GUIDES TO STANDARDS IN PROSTHETIC DENTISTRY
- COMPLETE AND PARTIAL DENTURES

A Report by the British Society for the Study of Prosthetic Dentistry

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Foreword

At the request of the Council of the British Society for the Study of Prosthetic Dentistry in 2003, a Working Party was convened to review the Guides to Standards in Prosthetic Dentistry formulated by the Society in 1994. We are pleased to report that very few changes were considered necessary. This is a tribute to the foresight and hard work of the original Working Party whose remit was set out in their report[1].

The revised guidelines relate to the practice of complete and partial Prosthodontics including the technical aspects of denture construction. They refer to the minimum acceptable standards appropriate to the United Kingdom. It was agreed by Council that standards for implant retained prostheses and for immediate dentures should form the remit of another group.

The provision of satisfactory complete dentures and partial dentures is a team approach involving clinician, technician, and patient. All should be involved in the design and construction of dentures in their respective ways. The clinician must be aware of the patient's requirements and take the ultimate responsibility for the final prosthesis. The technician should be involved with the practicalities of the design and must follow the prescription exactly. It is beneficial, where feasible, to involve the technician in the surgery where he/she can see the patient and understand any problems. The nurse should support the patient during the selection of teeth and encourage the patient's comments.

It has been necessary since June 1998 for all prostheses manufactured in dental laboratories to comply with the European Union Medical Devices Directive (MDD), and for laboratories to be registered with MDD:

Article 22(4) of Directive 93/42/EEC requires Member States to accept the placing on the market and the putting into service of devices which conform to the rules in force in their territory on 31 December 1994 (pre-existing national rules) during a period of five years following the adoption of the aforementioned Directive, i.e. ending on 14 June 1998. Accordingly, since 1st January 1995, when Directive 93'42/EEC became first applicable, it has been possible to place medical devices on the market and put them into service either in accordance with the pre-existing national rules or in compliance with Directive 93/42/EEC.

From 15 June 1998, it will only be possible to place medical devices on the market and put them into service if they comply with Directive 93/42/EEC.

One requirement of the Directive is that the device is manufactured according to the prescription requiring the clinician to provide this for all patients.

Further information about the Medical Devices Directive can be obtained from the Medical Devices Agency (since April 2003 part of the Medicines and Healthcare products Regulatory Agency)

Internet sites:

www.mhra.gov.uk

www.medical-devices.gov.uk

The Construction of Complete Dentures

Complete dentures are constructed to restore normal speech, provide occlusal and facial support and adequate masticatory function. They should have a pleasing appearance, be comfortable to wear, and not prejudice the health of the supporting tissues. There can, however, be no guarantee that they will satisfy all these criteria for patients who have poor denture control skills, poor motivation, inadequate foundations, or intolerance to prostheses.

Preparation of the mouth prior to treatment and the design of complete dentures is the responsibility of the clinician.

A) CLINICAL PROCEDURES

Diagnosis and treatment plan

In order to formulate the treatment plan a medical and dental history should be taken and a clinical examination carried out, together with any appropriate investigations. Radiographs should only be taken when there are clear clinical indications. Previous dentures should be examined in conjunction with any complaints from the patient. Any pathological conditions should be investigated and appropriate treatment provided in order to render the oral tissues healthy before final impressions are made. Any elective surgery should be carried out at an appropriate stage.

There should be a clear treatment plan and expected outcome put to the patient, ideally in writing, so that they are able to make an informed decision of accepting the treatment proposed and related costs. It is well to remember that dentures are seen as goods and therefore subject to the Sale of Goods Act. This means that that they are suitable for the purpose for which they were made (i.e. to replace missing teeth) or according to the contract with explanation of any possible shortcomings.

Primary impressions

The requirements of the primary impressions are that they should accurately record clinically relevant landmarks of the edentulous mouth without excessive tissue distortion. They should be made in rigid stock trays modified as necessary to fit the form of the denture bearing area.

Maxillary impressions should record the following:

i) The residual ridge, tuberosities and hamular notches.
ii) Functional labial and buccal sulci, including the fraena
iii) The hard palate and its junction with the soft palate.

Mandibular impressions should record the following:

i) The residual ridge and retromolar pads.
ii) Functional labial and buccal sulci, fraena and the external oblique ridges.
iii) The lingual sulcus, lingual fraenum, mylohyoid ridge and retromylohyoid area. The impression should be recorded with the mylohyoid muscle in a functional raised position.

Where the impression is over-extended in relation to the functional depth of the sulcus, a clear indication should be made on the impression or resultant cast to help the technician in the construction of special trays.

Appropriate spaced or close fitting rigid trays should be requested in the laboratory prescription, depending on the type of impression material and technique to be used and the anatomy of the denture bearing area. The site for any stops, the type and position of the handle, as well as the amount of spacing should be stipulated by the clinician.

Working impressions

These should record the entire functional denture bearing area to ensure maximum support, retention and stability for the denture during use. Each special tray should be examined in the mouth and adjusted as necessary to satisfy the above requirements.

To ensure adequate lip and cheek support the maxillary impression should show an intact rounded record of the labial and buccal sulci, together with the fraena. It should extend posteriorly to the hamular notches and just beyond the junction of hard and soft palates. The mandibular impression should show an intact rounded record of the labial, buccal and lingual sulci, including the fraena. It should extend posteriorly to cover the retromolar pads.

Impressions should be boxed or the borders marked appropriately before the casts are poured in order to preserve an accurate record of the functional depth **and width** of the sulci.

Recording jaw relations (maxillo-mandibular relations)

The bases which carry the occlusal rims should be rigid and stable. The upper rim is modified to give correct lip support, which will vary from patient to patient. The incisive papilla provides a useful biometric guide to the prominence of the rim, its centre lying 8-10 mm palatal to the labial surfaces

of the maxillary central incisors (in the natural dentition). Patients' wishes, or previous satisfactory dentures, may sometimes dictate otherwise.

The length of the upper rim should be adjusted to indicate the level for the upper anterior denture teeth and the antero-posterior (occlusal) plane made parallel to the interpupillary and alar-tragal lines (unless facial asymmetry warrants an alternative). A centre line should be marked on the upper rim. This will usually be coincident with the midline of the face. High and low smile lines, and the corners of the mouth may also be indicated. It may also be advantageous to mark the centre line of the lower rim.

The occlusal vertical dimension should provide for most patients a minimum inter-occlusal clearance (freeway space) of 2-4 mm in the premolar region. It is established by adjustment of the lower occlusal rim and verified using various techniques of clinical measurement.

Failure to provide sufficient freeway space may lead to muscular discomfort, pain involving the denture bearing areas, and possible increased bone resorption. Excessive freeway space may lead to cheek biting, angular cheilitis, poor appearance and contribute to discomfort from the temporomandibular joints. Progressive incremental additions of acrylic resin to the occlusal surfaces of existing or diagnostic dentures may be necessary before a satisfactory occlusal vertical dimension can be established. It is essential to obtain a patient's consent before making modifications to their existing dentures.

The horizontal jaw relationship to be recorded at the established occlusal vertical dimension is retruded contact position (RCP). This is a reproducible position at which the denture teeth are placed in intercuspal position (ICP). Once this position can be reproduced, the bucco-lingual width of the occlusal rims should be adjusted to identify the "denture space" (neutral zone). This is important in order to provide tongue space, facial soft tissue support, and denture stability. In some instances functional recording of the mandibular denture space may be appropriate using a suitable impression material on a stable base.

The occlusal rims must be located securely together in RCP in the mouth using an accepted technique. Small V-shaped notches may be cut bilaterally in the occlusal surfaces of the rims prior to the use of a suitable registration material. Wax as a recording medium in these circumstances is not generally recommended. Zinc oxide/Eugenol impression paste or rigid silicone registrations have the advantage of relocation if the rims become detached during transportation. The use of a face-bow may be desirable with a semi-adjustable articulator, although in the majority of situations an average value articulator will suffice. In this latter case, any change in occlusal vertical dimension will require new records to be made.

The prescription accompanying the registration should give details of mould, shade, material, and manufacturer's brand of chosen teeth. A diagram may help the technician with the arrangement. The cusp form, material, and size

of posterior teeth should be selected. The number of teeth to be used and their anatomical type should be recorded.

When setting up the teeth it is usual to limit the lower occlusal table to the horizontal part of the ridge and to avoid placing teeth over an inclined plane of the ascending ramus. Where patients have extremely resorbed lower ridges, and have had problems with previous lower dentures, the use of premolars rather than molars for the lower set up is suggested.

An impression of a previous denture may be helpful to the technician where a particular form of anterior tooth arrangement is to be repeated.

Photographs which show the patients natural teeth and facial appearance may also be helpful.

The trial insertion

The occlusal plane, occlusal vertical dimension, and RCP should be verified as correct. Tooth position and arrangement should provide adequate lip and cheek support and tongue space, allow clear speech, and give a pleasing appearance to the patient. Where alterations are required to the horizontal or vertical jaw relationship, a new recording will be required and a re-try necessary.

The position of the posterior palatal border of the maxillary base should be examined to ensure it is correctly extended just beyond the junction of hard and soft palate lying on displaceable but non-moving tissue. The foveae palati act as a useful landmark, lying 2-3 mm behind the posterior margin of the hard palate. It is the clinician's responsibility to cut a post dam on the master cast in the appropriate position unless a functional post dam was incorporated into the final impression. The patient should be given the opportunity to see the trial dentures in place at this stage. It is wise for them to agree verbally (and ideally in writing) that the appearance is satisfactory.

The extension of the lower base onto the retromolar pad should be clearly indicated on the cast for the technician.

Insertion of the dentures

The denture bases should be inspected and any remaining surface blemishes or defects removed. Each denture should be inserted and assessed for retention, extension, appearance, and stability. Factors assessed at the trial stage such as lip support, speech, and horizontal and vertical jaw relationships should be reconfirmed as correct. Articulating paper or foil may be used to examine occlusion and articulation in the mouth, although this should be carried out with caution to avoid errors.

A pressure indicating paste or other suitable recording material may be used on the fitting surfaces of the dentures to indicate excessive tissue displacement.

A check record is a useful method for refining the occlusion, the dentures being re-mounted on the original articulator and adjustments carried out to provide correct articulation. It is strongly recommended that the processed

dentures are routinely remounted on the articulator following deflasking (using the split-cast method), and the occlusion adjusted and ground in to overcome processing inaccuracies before returning to the clinic/surgery.

A check record may not then be necessary at the insertion stage, but could be valuable at the review appointment after the dentures have been worn for a period and the supporting tissues have adapted to them.

Instructions (both verbal and written) on the use and care of dentures should be given to the patient, and a review appointment made approximately one week later.

Inspection and review

At the review appointment, any adjustments should be made to the dentures in the light of the patient's experiences or complaints. The denture bearing areas should be examined for signs of trauma even in the absence of patient complaints. The occlusion and articulation should be examined at this stage.

The importance of attending for regular review should be explained to the patient.

Addendum

The above guidelines are meant to cover techniques used in the different stages of complete denture construction. However, it is accepted that variations may occur, some of which are listed below:

- Copy/duplication techniques are extremely valuable for many patients, particularly the elderly. The techniques have been well documented[2-5] and enable reasonably similar copies of previous satisfactory dentures to be made with a minimum of clinical visits.
- Making working impressions in a patient's existing dentures may eliminate the need for primary impressions, special tray construction and occasionally jaw registration rims.
- Using appropriate impression materials, and by modifying stock trays, acceptable working impressions can be made without the need for special trays in some situations.

Disinfection

In all cases due regard should be given to the disinfection of all materials/prostheses which pass from clinician to laboratory and vice versa, according to health and safety requirements.

NB The British Dental Association Infection Control Workshop held in 2003 is recommended reading, particularly Workshop 4 on decontamination and disinfection. This can be accessed from the following address:
http://www.bda-dentistry.org.uk/pdfs/ICWorkshop4.pdf

Current practice and disinfection agents are subject to change and it is a clinician's responsibility to keep up to date on such matters.

B) TECHNICAL PROCEDURES

The clinician is responsible for the provision of complete dentures. At each stage the dentist should provide a clear prescription for the laboratory. If the technical quality of the dentures is inadequate it is the clinician's responsibility to have the problem remedied.

Primary casts and special trays

Surface moisture should be removed from the impressions after rinsing and before casting. Plaster of Paris and dental stone (50/50 w/w) are vacuum mixed with water. The impressions are cast using vibration to eliminate air bubbles and separated from the cast after 40 minutes. The cast should record the depth and width of the sulci and be surrounded by a "land" width of at least 3mm. The base should be 10 mm thicker than the deepest part of the impression. The "land" area should always be recorded unless the extent of the special tray has been indicated on the impression by the clinician.

Special trays are made according to the clinical prescription, which will stipulate the amount of spacing (if any) and stops. Handles must be designed to avoid distortion of the tongue or lips and finger rests are required in the premolar region on the mandibular tray to prevent the operator's fingers distorting the soft tissues. The borders of the tray should normally extend to the deepest part (or slightly short if border moulding techniques are to be used) of the functionally recorded sulcus, or to an outline on the cast made by the clinician. In the maxilla it should extend posteriorly to the hamular notches and fovea palati ; in the mandible to the distal aspect of the retromolar pads.

Working casts and registration rims

Surface moisture should be removed from the impressions after rinsing and before casting. Dental stone in the correct measure is vacuum mixed with water and the impression cast. The thickness of the base and the width of the "land" is the same as for primary casts.

The base of the registration block should normally be made of a rigid material. Close adaptation of the base to the working cast is essential for stability in the mouth and accurate registration of jaw relations.

Registration rims are usually made of wax. The upper block should measure approximately 22 mm in height from the deepest part of the sulcus adjacent to the midline fraenum. The equivalent dimension of the lower block should measure approximately 19 mm anteriorly

Wax rims are positioned bucco-lingually in the same place as the lost teeth, according to the amount of resorption that has taken place. The occlusal surface of the lower rim passes posteriorly from its anterior edge to a point 2/3 up the retromolar pads. The upper rim should be created using an occlusal rim inclinator so that in the mouth it can easily be adjusted to be parallel to the alar-tragal line antero-posteriorly.

Mounting and setting up

The registration rims are mounted on a semi-adjustable or average value articulator (according to clinical requirements), preferably using the split cast technique. After noting the prescription for tooth arrangement, the maxillary anterior teeth are set up in accordance with the marked centre line, always conforming to the contour of the wax rim.

Unless the prescription says otherwise, or a neutral zone (piezograph) technique has been used, the mandibular posterior teeth are placed to conform to the buccal contour of the wax rim. It is wise, particularly with flat lower ridges, to avoid the most posterior tooth being positioned over an inclined plane, and to achieve this, the last tooth should be at the posterior extremity of the horizontal part of the ridge.

The teeth are adjusted to allow balanced articulation in lateral and protrusive excursions. Any part of the try-in base which was removed to facilitate registration is replaced unless this interferes with occlusal balance.

Processing and finishing

While in ICP on the articulator, the try-in is sealed to the casts with wax around the denture borders. Following processing, the dentures (still on casts) should be replaced on the articulator, by means of the split cast, and any processing errors removed by occlusal adjustment.

Finishing and polishing is carried out carefully to preserve the full width and depth of the recorded borders. Apart from the removal of imperfections, the fitting surface remains untouched. The completed dentures should be stored in clean water (with antiseptic as appropriate) after removal of traces of polish. Denture identification is a desirable option with complete dentures.

Check record

Where this is requested, it is preferably carried out on the original casts if possible. Failing this, the dentures may be remounted on an articulator using quick setting plaster and occlusal adjustments carried out.

The Construction of Partial Dentures

Partial dentures should assist the mastication of food, be cosmetically pleasing and help maintain normal speech. They may also be required to maintain oral health and prevent tilting and overeruption of natural teeth. They should never be made merely to "fill gaps" in the mouth and should be designed and constructed in such a way as to minimise oral damage. A high standard of oral hygiene is necessary on the part of the patient. The underlying principles of support, retention and stability should be understood whatever type of partial denture is to be made.

A) Clinical Procedures

Diagnosis and treatment plan

In order to formulate the treatment plan a medical and dental history should be taken, noting the patient's complaints, dental experience and attitude to treatment. The natural teeth should be examined, their number, position and occlusal relations noted, and evidence of caries, plaque, periodontal diseases and tooth mobility recorded. The state of the mucosa should be examined and previous dentures inspected in relation to the natural teeth and the patient's experience. Radiographs of the teeth and supporting tissues may be necessary. Pathological conditions should be investigated and treated appropriately.

Extraction of teeth, periodontal treatment or restorative treatment of any kind should be completed prior to partial denture construction. However, it is essential that the provisional design of the dentures is made early in the treatment plan so that the most appropriate restorations are placed in any natural teeth which will act as abutments for the partial denture. When crowns or cast restorations are to used to restore abutment teeth they should be designed to incorporate suitable features for the partial denture (e.g. guide planes, rest seats, milled ledges and suitable undercuts for clasps). Dietary advice and attention to oral hygiene should be given as appropriate.

Impressions for study casts

Study casts are essential, along with clinical and any radiographic examinations, in the assessment and planning of partial dentures.

A suitable elastic impression material in a rigid tray, modified where necessary, should be used to record the teeth, palate, edentulous areas and labial, buccal and lingual sulci. Casts should be poured in stone and, where the occlusion is self-evident, mounted on an articulator in the intercuspal position (ICP). In some instances it is possible to hand-hold the casts for analysis of the occlusion. Where the occlusion is not self evident, occlusal rims should be constructed and either ICP or the retruded contact position (RCP) recorded, depending on the natural teeth present and position required. A face-bow record may be taken where a semi-adjustable articulator is to be used. The mounted casts should be examined and the

occlusion compared with that of the patient. It is important that they exactly coincide unless alteration to the relationship is being made deliberately.

The use of a plasterless articulator and silicone registration may be an acceptable alternative for designing partial dentures in the surgery where there are no facilities for mounting with plaster.

Partial denture design

N.B. In order to design a partial denture correctly, a surveyor is an essential piece of equipment in the surgery.

The design of a partial denture is the duty and responsibility of the clinician. The dentist should survey the cast and choose the most appropriate path of insertion for the denture in relation to suitable guide planes, tooth and bone undercuts and appearance. The path of insertion and removal should be transmitted to the laboratory by marking lines parallel to the analysing rod on each side and back edge of the study cast. Restorative work involving technical procedures requires a close relationship between clinician and technician and discussion of a proposed design firstly with the technician and subsequently with the patient can only enhance the likely success of the treatment. The framework should be designed outlining the saddle areas, occlusal and other support, the direct retainers and any necessary indirect retention to prevent rotation. Resistance to lateral and antero-posterior displacing forces should be planned, and connectors should be rigid and strong with minimal gingival coverage. The position of the undercut to be engaged by each clasp arm should be indicated on the cast, and the type of clasp and material to be used included in the prescription.

Any tooth alteration procedures necessary to improve the effectiveness of the design should be noted. In addition to the preparation of guide planes, rest seats, recontouring of buccal or lingual tooth surfaces and occlusal adjustments, it is sometimes useful to modify the natural teeth by addition of adhesive restorative materials.

The design and written instructions should form a comprehensive prescription for the laboratory to follow, aided where possible by a design drawn on the study cast.

Where anterior teeth are being replaced, it is valuable at this stage (and certainly prior to construction of a metal framework) to try in a waxed up denture to determine the final position of the teeth so that the technician can place the retentive components for the teeth and saddle in the most favourable position.

Working impressions

After all tooth preparation and restorative procedures have been carried out according to the treatment plan, verification should be made that there is sufficient clearance for the denture base and components. Final impressions should be recorded using either a modified metal stock tray or preferably a rigid special tray. When a cast metal framework is to be constructed such impressions should be recorded in a dimensionally stable elastomeric

material. To prevent tearing and distortion of the impression material, large interdental spaces beneath contact points should be blocked out in the mouth using soft ribbon wax or other suitable material, prior to completion of the impression. Where alginate is used, stone casts should be poured immediately to minimise dimensional change. Each impression should be examined for defects and the surface should exhibit clear detail. No part should be detached from the tray. Any excess unsupported bulk of material should be removed with a sharp instrument to prevent distortion.

Master casts should be treated with great care to avoid the risk of abrasion. Duplicate master casts should be made for use at a later stage.

Recording jaw relationships

The occlusion will already have been recorded as outlined under "Impressions for study casts". However, for greater accuracy where a cast metal framework is to be constructed, the jaw relationship should be recorded again using occlusal rims (if appropriate) constructed on a duplicate master cast. Where anterior teeth are being replaced, a wax trial denture should have been constructed on a duplicate master cast and tried in the mouth before construction of the metal framework in order to indicate to the technician the position of retentive components and/or any necessary "backings", as outlined previously.

Construction of the metal framework

It is essential that written and diagrammatic instructions are submitted to the laboratory on an appropriate prescription form. Both clinician and laboratory should retain a copy. The path of insertion, and the positioning of critical borders of major connectors, tissue relief (where necessary) and tissue stops for free-end (distal extension) saddles indicated by the clinician should be noted by the laboratory along with the rest of the design. Mounted duplicate casts should be returned to the laboratory at this stage to indicate occlusal relationships, as should wax trial dentures using anterior teeth.

Try-in of the framework

The framework should be presented on mounted master casts. The returned framework should conform precisely to the design prescription sent to the laboratory by the clinician. Criteria for the objective assessment of cobalt-chromium castings have been developed and minimum standards that may be applied in clinical practice suggested [6]. On trying in the mouth, any minor errors may be located using a disclosing material and corrections made to ensure a precise fit. If a casting fits the master cast but does not fit the mouth then the most likely source of error is the impression (unless the cast has been damaged or inaccurately 'blocked out'). A new impression and remake of the casting is then necessary.

Occlusal relationships should be examined with the framework in the mouth and any interferences with the opposing teeth noted. Only minor interferences can be dealt with by altering the framework since excessive thinning increases the risk of subsequent fracture. There should be a minimum thickness of 1mm at the rest/minor connector junction. Although adjustment of opposing teeth as part of the treatment plan to provide a

satisfactory denture is acceptable, modification at the try-in stage because of lack of room demonstrates poor clinical practice.

An occlusal rim may be added to the framework to record the jaw relationship again if this is found to be in error, provided the framework does not interfere with the occlusion.

With a free-end (distal extension) saddle, the altered cast or other differential impression technique may be used to give a more stable denture.

The shade, mould and material of the denture teeth should be selected at this stage if not already recorded.

Trial insertion

The trial partial denture should be tried in the mouth to check occlusion, appearance and speech, and should be satisfactory to both clinician and patient. It is wise for them to agree verbally (and ideally in writing) that the appearance is satisfactory.

Final Insertion

The finished partial denture, which has been processed on the blocked-out master cast, should ideally be presented to the clinician on the duplicate master cast mounted on the articulator. The occlusal relationship should be checked once again to ensure that there are even bilateral contacts at the correct horizontal and vertical jaw relationship and that the denture does not cause any occlusal interference. Minimal adjustment should be required, although it may be necessary to correct processing errors. The fitting surface of the saddles should be checked with a disclosing paste or other suitable material and any pressure areas relieved.

Patients should be instructed on the insertion and removal of their new denture(s).

Verbal and written instructions should be given to the patient on the use and care of the partial denture, in particular the need to maintain good oral hygiene and health of the natural teeth and soft tissues. The need for careful handling of delicate components should be stressed.

Inspection and review

After the denture is fitted, the patient should attend for review approximately one week later. Any adjustments may be carried out, and the need to attend for regular review stressed.

NB Due regard should be given to the disinfection and sterilisation of all materials/prostheses which pass from clinician to laboratory and vice versa, according to health and safety requirements. The British Dental Association Infection Control Workshop held in 2003 is recommended reading, particularly Workshop 4 on decontamination and disinfection. This can be accessed from the following address: *http://www.bda-dentistry.org.uk/pdfs/ICWorkshop4.pdf*

B) Technical Procedures

The clinician is responsible for the provision of partial dentures. At each stage the dentist should provide a clear prescription to the laboratory. If the technical quality of the dentures is inadequate it is the clinician's responsibility to have the problem remedied.

Primary casts and special trays

Surface moisture is removed from the impressions before casting. Plaster of Paris and dental stone is the proportions 50/50 (w/w) are vacuum mixed with water, the impression being cast using vibration to eliminate air bubbles and removed from the cast after 40 minutes. .The base must be at least 10mm thicker than the deepest part of the impression.

Special trays are made according to the clinician's prescription which will stipulate the amount of spacing (this will depend on the type of impression material to be used for the working impression) and position of any stops.

Working casts and registration rims

The surface of the impression is rinsed with water and dried with air. Dental stone for acrylic resin dentures, and class 4 die-stone for cobalt chromium dentures, in correct measure, is vacuum mixed with water and the impression cast in the same way as for primary casts. The tray should be carefully removed and may need to be burnt off to avoid fracture of teeth on the cast. The casts should be surveyed using the path of insertion already indicated by the clinician on the primary casts. Unwanted undercuts should be blocked out using appropriate materials (preferably plaster rather than wax) and the cast duplicated.

The base of the registration rim is made from a suitable rigid material. Good adaptation of the base to the working cast is essential for stability in the mouth and accurate registration of the jaw relations. Wax registration rims are positioned onto the saddle areas to be level with and no wider than the remaining standing teeth, and should be constructed on the duplicate master cast in the case of a metal framework.

Mounting, metal work construction and set-up

The master casts are mounted with the aid of the registration rims on a semi-adjustable or an average value articulator, preferably using the split-cast technique.

The metal partial denture framework is constructed on a duplicated investment master cast, after the master cast has been prepared. The metal framework should fit accurately with no sharp edges, ensuring that clasp arms will not impinge on the mucosa and will terminate in the correct depth of undercut. It should also be highly polished on the non-fitting surface.

Altered cast technique

The clinician may at this stage have used an additional impression where free-end (distal extension) saddles are present. On receipt of the new saddle impression the old saddle area should be removed from the master cast, the denture framework seated and a new saddle cast (the new master cast will need to be reduplicated). The tissue stop may no longer touch the crest of the ridge on the new cast but this contact can be re-established before processing by placing a small amount of self-curing resin between the stop and the cast.

After noting the prescription for tooth arrangement, the maxillary and mandibular teeth are set up to conform to the contours and occlusion of the remaining natural teeth, as per the prescription from the clinician. With free-end saddle (distal extension) cases premolars may be preferred to molars as discussed previously in relation to the lower complete denture.

Processing and finishing

While in occlusion on the articulator the try-in is sealed to the cast with wax around the borders of the saddles. After processing, the denture (still attached to the cast) is remounted on the articulator and any occlusal processing errors adjusted. Smoothing and polishing is carried out taking care to preserve the recorded borders. Apart from the removal of surface imperfections, the fitting surface must remain untouched.

After completion, the denture is thoroughly cleaned of traces of polish before being placed in antiseptic to maintain the water balance and prevent cross infection. The denture should be presented to the clinician on the duplicate cast.

Check record

If the new occlusion was recorded incorrectly the clinician will make a new registration. The dentures should be remounted onto the articulator using the new occlusal record provided and the occlusal surfaces of the artificial teeth adjusted until an even occlusion is achieved (where severe modification of the denture teeth is needed to achieve this, it may be necessary to replace them).

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