Denture processing

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VITA shade, VITA made.

14.1 Denture processing systems

Differences of opinion exist in regard to denture processing systems. It is up to the individual to choose a preferred method of working. The following describes some of the advantages and disadvantages of the various procedures.

14.1.1 Injection systems

Injection systems with different equipment for using both self curing or heat curing polymers have yielded good results and enjoy a high degree of popularity. An advantage of closed injection systems is that the bite is not raised which enables fabrication of dentures with a high degree of occlusal accuracy.

14.1.2 Packing systems

Packing systems using flasks and presses and using both heat curing and self curing polymers are widely used and when correctly used, deliver good results.

In order not to raise the bite, a certain amount of practice/experience in handling flasks and hydraulic presses is required.

14.1.3 Pouring systems

Acrylic pouring systems which use self curing acrylics are inclined to increased shrinkage of the material due to their greater fluid content. Generally it can be said that the more fluid, the greater the shrinkage.

There is also the possibility that when using pour systems liquid will be unable to escape from the mould resulting in incomplete filling of the mould.

The time intended to be gained by using a pour technique may well be a mirage if work must be repeated resulting from sensitivities in the use of this system. With pour systems the residual monomer content in the acrylic is highest. It is unrealistic to describe pour systems as being capable of delivering high quality results.

14.1.4 Heat Curing Acrylic versus Self Curing Acrylic

Heat Curing Acrylics (thermo-polymers) have superior long term characteristics compared with Self Curing Acrylics:
They have a lower content of residual monomer; are more dense; are more dimensionally stable; they are easily polished to a high lustre and maintain the lustre indefinitely. To achieve reliable and consistent bonding between the denture base acrylic and the teeth, the following procedure is recommended.

14.1.5 Improving adhesion / preparation of the denture teeth

Bonding agent for acrylic teeth and denture base.

With so many brands of denture acrylic available, it is difficult for the dental technician to determine as to the quality of the "bond" between the particular teeth and the selected denture base acrylic. With correct use of VITACOLL combined with good packing associated and processing procedures, good bonding is assured.

1. The base of each tooth should be roughened using a shallow groove cutting bur (No 108). A coarse toothed steel or carbide bur may also be suitable. Any type of retention holes or dove tails are strongly recommended against. During the flask packing and pressing procedure, air can be trapped in such "retention holes" impairing the bond. Dove tails serve only to weaken the body of each tooth and increase the likelihood of fracture including at low levels of loading (Fig. 1).

2. The teeth must be free of wax residue and plaster separator. It is also preferable that the mould/flask be cool rather than hot. VITACOLL is recommended for use with Heat Curing Acrylics and mandatory when using Self Curing Acrylics. VITACOLL acts on the clean cut surface of the denture teeth and modifies the chemistry of the surface to accommodate the chemistry of the denture base acrylic. A strong chemical bond results. Some denture base materials are available which cannot otherwise form a bond with modern high quality acrylic denture teeth.

THE PROCEDURE

VITACOLL is applied to the roughened base of each tooth with a small brush. It must be allowed to stand to take effect for a minimum of 5 minutes. If after 5 minutes the surface appears dry and not shiny-wet, VITACOLL should again be applied.

After another 5 minutes has elapsed, packing of the denture base acrylic can begin. Packing of the denture base acrylic should begin within 10 minutes of the end of this 5 minute holding time. If not, the bond enhancing effect of the VITACOLL may be lost.

Further procedural instructions.

When contouring, carving and refining the gingival wax up of dentures, one must be careful when using a flame to smooth the finally contoured gum areas. A flame in contact with the teeth will scorch the high points of the teeth and cause whitish discolouration which may not be immediately evident (Points of cusps/ridges/incisal edges). During processing of the denture base these scorched areas which are microscopically porous, absorb moisture emanating from the plaster mould. In a short amount of time in the mouth they will discolour and can be seen clearly. When smoothing with a brush flame, the flame should be small and soft and care must be taken that the more prominent areas on the teeth are not scorched by the flame.

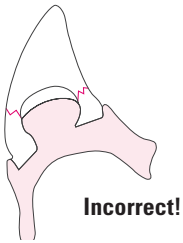

Fig. 1: Loading of the body of the tooth.

14.2 Denture Processing

14.2.1 Inserting the Post Dam (Distal Palate Vibrating/Finish line)

The scraping of the upper model across the distal of the palate to provide a post dam and denture finish line is essential for obtaining retentive suction of the denture.

If not done correctly the retention of the denture is put at risk and will have to be corrected.

Full upper dentures are commonly over or under extended in this area and/or, improperly dammed. The palatal finish line should be placed in the mucosal area which begins to vibrate when forming the sound of the letter "a".

14.2.2 How – and where – should the distal palate of the model be trimmed

The dental care provider should mark the finish line and palatal post dam area on the model for the technician or, personally prepare the model with both finish line and post dam.

A fairly standard example follows:

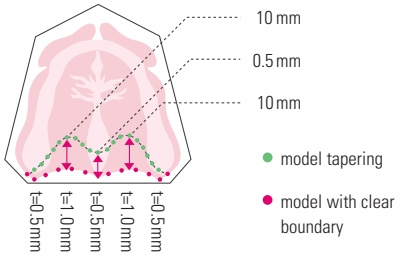

Fig. 2

The green dotted line indicates the extremity of the palatal reduction from the red dotted, palatal finish line. The depth of palatal reduction of the model at the red finish line is usually 0.5 - 1.0 mm and tapers anteriorally to the greenline.

14.2.3 Plaster/stone separators (cold mould seal)

In order to prevent adhesion of acrylic and plaster/stone during polymerization procedures, alginate based "plaster separator liquid" is used (cold mould seal). It is important to use these separators correctly to obtain the best possible surface on the acrylic after the processing is completed (as follows).

Immerse the model or flask halves in hot water for a few minutes. Remove from the water and remove remaining water with compressed air.

Generously apply the plaster/stone separator with a brush and massage it onto the plaster/stone for 50 – 60 seconds. Excess is then removed by rinsing with a fine jet of warm water. Next the models/flask halves are placed in a sealed container where they remain for 15 or 20 minutes. After removal, packing of the acrylic can begin.

This procedure results in the subsequently packed and processed acrylic having a dense and glass like surface.

Using this method it is also possible to delay packing of the acrylic for some time, without having the separator becoming too dry.

On the other hand, if separator is applied to dry not warmed models, it does not penetrate and dries out very quickly. This allows moisture to escape from the model/mould during polymerisation and diffuse into the acrylic. This results in whitish areas on the surface of the acrylic which indicates a reaction has taken place between the moisture and acrylic. There is not much sense in repeatedly applying separator to attempt to prevent such a problem. Better to apply separator just once, but correctly, as indicated.

14.3 Occlusal Contact Adjustment

The ideal point at which to adjust the occlusion is after the dentures have been transferred from wax to acrylic. Regardless of the preferred set-up method, a balanced centric occlusion is essential. The dentist must decide which concept is appropriate for the particular case.

1. If a patients dentures are constructed accordingly to the mandibular neuromuscular guidance philosophy of Dr Karl Hiltebrandt, as opposed to tooth guided movement, the resulting centric support will be sufficient.
2. If a fully balanced occlusion is the goal, occlusal adjustments are made as follows.

14.3.1 What is the correct method to follow when adjusting the occlusion of full dentures?

Occlusal adjustment of full dentures by bilateral balancing.

Prerequisites:

- Correctly set teeth with interdigitation of the cusps and fissures.
- Taking into account the sagittal and if appropriate, the transverse compensating curve.
- Sagittal overbite (overbite – overjet) as a rule by 1 – 2 mm.

Basic rules:

- The palatal cusps of the maxillary teeth 4, 5, 6 and possibly 7, and the buccal cusps of the mandibular teeth 4, 5, 6 and possibly 7 secure the occlusion. They must always be conserved when determining the occlusion.
- When adjusting the occlusion of the anteriors, cosmetic factors should also be taken into consideration.

Adjusting the occlusion

The palatal cusps of the upper posteriors 4, 5, 6, and possibly 7 should have homogeneous contact in the fossae of the lower posteriors. Likewise, the lower posteriors 4, 5, 6 and possibly 7 should have good contact with their antagonists. The supporting cusps must not be shortened, but should be adjusted to fit into the fossa of the antagonist.

14.3.2 Which contact points are actually necessary?

Different contact points will be required, depending on which occlusal concept is selected for the patient in question. If the concept of lingualised occlusion is used, the following contacts are required in the centric position:

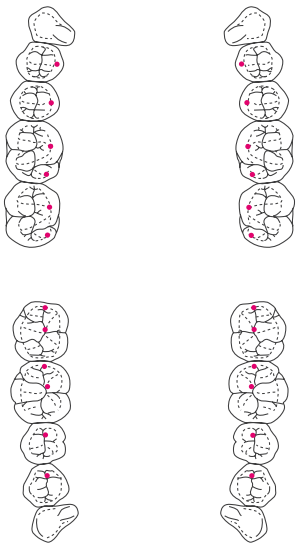

Fig. 3: Lingualised occlusion.

If the teeth have been setup according to the concept of canine guidance with ABC contacts, possible combinations of contact points are depicted in the following diagram. These are positioned individually, but usually in pairs. As already described in section 12.12 the A and B or B and C contacts, and sometimes also A and B and C contacts, which will provide stability.

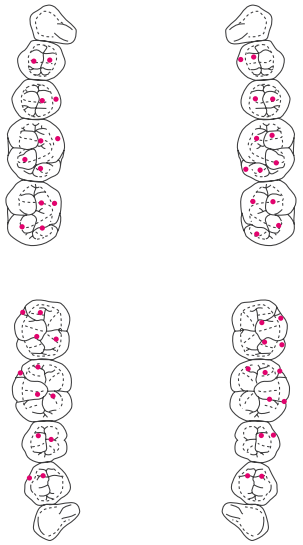

Fig. 4: ABC contacts – this concept does not have the aim of balancing.

14.3.3 Which movements must be free from occlusal interference ?

If at the outset we do not wish to work according to the described principles and grind the occlusion to enable excurson movements, or, if another approach is necessitated by the particular case, we can proceed as follows.

Occlusal adjustment to facilitate excursive movement as per generally accepted principles.

As a rule, the occlusion supporting cusps of the posterior, 4 ,5, and 6 must not be ground in any way during occlusal adjustment procedures. They must be preserved in all circumstances.

Laterotrusion

In Laterotrusion on the working side contacts should be created both frontally and between the buccal cusps of the posteriors. For cosmetic reasons, anterior grinding in laterotrusion should be carried out, if possible, only on the lowers. Posterior occlusal adjustments are made only to non occlusion supporting cusps. Prior to this, the occlusion supporting occlusal contacts should be marked as they must be preserved in all circumstances.

Mediotrusion

In mediotrusion on the balancing side, antagonist contacts are required on at least two posterior teeth between the upper lingual cusps and the lower buccal cusps.

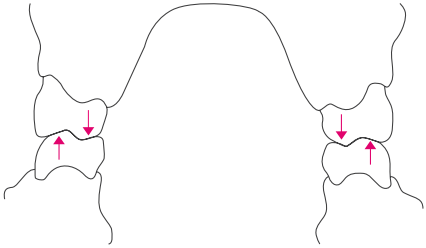

Fig. 5: When adjusting the occlusion, the red arrows indicate the occlusion supporting cusps which must not be ground.

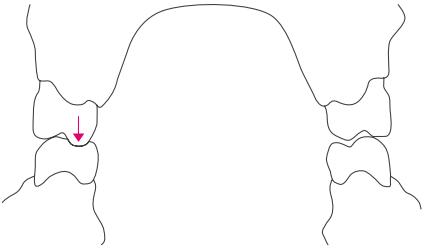

Fig. 6: In this case it is necessary to grind the fossa of the antagonist. As indicated.

Protrusive adjustment:
Bennett angle set at zero

In protrusion, when the upper and lower incisors are "edge to edge", bilateral occlusal support is required distally in the posterior area.

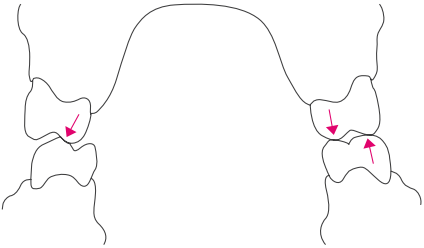

Fig. 7: Optimally balanced posteriors.

14.4 Finishing and Polishing

A high quality polish is a must in order to provide comfort and hygiene for the patient. Light curing glaze varnish is no substitute for a sparkling polish. The working steps towards achieving a good polish are simplified and shortened by careful waxing, wax contouring and carving, investing and the correct use of acrylic/plaster separators both alginate based and silicone. Theories regarding the addition of bulked out gum areas which can be carved or removed as required with trimming burs after processing of the denture acrylic are very inefficient as they require a great deal of both time and experience. The time is far better spent with careful wax contouring, wax carving and preserving this with thoughtful use of the various wax/plaster separators available. If the various working steps are diligently carried out, the denture finishing and polishing time and work is minimised and results in a quality finish for the dentures. After removal of the processed dentures from the flask/mould is the trimming of the acrylic 'flash'.

Do not trim or remove any of the bulk of the denture border/periphery as this is a reproduction of the muscle trimmed, functional impression

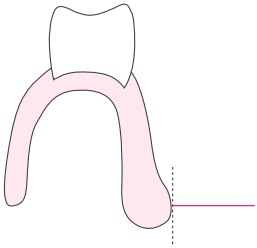

Fig. 8: Remove only the acrylic 'flash'.

which was painstakingly obtained by the Dentist. These borders are important as they contribute towards the seal of the dentures with the tissue which is necessary for retention of the dentures. Additional trimming will diminish or even eliminate the retention.

The palatal finish line and post dam areas are normally clearly visible on the processed denture. The acrylic 'flash' in this area is first removed and the finish line trimmed.

The thickness of the post dam/finish line area of the denture palate can be reduced to a feasible minimum in order to maximise comfort for the patient and avoid nausea.

With a sandpaper mandrel and a suitably fine grade of sandpaper, the lightly trimmed surface of the exposed periphery and reduced post dam/finish line areas can be refined.
Further surface refining can also be accomplished with the use of rubber polishers before finally using pumice.

In regard to the use of abrasives in refining the cut of a surface to be polished, the basic rule is to work from a larger coarser grain progressively towards a finer smaller grain size. This will always give the best possible surface finish and ultimately the best polish.

When beginning the refinement of the denture surface start with the relatively coarse grain abrasive and use on all necessary surfaces of the denture before moving on to a finer grain abrasive. Chopping and changing from coarse to fine and fine to coarse is time consuming and will compromise the surface finish. It makes sense to develop a systematic approach to denture finishing in order to acquire the necessary experience and obtain consistent results.

Particular areas of some dentures are not very accessible to the large polishing brushes mops or felt cones normally used on a polishing lathe. These include the areas immediately around the teeth and very high palates. Such inaccessible areas are best polished at the work bench with the use of small handpiece mounted polishing implements, (brushes, mops and felt cones).

The gingival area of a denture wax up requires special attention as the finishing of the junction of teeth and denture base material must be accomplished without damaging the acrylic teeth. Picking around the gingival with a sharp instrument in order to remove any 'pink acrylic flash' will inevitably cause damage to the surface of the teeth. This whole procedure can be avoided with the use of a silicone protection layer which is applied to the carefully waxed and carved gingival area immediately prior to the pouring of the second (top) half of the denture flask during the investing procedure ("VITAFOL–H"). Use of such products greatly simplify the gingival finishing/polishing procedures and eliminate completely, the otherwise inevitable damage to the surface of the teeth while finishing. Final pumice polishing of such a well finished area is minimised and the danger of over polishing of fine contouring and characterization, eliminated.

A sparkling glaze like surface can be obtained with polishing mops using a good high shine polishing paste the selection of which is one of personal preference. There are many such polishing materials available and a discussion of the pro's and con's of each would probably yield sufficient material for a separate publication on the subject.

For those who may be accustomed to working procedures and sequences different from those described, it will likely take time and some effort to 'change their ways!' If however they choose to do so, they will be rewarded with increased productivity and above all the high quality of their work will be obvious to their Dentist client's, patients and most importantly, themselves.

14.5 Seating and issue of the dentures

In the entire sequence of the various working steps, the seating and issue of the dentures is undoubtably the most important moment for all involved. Checking the retentitiveness of the dentures, their functional stability and their aesthetics are the penultimate steps in this procedural chain.

14.6 Remounting the dentures

Patient aftercare is an integral part of treatment. Remounting of the dentures after a short time in the mouth is essential and should be done after the dentures have been worn for about 24 hours.

For this purpose, newly fabricated models and a new bite are used to remount the dentures on the articulator. It is important that the bite recording medium not be perforated as this would produce an not physiological bite relationship with possible pathological consequences. It is also most important that the remounting not be done on the "used" models. Polymerisation will have caused volumetric change and if used for remounting would subject the dentures to harmful stresses.

For the purpose of model remounting, the use of split – cast models or mounting plates are useful along with the indispensible use of articulation Shimstock foil.

This particular step should be carried out with much care in order to obtain the optimum occlusal comfort for the patient. If not done with care it would seem so to speak that the cake is being delivered without the icing.

14.7 Instructions for care

Caring for dentures.

- Using toothpaste and hard bristle toothbrushes are not recommended.
- Dish washing liquid and a SOFT brush are excellent for the purpose.
- Any tartar can be removed by immersion in vinegar.
- The occasional immersion in water with a denture cleansing tablet is also helpful.

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