clinical cases by dr. Y.Wind and dr. M.Fradeani



A relative new form of tissue retraction is with retraction paste. The hemostatic properties of this paste help stop the bleeding, and it is rinsed away after two mintues. This reduces the chances of recurrent bleeding, as sometimes happens when a retraction cord is pulled out mechanically which can open the ‘wounds’ again.

Clinical case by dr. P. Monteiro

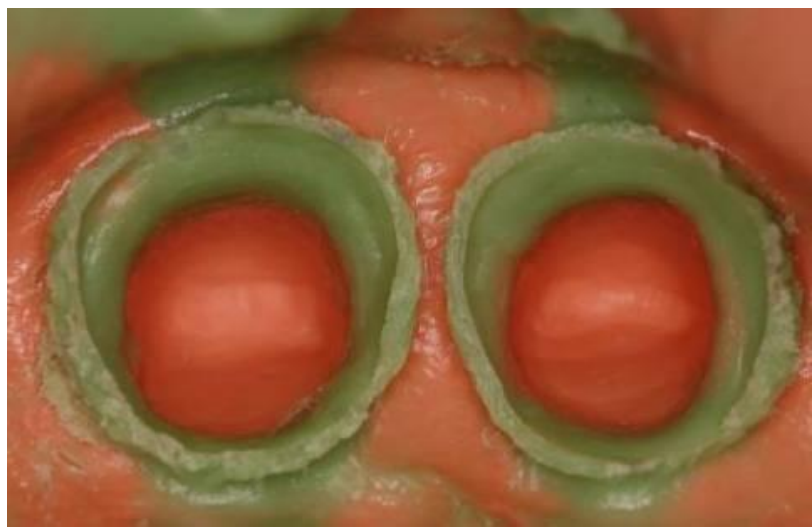


After the preparation is finished an impression is made. This is done with a precision elastomeric material, and basically there are three different techniques:
Thie oldest technique is called the two step or putty-wash impression – basically a first, rough impression followed by a correction or final precision impression. The impression tray is filled with a (thick) tray material and inserted into the mouth. After hardening and removal, a thinner material is used to syringe the preparation and fill the first impression. The impression tray is then placed again in the mouth of the patient and the final impression is made

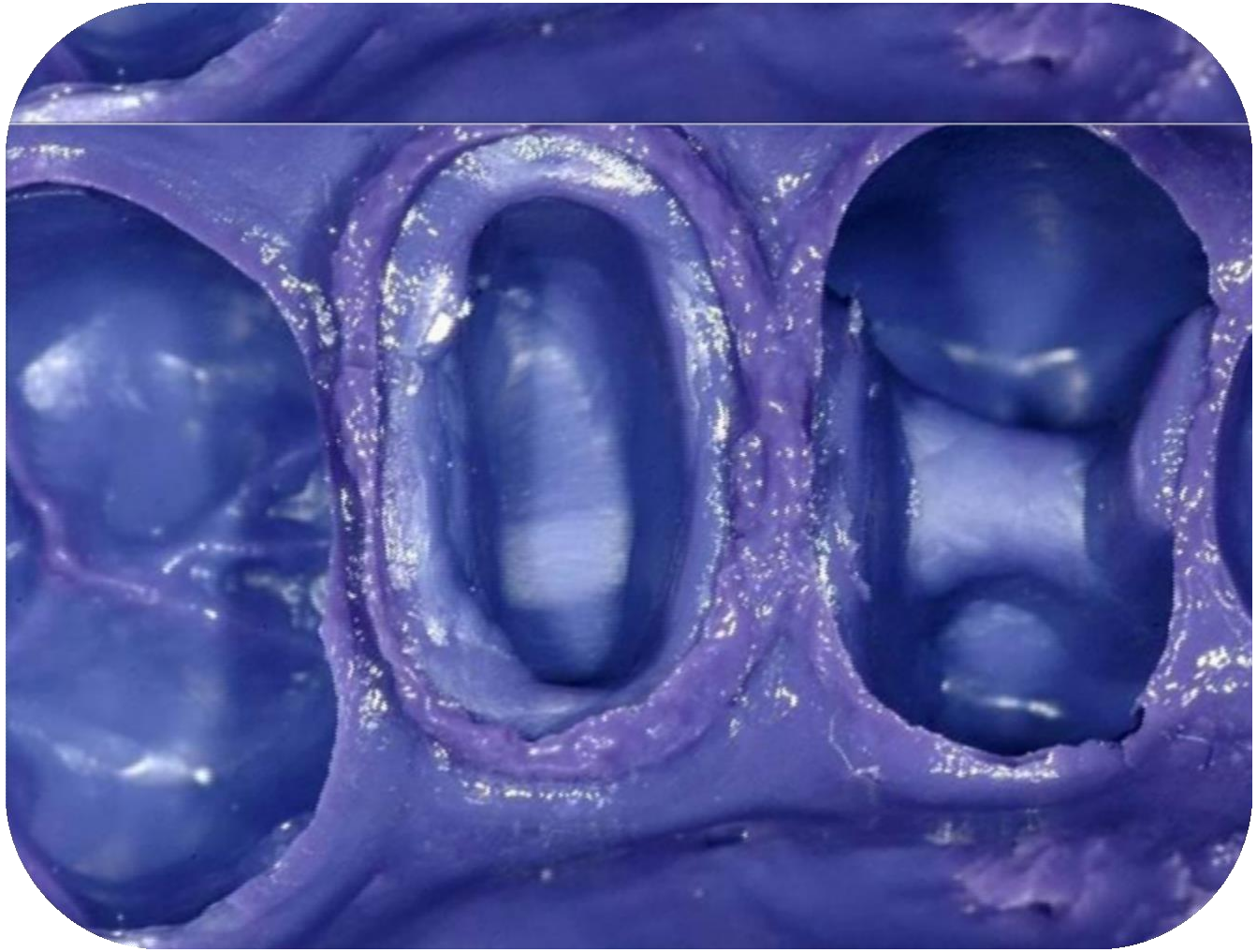


These three pictures show the beginning of syringing the preparation with a syringeable low or medium viscosity impression material.

The next impression technique is the one step technique with two different viscosities. This means the impression tray goes into the mouth of the patient once, when all materials are still fluid, but different materials are used to fill the tray and syringe the preparation. When the impression is removed from the mouth, you typically see the syringeable material only at the margins of the preparation.



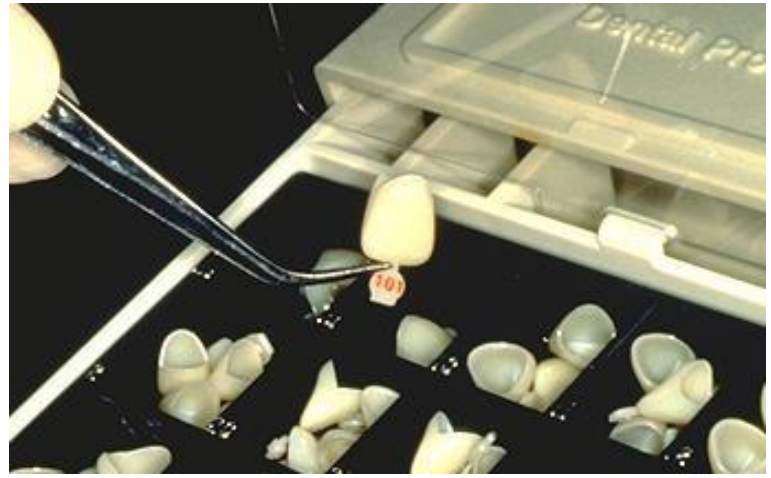
Clinical case by dr. P. Monteiro



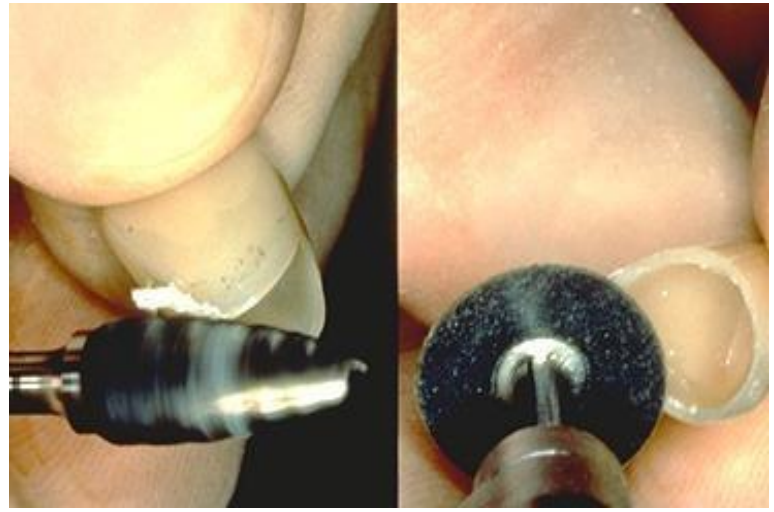
Arguable the safest impression technique was specifically developed for polyether material and is executed with a medium viscosity material, for filling the tray and syringing the preparation.
In this one step technique the materials are not only in the same setting stage, the also have the same viscosity and usually they produce very good impressions, easily and repeatable.
The modern one-step techniques in general save time and materials and produce as accurate restorations as the two step technique.
For every indirect restoration an (not as precise) impression of the opposing arch and of the relation between the arches (bite registration) completes the impression procedure.

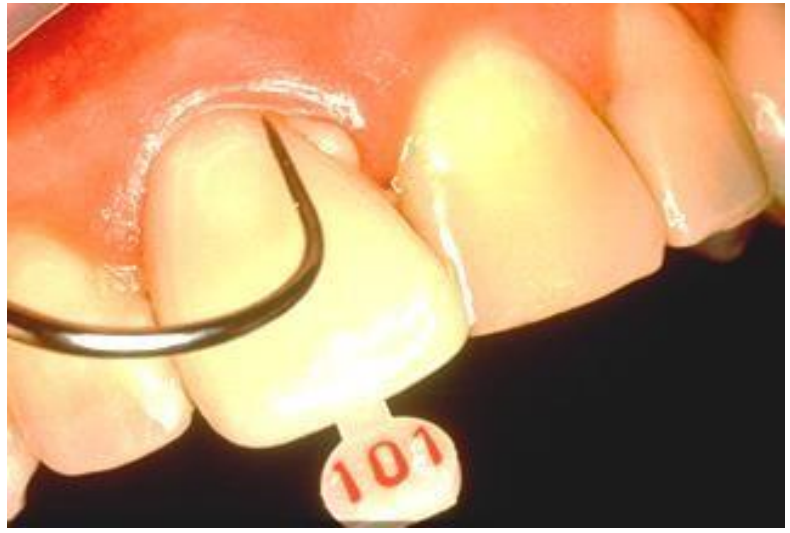
After the crown preparation and impression are completed, the preparation needs to be temporarily covered until the final restoration can be placed. This is to protect the preparation margins, to maintain proper interdental spacing and to prevent sensitivity. Basically there are two approaches to this; preformed temporary crowns and custom made temporary crowns of acrylic or resin. Both examples will be shown in this paragraph.

When using preformed crowns first the proper size is chosen from a template, and selected from the box.



The chosen crowns is trail fitted on the preparation, and the proper margin length is indicated. After that the margins are trimmed and polished as needed.





After trimming and polishing the temporary preformed crown is placed with a temporary cement, often with the number tab still attached for easier placement. The tab is removed, and articulation paper is used to verify proper seating of the crown.

Preformed crowns are available in polycarbonate for incisors, canines and premolars, and in metal alloys for premolars and molars. Although they are very easy to use for temporization of individual crowns, temporary bridges are usually custom made as this is easier. A relatively new solution is malleable composite preformed crowns.

After extractions, perio treatment and preparation these teeth are ready for a provisional restoration. Previously an impression was made, on which the dental lab created a diagnostic wax-up.

It would be very labour intensive to use pre-formed temporary crowns, so here we use another system.

From this wax-up an impression is made to use as template/matrix for the provisional bridge. On the right you can see how the impression has the shape for the teeth and the pontic.

The impression is filled with the temporary resin material , inserted onto the teeth and allowed to set.

After removal of the impression some excess material is visible.

The restorations are removed, excess is cleaned of and the restoration receives a final finish and polish. It is then placed again with a temporary cement.

The right picture showed the cemented restorations.

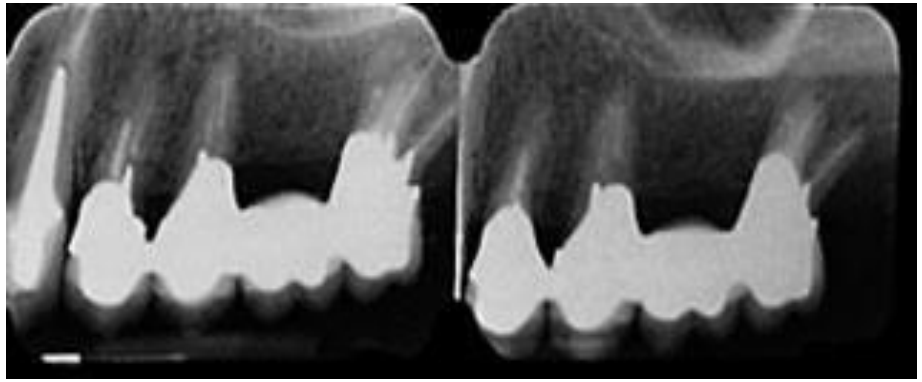
Esthetic Dentistry

This type of dentistry is called esthetic or cosmetic dentistry. It has been shown that treating the main dental problem for the patient also increases the motivation to take proper care of the rest of the teeth. Discolorations can be corrected with direct composite techniques, indirect composite technique and indirect porcelain restorations. The advantage of composite is that new material can be added and mistakes/discoloration over time can be easily corrected. The advantages of porcelain are the numerous nuances of color that can be created and less strain on the dentist's technical skills. Lately direct and indirect composite seem to become more popular than porcelain.

Teeth before and after tissue conserving indirect composites veneers -
Cinical case by Dr. P. Monteiro

Teeth prepared for and veneered with porcelain laminate veneers -
Clinical case by Dr. H.Dumphart

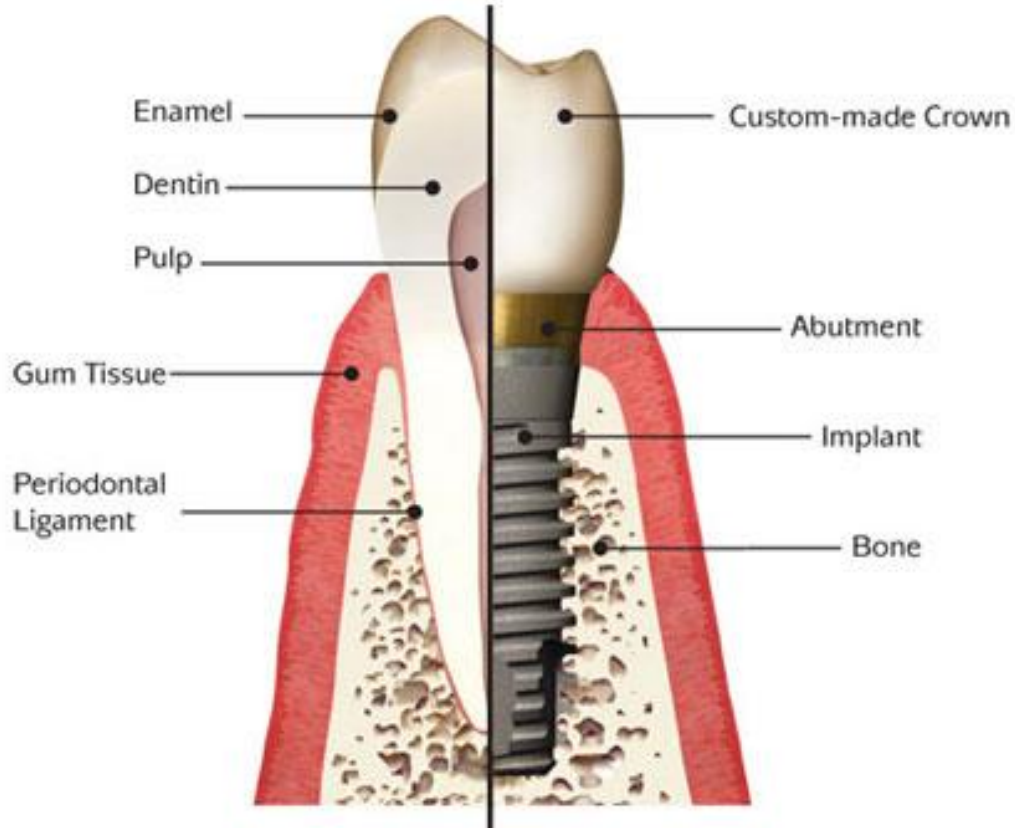
Dental Implants



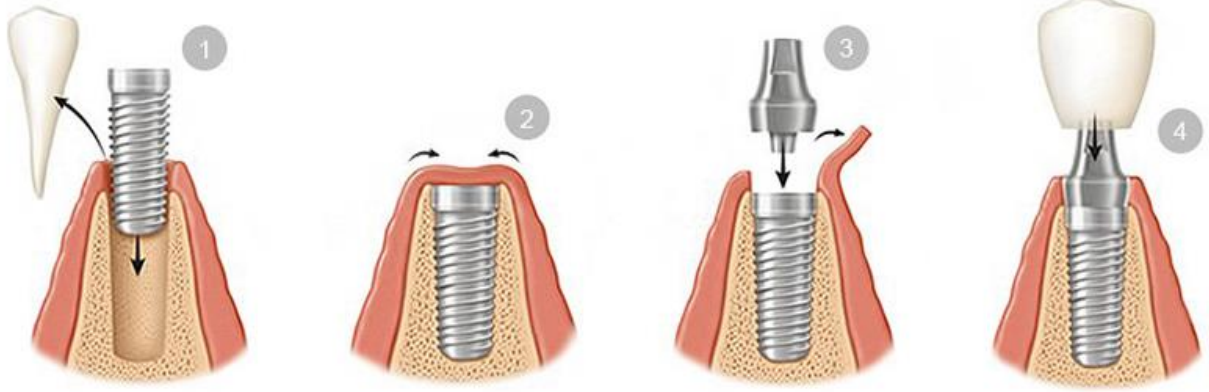
When a tooth is lost the space can be covered by a pontic in a bridge as shown on the left. For that the adjacent teeth have to be prepared for a crown to support the bridge construction. Especially when these teeth are rather healthy this unnecessarily sacrifices a lot of tooth tissue, and because there is no loading of the bone by the missing root the bone will atrophy or disappear over time.

A better solution is to provide an artificial root by a titanium dental implant on which later a crown is screwed (the most common solution) or cemented (not done so often).

Clinical case by prof. M.Fradeani


Enamel
Dentin
Pulp
Gum Tissue
Periodontal Ligament
Custom-made Crown
Abutment
Implant
Bone

Dental Implants

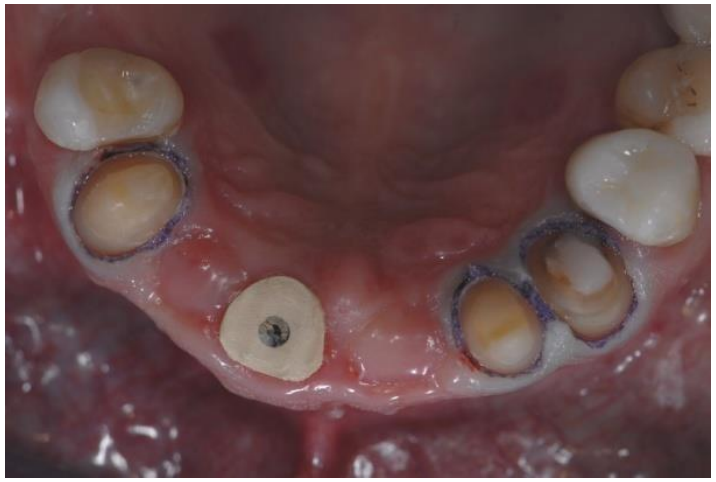


Implant is inserted into the bone

Healing process of the bone (osseointegration)

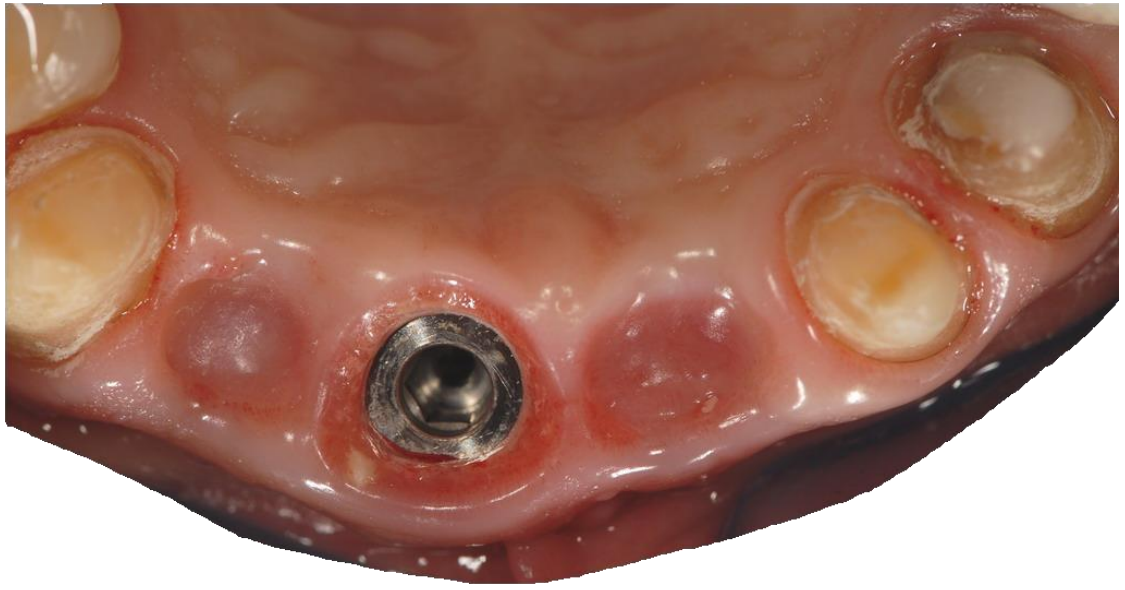
Dental abutment is placed on the dental implant

Ceramic crown is placed which replaces the real tooth



The conventional dental implant is screwed into the bone after a sufficient hole is drilled. The implant is then temporarily covered with a healing cap, and allowed to heal for up to 6 months to integrate with the bone – this is called osseo-integration.

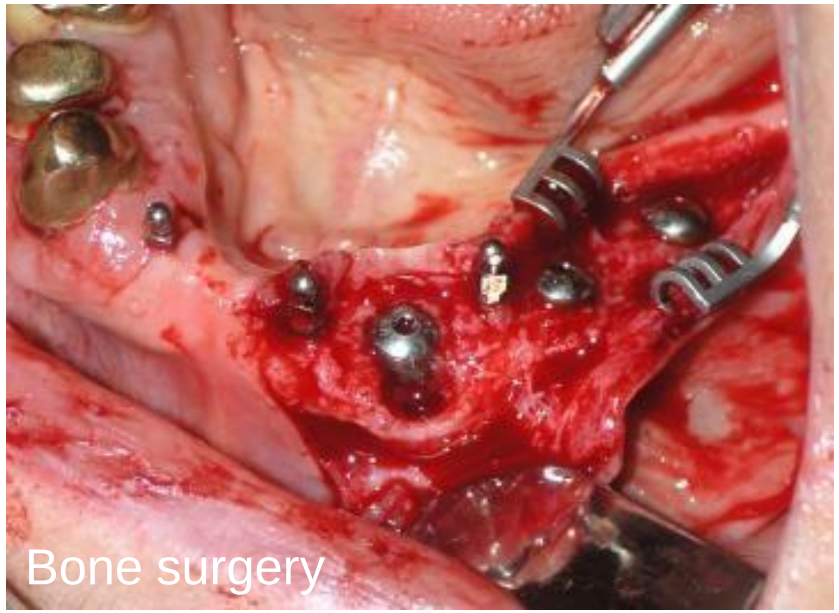
During the healing period the space is temporarily filled with a temporary bridge that does not load the implant. This is good for esthetics, and keeps everything in the right place. Under certain conditions (special) implants can be used that allow immediate loading. There is a lot of discussion among implant specialists about the advantages and disadvantages of immediate loading.



After healing and osseo-integration the healing cap is removed exposing the threads in which the implant abutment will be screwed to support a crown. This can mean small surgery to open the gingival tissue that was used on top of the healing cap.
The dental laboratory produces a crown that usually resembles the temporary crown, and in most cases this crown is screwed onto the abutment and then the hole on the cap of the screw is covered using a resin.

Clinical case by Dr. G.Gurel

When people loose all their teeth they usually get a full removable acrylic prothesis. Since there are no more roots loading the bone over time, the bone atrophies and the prothesis falls out regularly and needs relining/refitting very often. To create extra retention of the prothesis, especially in the mandible, conventional implants have been used. The prothesis snaps onto a special abutment and/or a connecting bar to keep it in place.


Bone surgery

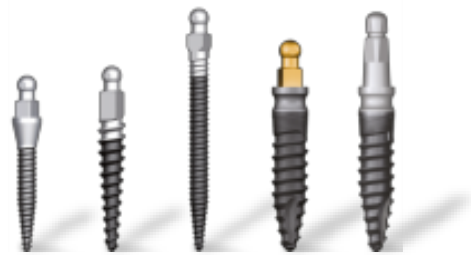

Mini Dental Implants


4 MDI's placed in 90 minutes without surgery

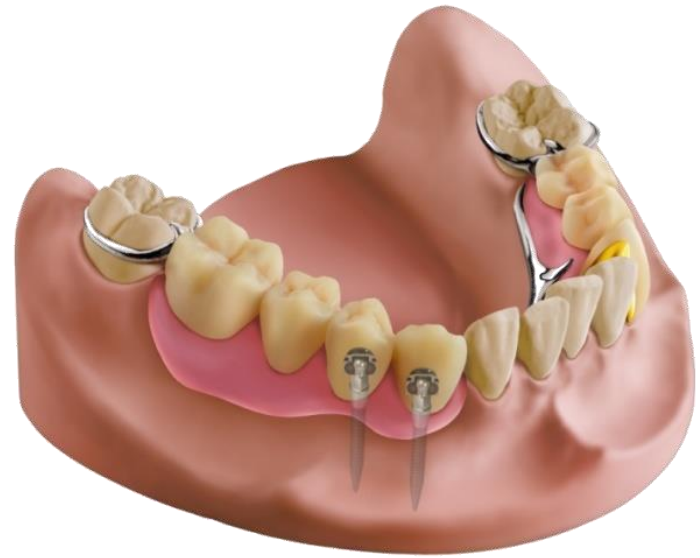
Sadly implant surgery can be very stressful for this usually older and possible medically and economically compromised patient. Often there is not enough bone for a (large) conventional implant and bone grafting is necessary prior to implant placement – making it a very long procedure.
Mini Dental Implants as shown on the right have become accepted as a better alternative, since they need very little space, minimum drilling and can be used immediately with the existing prothesis. The entire procedure can be done in 90 minutes.

Clinical case by Dr. W.Waltzer

Dental Implants



Mini Dental Implants



In 2013 mini dental implants were also approved for removable partial dentures. If possible removable partial dentures have even more fit and retention issues than full dentures, and the support of two or more properly placed mini dental implants can offer an enormous increase in retention of the partial dentures.

Clinical case by Dr. W.Waltzer

Basic Dentistry

1. Describe a Class II restoration, a Class IV restoration.
2. Why could the description given in answer to question 1 be considered inappropriate for composite restorations?
3. Why is it necessary to check the occlusal contacting areas with the antagonist tooth before preparing a cavity for a posterior composite restoration?
4. Why is firm wedging necessary when placing a Class II posterior composite restoration?
5. What are the advantages of an indirect posterior composite restoration compared with a direct restoration?
6. What are the main advantages of glass ionomer restorative materials?
7. What are disadvantages of glass ionomer materials?
8. What is the difference between an open and a closed sandwich restoration?
9. Why should traditional glass ionomer cement not be used in open sandwich restorations?
10. What is the advantage of bonded amalgams?

11. What is the difference between a pulpotomy and a pulpectomy?
12. What is the concept of fissure sealing and why is it so successful?
13. Why is the tunnel restoration considered to be controversial?
14. Name some situations where the use of stainless steel crowns for adults can be beneficial.
15. What could be the advantage of a direct core build-up technique over an indirect technique?
16. Why are resin-modified glass ionomers so suitable for long term provisional restorations?
17. What is the advantage of an adhesive (Maryland) bridge over a conventional bridge?
18. What is the function of a retraction cord?
19. Why are temporary crowns necessary, what is their function?
20. When and why are chemical, custom made temporary restorations preferable to the preformed type?
21. What is the difference between normal and esthetic dentistry?

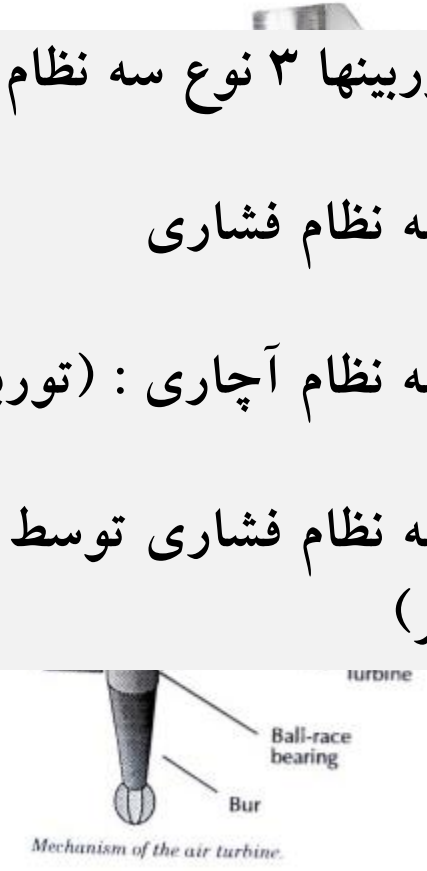
- بلبرینگی
- ایربرینگی

در توربینها ۳ نوع سه نظام وجود دارد :

۱- سه نظام فشاری

۲- سه نظام آچاری : (توربین های زیمنس)

۳- سه نظام فشاری توسط فرز : (توربین های سوپرتک و فارو و سوپر آل ایر)



Mechanism of the air turbine.

دو عدد شیر برقی (سلونوئید) و دو عدد فشار شکن نیز برای تنظیم و قطع و وصل آب و هوا در مسیر آب و هوا بکار می رود.

برای کنترل و قطع و وصل حرکت اینسترومنت ها از پدال استفاده می شود :

۱- پدال برقی

- بدنه پدال که در برگیرنده تمام قسمتهای پدال است .
- اهرم کنترل پدال که توسط پتانسیومتر (مقاومت متغیری که مقدار آن بر اثر چرخیدن یک محور تغییر کرده و معمولاً در مدارات تقسیم ولتاژ بکار برده می شود) داخل پدال جهت کم و زیاد نمودن سرعت به کار می رود .
- اهرم کلید اسپری آب که قطع و وصل اسپری آب اینسترومنتها را توسط میکروسوئیچ انجام می دهد .

۲-پدال پنوماتیک

- شیر هوا جهت قطع و وصل هوا
- اهرم پدال جهت قطع و وصل جریان
- لوله های ورود و خروج هوا

اصول نگهداری توربین ها

۴.رفع انسداد مجاری آب و هوا توربین با استفاده از سوند مخصوص

**** استفاده از فایل یا سوند غیراستاندارد باعث انحراف دهانه مجاری و در نتیجه عدم پاشش آب خروجی به فرز می شود.**

۵. برای استریل نمودن توربین می بایست از اتوکلاو استفاده شود. برای این کار ابتدا توربین را روغن کاری و سپس داخل بسته استریل و در نهایت داخل اتوکلاو قرار دهید.

**** هرگز از مواد ضدعفونی برای استریل نمودن توربین استفاده نکنید زیرا این کار باعث آسیب کارتریج توربین می گردد.**

۶. جلوگیری از آسیب و ضربه به هد توربین است زیرا این اتفاق نیز باعث اختلال در عملکرد کارتریج می شود.

۷. تخلیه هوای کمپرسور هوا به صورت هفتگی و همچنین نصب فیلتر هوا با قابلیت جذب رطوبت بر روی کمپرسور، این امر در ارسال هوای خشک و تمیز به توربین موثر می باشد.

Some typical light curing devices

- **Tungsten halogen**
- **light-emitting diode (LED)**
- **plasma arc curing (PAC)**
- **laser**

Some typical light curing devices

LED

Halogen

– قدرت خروجی

میزان نور خارج شده از لایت کیور، با واحد مگا وات بر سانتی‌متر مربع اندازه‌گیری می‌شود. اکثر LEDها، با داشتن قدرت خروجی بیش از ۱۰۰۰mw/cm2، از عهده کلیه فرآیندهای مورد نظر کاربر، بر می‌آیند. در واقع هر چه قدرت خروجی بالاتر باشد، روند درمان سریع‌تر اتفاق خواهد افتاد و به‌طور بالقوه توانایی دستگاه برای ترمیم‌های عمیق‌تر، ارتقاء می‌یابد.

– طول موج خروجی

سیستم‌های جدیدی که به LEDمجهز هستند، دارای طول موج‌های کوتاه‌تری نسبت به اجداد هالوژنی خود بوده و می‌توانند به طیف وسیع‌تری از طول موج‌های مختلف پاسخ دهند. مهم‌ترین نکته‌ای که باید در نظر گرفت، اطمینان از سازگاری و تناسب طول موج منتشر شده از دستگاه با متریالی است که از آن استفاده می‌کنید.

– حالت‌های مختلف دستگاه

– تابش ثابت؛ که در طول کیورینگ نور شدت ثابتی را می‌تاباند.

۲– تابش پالس؛ که شدت نور کم و زیاد می‌شود.

۳– تابش رمپ؛ که شدت نور نسبت به زمان متغیر بوده و با گذشت زمان شدت نور زیاد می‌شود.

۴– تابش اتوماتیک؛ که شدت نور و زمان کیورینگ قابل تنظیم است.

– زاویه تیپ

–تیپ‌های موجود

– **ساختار:** استایل و شکل ظاهری لایت کیور را متناسب با اندازه دست خود انتخاب کنید ارگونومی مناسب

– عمر باتری

Technical Performance Data	
Wavelength	430–480 nm
Light intensity	1,470 mW/cm^2 (-10%/+20%)
Power supply	Lithium-ion battery Approx. 120 min. battery runtime (~720 10-sec. cures) with constant light output regardless of battery charge
Operation	Intuitive two-button and single-mode operation Pre-set cure times: 5, 10, 15 and 20 sec. continuous mode (120 sec.) and tack cure mode
Curing time	Refer to material instructions; 10 sec. for many composites
Light guide	10 mm, black coated, autoclavable, optimal intraoral reach due to user- and patient-friendly geometry

Comparison of light penetration

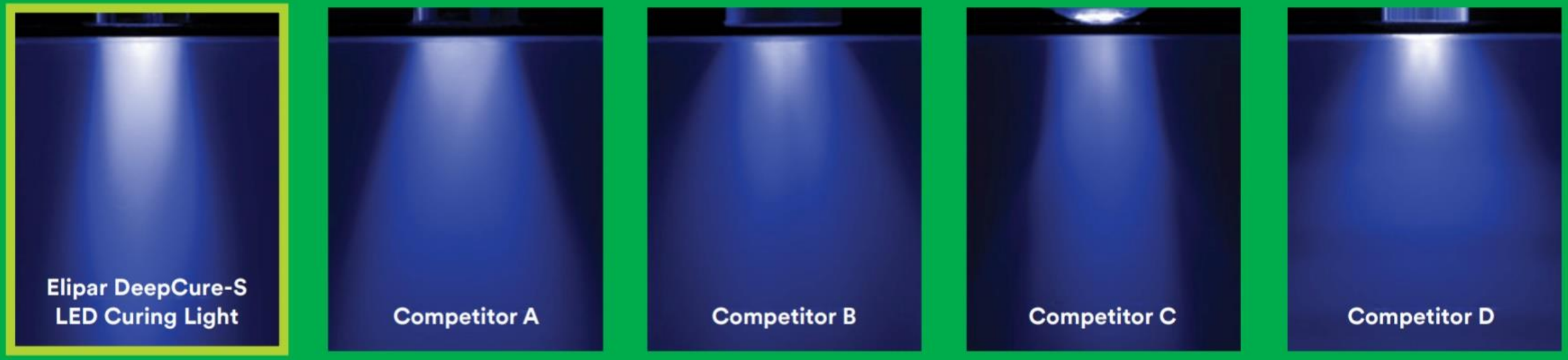


Figure 1: More homogeneous energy distribution throughout the restoration. Images comparing the light penetration of various light curing devices show that the 3M™ Elipar™ DeepCure-S LED Curing Light produces a more collimated and uniform beam profile—even in deeper areas.
Source: 3M internal data

Material Basics

Basics

Many products are introduced into the dental market. These materials all have different indications for use and are based on different technologies. However certain technologies offer common properties and characteristics to these products regardless of their specific use. By understanding these basic technologies the behavior of such a material can be anticipated, be it a restorative, sealant, (luting) cement or impression material, regardless of brand. This introduction is intended to give an overview of what to expect from which materials. In the next chapters you will find more information about tests to characterize these materials and the background of the materials themselves. In the Product Profiles you will find detailed information on specific products.

- Dental Composite Resin
- Conventional glass ionomer
- Resin modified glass ionomer
- Compomer
- Restorative summary
- Light curing units
- Finishing & Polishing
- Alginate
- Hydrocolloid
- Polysulfide
- Polyether
- Condensation Cure Silicones
- Vinyl Polysiloxanes
- Impression summary
- Preformed Crowns
- Acrylic temporary crown & bridges
- Composite resin temporary crown & bridges

Dental Composite Resin

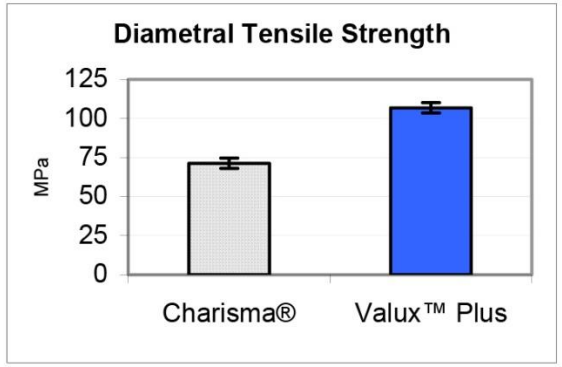
Dental composites were introduced in the 1960's and consist of a (usually hydrophobic) resin and an inert filler. The material cures by free radical polymerization initiated by light and/or chemical means and can be bonded to tooth tissue with dental adhesive systems. While composites can be segmented into different types such as microfills, hybrids, etc., they share many advantages. They are highly esthetic, have excellent strength properties and are wear resistant for their intended uses. Dentists are very familiar with composites, but in some clinical situations they can be time consuming to place and finish. They are sensitive to the presence of moisture and they have no significant fluoride release. Composite resin is used as direct and indirect restorative, as fissure sealant and as luting agent for crowns and bridges.

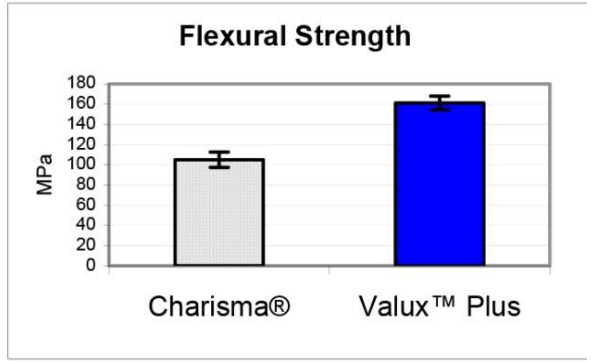
Some typical composites

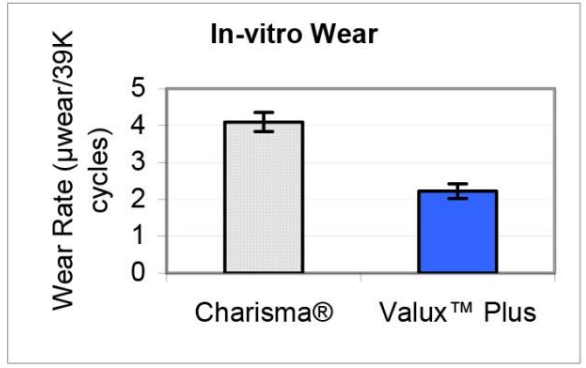
For Example : Valux™ Plus Restorative

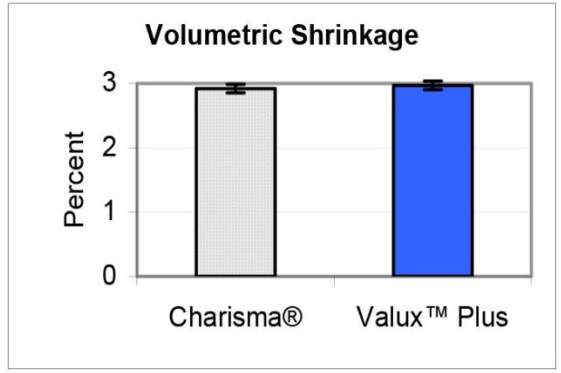
ویژگی ها :

- پارامتر های چقرمگی شکست (Fracture toughness) و مقاومت سایشی (Wear resistance) بالا می باشد.
- حداقل نشت (leakage)در مارجین ها
- پالیشینیگ و Handling بسیار خوب.
- در ۵ رنگ A1, A2, A3, A3.5, B2 موجود می باشد.
- این محصول از رزین های Bis-GMA و TEGDMA و به کارگیری فیلر زیرکونیا/سیلیکا، ۶۶٪ حجمی با محدوده اندازه ذرات 0.01µm تا 3.5µmتشکیل گردیده است.









موارد مصرف :

محصول قابل استفاده در موارد ذیل می باشد :

- ترمیم های direct خلفی و قدامی کلاس ۱ تا ۵.
- ترمیم های Indirectشامل inlay, onlay, veneer.
- تکنیک ساندویچ.
- کور بیلدآپ.
- کاسپ بیلدآپ.
- Splintingبرای دندان های که دچار تروما شده است)
- بستن فواصل بین دندانی (دیاستما) (Diastema closure)

Some typical Bonding

7th Generation

5th Generation

4th Generation

Conventional Glass Ionomer

Conventional glass ionomer cements were introduced in the 1970's and consist of polycarboxylic acid, fluoroaluminosilicate glass and water. They are powder-liquid materials that set by an acid-base reaction and metal chelation which occurs after hand or mechanical mixing in a capsule. Conventional glass ionomers have high initial and continued fluoride release and chemically bond to enamel and dentin. They show good clinical retention and have similar thermal expansion properties as dentin. They are technique sensitive, particularly to the presence of moisture during placement and desiccation after placement. Compared to composite, they are generally considered to have lower strength and poorer esthetics but are more suitable in patients with poor oral hygiene. Conventional glass ionomers are used for direct restorations, fissure sealing and cementing of crowns and bridges.

Some typical glass ionomers

Resin-Modified Glass Ionomer

Resin-modified glass ionomers were first introduced in the late 1980's. They consist of a methacrylated polycarboxylic acid, fluoroaluminosilicate glass and water. The material is also a powder-liquid that hardens by the same acid-base reaction as that of the conventional glass ionomers . In addition they cross-link through their methacrylate (composite resin) functionality. The resin-modified glass ionomers are less sensitive to early moisture contact and desiccation. As a result they are easier to use, can be finished immediately after curing, have significantly greater strength and improved esthetics compared to conventional glass ionomer materials. They are not as strong as composites but offer better esthetics than traditional glass ionomers. They are used as direct restorative, crown build-up, liner/base and as luting agent for crowns and bridges. They are also produced in paste-paste formulations now for easier mixing and application.

Some typical resin-modified glass ionomers

Compomer

Compomers were introduced in the 1990's, combining features of **compo**site and glass iono**mer.** Compomer restorative products are made of a carboxylated methacrylate resin and fluoroaluminosilicate glass filler and after some confusion were called poly-acid modified resins. Compomers set by light-initiated polymerization and come in one-part pastes - primarily in capsules. Used with their respective primers they can usually be placed without a traditional acid etch procedure and are considered to have good handling characteristics. They have decent esthetics and fluoride release, but compomers show lower wear resistance than composites and lower fluoride release than most glass ionomers. There are many private branded compomers in the market, and they are usually considered poor restoratives. However, their ease of use makes them very suitable to treat primary teeth in children.

Some typical compomers

Restoratives Summary

With the various types of materials available, dentists today have greater options to tailor their material choices to the specific needs and desires of their patients. Conventional glass ionomer and composites are the extremes of the spectrum. Resin-modified glass ionomer is similar to conventional glass ionomer but also has some composite characteristics. Compomers have many similarities to composites but they also have some features of glass ionomer. Each material category has significant advantages and some disadvantages.

Conventional GI	Resin-modified GI	Compomer	Composite

Light Curing Units

Light curing units for light curing composites were introduced in the late 1970's. The first light cure systems used ultra-violet light bulbs, making them very costly and sensitive. The limited polymerization depth of the material and concerns over the UV radiation let quickly to the introduction of halogen visible light sources with appropriate composite systems. Curing units using visible light are more reliable, offer a greater depth of cure and the light penetrates better through enamel and dentin. However, polymerization can be greatly compromised by aging of the light bulb and heat filters, by poor hygiene (e.g. resin or composite smeared on the light exit window) and by fluctuations in the power supply. For these reasons good lights should have an in-built light intensity checker and power regulator. Most of these problems have been eliminated with the introduction of LED lights. These LED lights have a much higher efficiency in turning electric energy into light, have a very long life span, produce far less heat at the light source than halogen lights and are mostly operated with batteries. Because each LED type has a specific wavelength, the curing efficiency of these lights is also higher than with halogen lights. All lights should be properly cleaned and maintained

Some typical light curing devices

LED

Halogen

Finishing & Polishing

Diamond burs and tungsten carbide are traditionally used for the preparation of cavities. Similar instruments were used for finishing (shaping) and polishing, together with various stones (like Arkansas and Carborundum) and rubbers. While providing adequate finishing, the final polish with this approach was highly dependent on the intrinsic roughness of the material used. 3M ESPE Sof-Lex™ Finishing and Polishing discs that are used dry overcome this problem by superficial heat generation,creating a nice luster to composite restorations. The heat generation is only superficial because composites conduct and diffuse temperature poorly. While perfect for the flat surfaces of restorations, discs are difficult to use in the occlusal contours of posterior teeth, for which the spiral wheels are better.

Some typical finishing and polishing

Diamond burs

3M ESPE Soflex discs & mandrels

3M ESPE Soflex Spiral Wheel

Some typical Impression Materials

- هیدروکلوئید برگشت ناپذیر(آلژینات)
- هیدروکلدوئید برگشت‌پذیر (آگار)
- مواد قالب‌گیری لاستیکی (پلی‌سولفیدها – سیلیکون‌ها –پلی‌اترها)

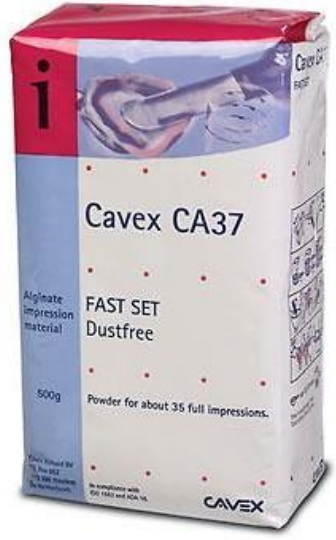
Alginate

Alginate has been used for a long time for all kinds of impressions. It sets irreversibly by mixing with water. The material has excellent hydrophilicity but poor detail reproduction. It has a very low tear strength and should be cast immediately. Alginates should be used for edentuluous patients and study models, not for crown and bridge impressioning.

- بسیار آبدوست
- ثبت جزییات ضعیف
- قدرت پاره شدن پایین
- باید به سرعت کست شود-تغییر ابعادی بالا
- زمینه کاربرد برای بی دندانی های کامل و کیس استادی ها

Some typical alginate

Alginate mixing bowl



Polyether

Polyether impression material was introduced as an improvement over polysulfides. Polyether is inherently hydrophilic, has good detail reproduction and is a monophase material making it easy to use. Compression set and dimensional stability are better than with polysulfides. The original material has a high strain in compression, making it sometimes difficult to remove the impression from the mouth. Soft versions of the polyether have overcome this problem. An automixing system was made available in the 1990's overcoming the disadvantages of hand mixing, and a heavy body/light body version was introduced for the specialists who prefer this. Polyether is indicated for all precision impressions, and is considered to be the best material for implant impressions.

- ذاتا آبدوست
- ثبت جزییات بالا و مونوفاز است و استفاده آسان
- ثبات ابعادی بسیار خوب
- بسیار دنس و سخت است به نحوی که جدا کردن از دندان ها گاهی سخت است(مشکل در بیماران دچار لقی)
  بنابراین مدل های سافت تر آن نیز وجود دارد heavy body/light body version
- زمینه کاربرد در مواردی که نیاز به قالبگیری دقیق داریم و بهترین متریال برای قالبگیری ایمپلنت

The only polyethers available – 3M ESPE

Condensation Cure Silicones

Condensation cure silicones were introduced at about the same time as polyethers. The basic chemistry is completely different from polyethers, overcoming some of the original problems like rigidity and compression set. Detail reproduction of these so-called C-silicones is adequate. They are however hydrophobic by nature and two stage or two-step impression techniques are necessary with a first impression and a detail correction impression The specific condensation hardening mechanism produces alcohol gasses as a by-product, giving the material limited dimensional stability. Condensation cure silicones have to be cast within the hour (ideally within fifteen minutes) but definitely on the same day the impression is taken.

When cast late the impression shrinks slightly towards the tray, the stone model will be slightly larger than the real situation and the restoration will be slightly over-dimensional.

- همزمان با پلی اتر وارد بازار شد و ترکیب شیمیایی آن کاملا متفاوت به پلی اتر است
- مشکلات ذاتی سختی و اسحتکام پایین
- ذاتا آبگریز و نیاز است که از تکنیک **two stage** برای قالبگیری استفاده شود
- ثبت جزییات مناسب
- باید کمتر۱ساعت کست شود(ایده آل ترین زمان ۱۵ دقیقه)ولی قطعا و ماکزیمم در روز قالبگیری
- اگر کستینگ به تاخیر بیافتد شرینک می کند و کست گچی بزرگتر خواهد شد و در نهایت رستوریشن بزرگتر

Some typical condensation cure silicones

Vinyl Polysiloxane

Vinyl polysiloxane impression materials, also called addition cure silicones, are the most recent entry into the field. They offer good reproduction, adequate strain in compression, very low compression set and very high dimensional stability. They can be cast several times within one to two weeks and are offered as hand mixing and automixing varieties. Most now have surfactants to make them more hydrophilic, and heavy body on light body and monophase impression techniques possible. Disadvantages are that some vinyl polysiloxanes cannot be cast immediately because of the catalyst system which promotes hydrogen development, and most systems are sensitive to contamination by latex gloves, astringents, uncured resins and other chemicals.

- از دیگر محصولات جدیدتر می باشد
- سختی و استحکام پایین ولی ثبات ابعادی بالا
- آبدوست
- استفاده به صورت **one – two stage**
- ثبت جزییات خوب
- در مدت یکهفته و تا دو هفته می توان چندین بار کست نمود

Some typical vinyl polysiloxanes

Impressioning Summary

All groups of impression materials with the exception of alginates offer sufficient detail reproduction for crowns and bridges. Used properly in the right situations they can all produce accurate stone casts on which the dental technician can fabricate an indirect restoration. However the vinyl polysiloxanes and polyether are the easiest to use impression material group, giving accurate results with the least amount of distortion.

Composite Resin Temporary Crowns & Bridges

Composite resin temporization material was introduced in the 1980's to overcome some of the short comings of acrylics. They are now available as self curing, light curing and multi-phase systems in both handmix and automix versions. They offer reduced volumetric shrinkage and less heat generation and are an improvement over acrylics in taste and odor. The light curing and multi stage systems offer extended working and adaptation time through a semi-flexible stage, with a stronger final set upon light curing. As a consequence these systems are much more versatile and flexible.

Some typical resin-based temporary material

Material Basics

Dentist

Dental Lab

CAD/CAM Procedure

3D scanners

3Shape Communicate™

Order Management

CAD Design

Model Builder™

VITA CAD/CAM MATERIALS – Indication table

	Oxide Ceramics		Fine-structure feldspar ceramics			Glass Ceramic	Hybrid Ceramic	Machinable Polymers	
	VITA YZ HT	VITA YZ T	VITABLOCS Mark II	VITABLOCS TriLuxe/ TriLuxe forte	VITABLOCS RealLife	VITA SUPRINITY	VITA ENAMIC	VITA CAD-Temp monoColor/ multiColor	VITA CAD-Waxx
	–	–	–	–	–	–	–	●	●
	○	–	–	–	–	●	● 1)	●	–
	●	●	–	–	–	–	–	–	–
	–	–	●	○	○	●	●	–	▲
	–	–	●	○	○	●	●	–	▲
	–	–	○	●	●	●	●	–	▲

Material Basics