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dental materials

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Amalgam

Amalgam is the least expensive material for filling a cavity. It is also very strong and durable. It is relatively easy to place and somewhat forgiving of an imperfect environment during placement.

Since amalgam does not bond to the tooth, it is held in place with mechanical retention. This requires the removal of more tooth structure than the other materials available. Enamel seems to crack around amalgam restorations more than other materials, which may lead to tooth fracture and the need for a crown. Amalgam is unaesthetic and gets more unaesthetic as it ages (and turns from silver to black).

Amalgam is an alloy composed of several metals, specifically mercury and some combination of silver, tin, copper, and zinc. Mercury makes up 40-50% of the alloy. A small amount of mercury is released throughout the lifespan of the restoration. Opinions vary about whether or not this poses a health risk.

Advantages

- strong, durable and stands up to biting force
- can be placed in one visit
- normally the least expensive filling material
- self-sealing with minimal to no shrinkage, and resists leakage
- resistance to further decay is high
- frequency of repair or replacement is low
- only material that can be used in a wet environment (good for kids).

Disadvantages

- research and studies have not found evidence of harm, but there are some people and groups who have raised concerns about the very low levels of mercury vapour released by amalgam
- amalgam scrap (waste left over after repairing a cavity) contains mercury and requires special handling to protect the environment
- can darken over time as it corrodes, but this does not affect the function of the restorations
- placement requires removal of some healthy tooth structures
- in rare cases, a localised allergic reaction such as inflammation or rash may occur.

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Composite Resin

Composite resins comprise most of the 'white' or 'tooth coloured' fillings and are, essentially, plastic. While the materials are constantly evolving and improving, there currently are no composite resins that are as strong and durable as amalgam, gold, or porcelain. This means that a composite resin filling will fail sooner and need to be replaced sooner than an amalgam, gold, or porcelain restoration.

Composite resins require perfect conditions for successful placement. If the tooth cannot be kept perfectly dry during placement, the restoration will fail. Since composite resin chemically bonds to the tooth, it is not necessary to remove as much tooth structure when preparing a tooth for a composite resin filling, as compared to an amalgam filling.

While a composite resin restoration is very aesthetic, it will discolour over time and may need to be replaced if it is in an area of aesthetic concern.

Composite bonding repair fractured corner

Composite filling

Advantages

- colour and shading can be matched to the existing tooth, composite is relatively strong material providing good durability in small to mid size restorations that need to withstand moderate chewing pressure
- generally used on front and back teeth
- usually complete in a single visit
- moderate resistant to breakage
- often permits preservation of as much tooth as possible
- low risk of leakage if bonded only to the enamel
- does not corrode
- moderately resistant to further decay
- frequency of repair is low and moderate.

Disadvantages

- can break and wear our more easily than metal fillings
- may need to be replaced more than metal fillings
- sometimes difficult and time consuming to place
- cannot be used in all situations
- more expensive than amalgam
- may wear faster than the enamel
- in rare cases there can be a localised allergic reaction.

Glass Ionomer

Glass Ionomer is similar to composite resin and, like composite resin, bonds well to the tooth. However, it is not as strong or durable as composite resin. It is also not as aesthetic as composite resin and will discolour more easily.

Glass Ionomer is, however, easier to place than composite resin and is more forgiving of less than perfect conditions.

This makes it a good choice for fillings in childrens teeth. Glass Ionomers have the added benefit that they release fluoride for a time after placement and continue to absorb and release fluoride during the lifespan of the filling.

Advantages

- tooth coloured filling
- can contain fluoride that may help prevent further decay
- minimum amount of tooth structure removed
- low incidence of allergic reactions
- usually complete within a single visit.

Disadvantages

- low resistance to fracture
- it is limited to non-biting surfaces
- moderate costs (costs more than amalgam)
- as it ages this material may become rough and plaque can build up on it
- can become dislodges
- rare localised allergic reactions.

Gold

There are no materials available today with the longevity of gold. Gold is very durable but, obviously, not aesthetic. If aesthetics are not a concern, there is no better material for restoring a tooth. Gold restorations are difficult and technique-sensitive. They require two appointments because the restoration is fabricated at a dental laboratory. Also, the material itself is expensive.

Gold Alloy

Gold alloy is a gold-coloured mixture of gold, copper, and other metals and is used mainly for crowns and fixed bridges and some partial denture frameworks

Advantages

- good resistance to further decay if the restoration fits well
- excellent durability; does not fracture under stress
- does not corrode in the mouth
- minimal amount of tooth needs to be removed
- wears well; does not cause excessive wear to opposing teeth
- resists leakage because it can be shaped for a very accurate fit.

Disadvantages

- is not tooth coloured; alloy is yellow
- conducts heat and cold; may irritate sensitive teeth
- high cost; requires at least two dental visits and laboratory services.

Porcelain

Porcelain is the most aesthetic of the tooth coloured restorations and it does not discolour or stain like composite resin or glass ionomer. Porcelain is very strong and much more durable than composite resin or glass ionomer. It also bonds very well to the tooth.

Porcelain is actually harder than enamel so it may cause premature wear of the tooth opposing the porcelain restoration. Porcelain restorations are difficult and technique-sensitive. They also, like gold, usually require two appointments because the restoration is made at a dental laboratory.

While porcelain itself is not as expensive as gold, the restorations are more difficult and, therefore, more expensive to produce. For this reason, porcelain restorations are usually the most expensive of all restorations. Porcelain restorations are also not feasible on primary teeth.

Porcelain fused to metal

This type of porcelain is a glasslike material that is 'enameled' on top of metal shells. It is tooth coloured and is used for crowns and fixed bridges

Advantages

- good resistance to further decay if the restoration fits well
- very durable, due to metal substructure
- the material does not cause tooth sensitivity
- resists leakage because it can be shaped for a very accurate fit.

Disadvantages

- more tooth must be removed (than for porcelain) for the metal substructure
- higher cost because it requires at least two visits and laboratory services
- the porcelain can wear with time and also fracture.

Zirconium Crowns

Zirconium crowns and bridges are so strong they can be used anywhere in the mouth. Zirconium crowns can withstand the biting pressure of the front teeth as well as back teeth grinding.

The look of zirconium crowns and bridges is so close to natural teeth that it is hard to tell the difference and it is this quality which makes it very useable within dental work. Zirconium crowns can be fixed using traditional dental cements.

Zirconium crowns have quickly become the preferred material for dental crowns. Zirconium is a very strong substance that can endure wear and tear of everyday use. When looking at Zirconium crowns from an aesthetic point it is clear and very similar to a natural tooth and reflects light the same way. This may be important if your new crowns are on the front of your mouth and it is particularly relevant in cases where the crown will be seen next to the natural teeth.

Zirconium crowns will not corrode and the normal black gum line that you can see around a porcelain fused metal crown, will not happen because of the strong ceramic material used. Also the normal too hot/cold sensations you can feel with other crowns does not normally occur because of the lack of electrical conductivity.

E-Max crowns

The E-Max crown is a type of all-ceramic crown which is preferred for its longer lasting, aesthetic qualities. This crown and the Zirconia crown are placed due to their highly attractive appearance which ensures that they complement the rest of your teeth.

It is considered a good option for damaged, stained or poor quality teeth.

What is an E-Max crown?

This is a type of all-ceramic crown with an appealing translucent colour which is combined with extra strength and durability.

This crown is made from a single block of lithium disilicate ceramic: this is a top grade material which has been harvested for its toughness, durability and opaque qualities which makes it a highly prized crown.

You get a glass ceramic crown which is tough and enduring but delicate in appearance.

Advantages

- this crown is considered to be the best match with your own natural teeth. The transparent colour and lifelike shape ensures that it is unlikely to be noticed amongst your own natural teeth
- there is no metal alloy base with this crown which means no unsightly looking grey line around the gum line
- they are strong, long lasting and unlikely to crack or fracture as compared to many other types of porcelain crowns. They are considered to be at less risk of chipping.

Disadvantages

- the only disadvantage is to do with the cost. A premium crown such as this which can be fitted with minimal need for any preparation is likely to be more expensive than other types of crowns
- they may not be suitable for everyone so check with your dentist to see if this crown is available and if it is right for you.

Partial Dentures

A partial denture is a removable dental appliance that replaces the missing teeth in the mouth. You may need a partial denture for aesthetic reasons, or for eating, talking or to protect remaining teeth from drifting or over -erupting.

Partial dentures are removable, meaning they are not fixed and can be inserted and removed at your convenience. This works by using the remaining teeth for retention, therefore stabilising the denture so that it does not move or fall.

Partial dentures come in a few dif ferent materials; namely Acrylic, Valoplast or Chrome.

Full Dentures

Full dentures are for people without any remaining healthy teeth. T raditional dentures rest on top of the gum line. Upper dentures remain in place with a build up of suction that can developing between the denture and palate however lower full dentures constantly move around and only stay in place with the control of your tongue, lips and cheeks. Adhesives can be used and will help prevent the denture from slipping or moving, increasing your overall confidence. Full dentures are not true replacements for natural teeth. Only dentures attached to dental implants will superiorly improve stability, retention and your ability to eat properly.

Various denture teeth are available to improve wear resistance and appearance. Please ask your dentist for details.

Acrylic Partial Dentures

Acrylic partial dentures are usually the most cost effective and can be made within a short period of time. Other advantages are that they can be added to (in case you lose any more natural teeth) and can be used as a temporary denture before dental implants, or whilst waiting for chrome dentures.

Some of the disadvantages are that the acrylic denture base is slightly weaker due to its irregular shape and tend to break frequently, especially those made for to replace lower teeth. In order to counteract this, the acrylic is usually built thicker and bulky, which can take a little extra time to get used to.

Acrylic full

Acrylic partial

Acrylic v chrome v valoplast

Acrylic v chrome

Advantages

- are the most economical way to replace missing teeth and are very easy to add to. Eg if you have one or several gaps and think that the remaining teeth may also be lost in time then an acrylic denture is one way to have the flexibility of adding teeth without breaking the bank
- acrylic dentures can look very natural.
- can be used for replacing 1, few or all of your teeth
- quick – sometimes can be done in a few weeks (temporary dentures only)

Disadvantages

- patients who have acrylic dentures often complain that they get food stuck under them so they need to be cleaned after every meal.
- acrylic dentures tend to move around during eating and do not stay firmly in place. Some patients use denture glue to stick them in.
- bulky, often affect speech
- patients report that they don't taste their food as well.
- upper denture usually covers some or all of the palate
- full lower denture (with all lower teeth) is impossible to eat with and will move in and out of view during speech!
- having a full upper or lower denture (or both together) will seriously restrict your diet – to soft foods!

Chrome Partial Dentures

Chrome dentures are more of a long term material for a partial denture, as the frame and required components are all cast in one piece. This is just one of the many advantages chrome dentures have over acrylic dentures.

The components of a chrome partial denture rest on soft tissue and natural teeth therefore distributing the load evenly during eating, helping to protect the underlying bone.

Due to the strength of the chrome it can be made in a smaller, more efficient design, making it more comfortable to wear and live with, whilst giving you the security of knowing it has less chance of breakage.

Advantages

- much slimmer than acrylic ones
- stay in place better than acrylic ones (more secure)
- easier than acrylic teeth for eating with as they move less

Disadvantages

- more expensive to produce
- often a metal clip or clasp will show at the side of your smile
- food gets stuck under them/around them (but not as badly as under acrylic dentures)
- harder to add teeth to later
- require some solid existing teeth to attach to
- not possible if there are no existing teeth to attach to
- take longer to complete than acrylic dentures

Valoplast dentures (also known as 'flexi-dentures')

Valoplast dentures are flexible and can work to replace a small number of teeth and fill a gap without necessarily covering the palate.

They look and feel very much like acrylic dentures but being slightly flexible allows them to 'pop' into place where 2 or 3 teeth are missing but there is still a tooth either side of the gap.

Advantages

- quick and easy to fit
- less bulky than acrylic dentures
- good for small to medium sized gaps

Disadvantages

- stain more easily than conventional acrylic dentures or porcelain teeth
- not appropriate where a large number of teeth are missing eg a whole lower or upper jaw.

Valoplast 1 unit

Valoplast flexibility

Valoplast partial

Allergic Reactions

Allergic Reactions to Dental Materials Components in dental fillings may have side effects or cause allergic reactions, just like other materials we may come in contact with in our daily lives. The risks of such reactions are very low for all types of filling materials. Such reactions can be caused by specific components of the filling materials such as mercury, nickel, chromium, and/or beryllium alloys. Usually, an allergy will reveal itself as a skin rash and is easily reversed when the individual is not in contact with the material.

There are no documented cases of allergic reactions to composite resin, glass ionomer, resin ionomer, or porcelain. However, there have been rare allergic responses reported with dental amalgam, porcelain fused to metal, gold alloys, and nickel or cobalt-chrome alloys. If you suf fer from allergies, discuss these potential problems with your dentist before a filling material is chosen.

The durability of any dental restoration is influenced not only by the material it is made from but also by the dentist's technique when placing the restoration. Other factors include the supporting materials used in the procedure and the patient's cooperation during the procedure. The length of time a restoration will last is dependent upon your dental hygiene, home care, and diet and chewing habits.

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