

Complete denture construction manual by Finlay Sutton (Prosthodontist) with Rowan Garstang (Dental Technician)



This complete denture construction protocol is based on the guides published by the British Society of Prosthodontics in 1996. These are as relevant today as when they were first published. The guides can be obtained at: <http://www.bsspd.org/About/BSSPD+guidelines.aspx>. It is relevant to refer to these Guides to Standards in Prosthetic Dentistry as well as these instructions. We attempt to give the patient “prosthodontic privacy”. A phrase created by Dr John Besford, whereby only the patient and treating prosthodontic team know that the patient has prosthetic teeth.

Removable prosthodontics is not easy

Removable prosthodontics is not easy and takes effort and graft to get good at it. Like anything in life that’s worth doing – it is hard, but it’s definitely worth the effort.

The most important factor in delivering successful dentures

Technical factors are extremely important but are not the most important factor in delivering successful dentures.

The patient’s education and understanding of their role is the single most important factor in the success of their dentures.

Having a great technician

Finding and keeping a great dental technician is an essential element to produce beautiful looking and well-fitting dentures for our patients. It is a relationship that requires nurturing through our generosity, kindness, love, time, patience, empathy and encouragement.

It is rather like a marriage, being a wonderful and exciting part of our professional life. Clear, two-way communication is the secret.

The dental nurse

The dental nurse's role in helping us deliver successful dentures cannot be overestimated.

This list of roles is by no means exhaustive and helps to highlight their importance;

- Patient comfort
- Patient understanding
- Aesthetics
- Mixing impression materials
- Patient relaxation

My nurse translates what I say so that the patient fully understands the true nature of wearing dentures. In addition, the patients can be truly honest with the dental nurse regarding the aesthetics of the dentures.

I always try to put myself in the patient's shoes

I always try to listen to understand the patient in all circumstances. This can be difficult if the patient is criticising me directly and my lizard brain is provoking me. In these circumstances, I try to be compassionate towards the patient and my thoughts.

Understanding the patient's concern fully is not enough. The patient has to know that I understand their concern too.

Dealing with our patients, staff and ourselves compassionately

Our patients are often traumatised by their loss of teeth and dignity. This can mean they react in hostile ways towards us as they may be communicating through their reactive and unsophisticated part of the brain sometimes known as the "lizard brain", "chimp" or "child brain". In doing so they can trigger defensive systems in our own brains, meaning that we feel hostile in return. I find it helpful to recognize these feelings both in my brain and body, as well as in my patients, acknowledging these feelings with compassion.

Developing a compassionate mind towards our patients, our staff and ourselves helps me treat them better and produces a much improved treatment outcome. There is good research to back this up and I have found this book very useful in the process – [The Compassionate Mind by Paul Gilbert](#).

How do you get good at making dentures – Deliberate practise

Deliberate practise is the way to get good at providing great dentures. This means:

1. Providing between 5 and 10 dentures a month, for enough to practise new skills
2. Actively seek and be completely open to feedback from an expert denture provider (mentor), from your dental technician, from your dental nurse and from the patient
3. Reading as much about the subject as possible in text books and papers
4. Seeking out and learn from experts on courses – really listen
5. Putting into practice what you learn

There are no quick fixes or easy way, it takes effort, focus and time

Mental pictures - representations

Before embarking on each treatment visit for a patient I want to have a clear mental image in my mind of the outcome of that treatment. For example, if I'm making an impression I want to picture it in my mind before creating it. This means making a mental map of the topography of the mouth, the teeth and sulci – which then leads me to think about how the impression should look. Doing this for each stage has helped improve the quality of the dentures I provide.

Knowledge of the shape of good quality dentures

In general complete dentures should be thin anteriorly and widen out posteriorly.

Uppers - very thin flange under the nose, lip support is gained lower down the flange and from the teeth. The labial edges of the upper central incisors should be between 5.5 - 12 mm from the centre of incisive papilla. The denture flange is wider from the 4s backwards to increase the suction by pressing on the cheeks. The denture fully covers the tuberosities and the post dam border is just in front of the fovea palatini. The coronoid process often flattens the dentures when the patient moves the lower jaw from right to left.

Figure 1 Good shape to a maxillary denture



Lowers – thin anteriorly and widening out posteriorly. Supporting a lower denture appropriately is very important. Primary support is gained from the buccal shelves and retromolar pads. The remaining ridge is secondary support and the lingual part of the ridge offers no support. Lingually the denture terminates at the insertion of the mylohyoid muscle, apart from distal to the 6 into retromylohyoid area where it is 2-3 mm overextended. The denture posteriorly extends completely over the retromolar pad. This is important to get stability and potentially suction from the lower denture.

Figure 2 Good shape to a mandibular denture



Figure 3 Upper central incisors are positioned 5.5 –12 mm in front of the centre of the incisal papilla



Tone voice and litigation

Our tone of voice when talking to our patients can influence the likelihood of litigation. If our voice sounds dominant we are more likely to be sued, than if our voice is less dominant and more concerned. The most corrosive tone of voice that we can assume is a dominant tone. We must be careful to communicate respect for our patients through our tone of voice.

Well engineered lumps of plastic

I liken successful dentures with well-engineered lumps of plastic made within the patients' adaptive capacity.

Consultation with the patient

The initial interview takes place outside of the surgery, away from the clinical environment, enabling the patient to "open up" as much as possible.

For the initial consultation appointment, my patients' produce a numbered wish list of what they would like to achieve following treatment. Once I have examined the patient and made a diagnosis, I use the wish list as the basis for their treatment options discussion and consent. I go through each of the wishes with the patient and say whether I can:

1. Fulfil the wish
2. Not fulfil the wish
3. May be able to fulfil the wish

I then put this in writing as part of their treatment plan letter

Dr John Besford introduced me to this technique and it has really helped me manage my patients' expectations.

During the consultation observations are made of the face and teeth, analysing the lip support, OVD and tooth show. Does it look right?

Photographs

My most important piece of kit – the camera

My camera is the most important piece of equipment I use. I use it constantly for all of my patients. It helps with the following things and more:

1. Diagnosis and treatment planning – particularly helpful for looking at high smile line and aesthetic problems
2. Checking the quality of my work – particularly when I am doing the end of treatment letters
3. Communication with the dental technician
4. When trying to mimic old dentate photographs for a person requiring full or almost full dentures
5. Patient education – showing them evidence of what I can do
6. Teaching colleagues and dental students
7. Communication with referring colleagues
8. A picture tells a thousand words

I use standardised [orthodontic](#) views. In addition, I use a few other extra oral views too which help aesthetically.

I use a [Canon 5D MkIII](#) and [lens](#) with [twin flash](#).

Examination

Extra oral, lip support, tooth show and OVD check.

Check occlusion RCP=ICP or is not coincident. High levels of occlusal wear may indicate excursive movements. Thinking balanced articulation if gross occlusal wear case.

Check extensions of dentures paying particular attention to retro molar pads and upper post dam.

Check retention support and stability

Without dentures in:

Cancer/lesion check

Check the support tissues with finger palpation, if sore areas or moveable areas think relief or potentially soft lining.

Maxillary and mandibular tori must be identified – think relief if these anatomical features are present.

Post examination discussion and in written treatment plan letter

Can the wish list be resolved? Each wish must be discussed with the patient, stating yes it can be resolved, or may be it can or no it can't.

Important - If it is stated something can't be resolved now (before treatment) – this is a diagnosis, if it is stated after the treatment, this is an excuse. This is where the “you should be aware of” part of the letter is very important.

Consent letter – containing all factors a patient should be aware of before treatment

All of my patients receive a treatment plan letter before proceeding with treatment.

There is a part of the letter which explains everything that a patient should be aware of before embarking on treatment and what to expect. This list gets bigger and bigger over time with treating patients as new things that patients experience get added to this list. If these factors are discussed with the patient prior to starting, they are a diagnosis, if they are discussed once the problem arises after denture provision they are often thought of as “an excuse”, by the patient, meaning we are then on the back foot.

Examples on the list are:

1. The dentures will be sore
2. The dentures will cause alteration to speech
3. The dentures are a prosthetic replacement – analogous to a prosthetic hand
4. Adaptation is required – neuromuscular control is discussed
5. Saliva flow changes
6. Chewing and eating
7. Cheek, lip and tongue biting
8. Potential feeling of fullness
9. One year warranty

This above list is not exhaustive.

The patients' letter and contents:

Rowan, the team and I do our absolute best to ensure that all treatment we deliver is successful. Replacing missing teeth (Prosthodontics) is challenging due to the two demands of function (chewing and eating) and aesthetics. The following list contains items that I feel you should be aware of before you decide to have treatment. It covers aspects of this type of treatment, which I feel are important and has been developed over the past 25 years following treating patients with similar requirements to you;

- The new upper denture will extend slightly further back in the mouth compared to your current denture. The extra extension is important in producing good suction (peripheral seal). I feel it is important for you to be aware of this prior to commencing treatment and I am confident that you will accommodate to this.

Under promise and over deliver = success

The success of denture treatment is dependent on fulfilling our patients' expectations.

When I over promise and under deliver I have an unhappy patient.

A successful outcome with a satisfied patient occurs when I have under promised and over delivered. This is where time spent at the beginning so the patient understands the pros and cons of the denture treatment is absolutely crucial.

Denture production process

In general, these are the timings I require to complete each stage for a set of complete dentures satisfactorily.

Visit	Treatment and result	Time required (Hours)	Time Gap	Dental laboratory to produce for next visit
1.	Primary Impressions	1	2 weeks	Special trays and primary registration rims
2.	Definitive impressions	1 ½	2 weeks	Upper rim and lower pivot Central bearing apparatus
3.	Registration stage – portrait and profile view s of patient’s face are sent to dental technician	1 ½	2 weeks	Prototype try in
4.	Try – in of prototype Video and photograph patient Patient assesses the appearance – if happy proceed to fitting, if changes a new try in appointment is made)	1	2 weeks	Process dentures
5.	Fit	1 ½	1 week	
6.	Reviews x 2	1		
Total			9 weeks	

Rehearse everything with the patient

Rehearsing each stage at the start of the patients’ appointment improves the technical quality of the desired outcome. Having a “dry run” - showing the patient the impression tray and practicing the insertion and positioning helps to relax the patient and importantly allows me to practice the positioning of the tray. Talking and rehearsing the process through with the patient really helps them relax and keep calm and is particularly helpful with sensitive gag reflexes.

In addition, rehearsal, helps me to visualise what you are trying to achieve so that you have a clear “mental representation” of the completed step. This is very important.

I rehearse each appointment in the process of making dentures with my patients.

Staying present during every patient contact

Staying present and focused on the procedure and technique is essential during every moment of each patient visit.

In addition, staying present helps my engagement and empathy with the patient too, making a visit which may be uncomfortable, more enjoyable and fun for the patient.

Practising mindfulness and mediation has strengthened this side of my clinical practice helping me to enjoy my clinical work much more.

Soreness of the ridge during the denture construction process

This can be a problem during each visit, particularly in patients who are elderly with friable denture bearing tissues. Making the definitive impressions and doing the registration with the central bearing apparatus can be particularly sore on the lower denture bearing tissues. Soreness at these visits is an indication to use a soft lining such as Molloplast B on the base of the definitive denture.

In these circumstances, I explain to the patient that these appointments may be uncomfortable and I encourage them to push through this, emphasising that these stages do not reflect how the final denture will fit or feel.

Bruxism and the lower denture

Bruxism (clenching and grinding the teeth together) – often known as bruxism still occurs in edentulous patients. This can be problematic underneath the complete lower denture, often resulting in trauma and support problems.

I counsel the patient to be mindful of the bruxism and often advise a soft lining (Molloplast B) on the fitting surface of the denture.

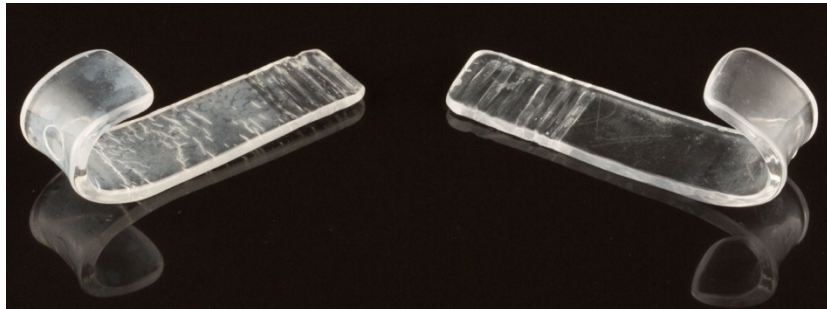
Impression making

Small lip retractors for impression making are very helpful

My dental nurse helps me when I'm impression making by holding the patients lips forward and out with small lip retractors. These help me to visualise the ridge and see more clearly where I need to position the tray. They help with accurate tray positioning.

We have cut down and polished two photographic retractors to do this. [This video shows how they are used.](#)

Figure 4 Lip retractors fashioned from photographic retractors are very useful for correct position of the impression tray in the mouth



The patient's breathing during impression making

I rehearse the procedure thoroughly first before doing the impression – this involves showing and talking through the process. I then do the impression. I talk in a low calm voice (hypnotically) and ask the patient to breathe through their nose (and wiggle their toes in their shoes) – as a distractor.

This helps reduce gagging during this process.

Using a timer to be sure that the dental material has set

I find having a visible stopwatch/timer really handy to let me know when an impression material or bite registration material has set fully. It avoids the temptation to take the material before out fully sets. This prevents having to redo impressions. This is particularly useful in the case of making impression with locator implant abutment mushroom pick ups and prevents them from “pulling out” of the impression.

In addition, a timer is psychologically useful for the patient to know when the impression can be removed from the mouth.

Primary impressions

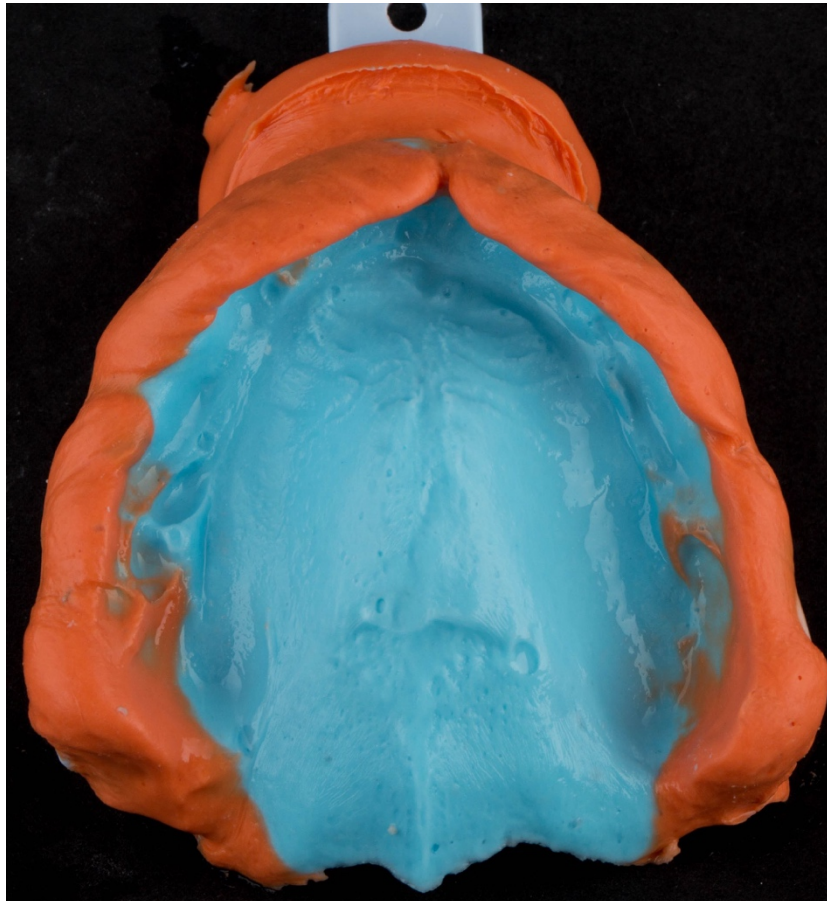
I look in the mouth before taking a primary impression. I look at the depth and width of the sulcus. I rehearse the process of taking the impression and imagine the material filling this space in a smooth roll. Visualising the denture space helps me produce better primary impressions enabling the production of correctly extended special trays.

Primary impressions are always over-extended so that correctly extended special trays can be made on the primary casts.

Maxillary primary impression:

This is made using 2 part Ivoclar Accudent XD impression material. Syringe light bodied alginate into the sulcus from hamular notch round to hamular notch. The heavy bodied alginate is carried in a Schottlander Edentulous tray. The impression is made by positioning the tray at the back of the mouth first and rotated up to include the anterior ridge.

Figure 5 Ideal maxillary primary impression

**Mandibular primary impression:**

This is made using 2 part Ivoclar Accudent XD impression material. Syringe the light bodied alginate from the retromylohyoid region around the lingual sulcus over the retromolar pad and around the buccal and labial sulcus. A “frame cut back tray” (available from Metrodent) is loaded with heavy bodied alginate. This is placed in the mouth and placed down over the lower anterior ridge. The patient is instructed to relax the tongue. Count slowly to 5 and the press gently down over the posterior ridge. The patient is instructed to close up a little and bring their lip together. The cheeks are massaged to allow the border of the mandible to show up in the impression.

Figure 6 Ideal mandibular primary impression



Special tray prescription

The upper special tray is spaced by 2 layers of wax – 3mm for alginate or silicone impressions. This is short of the depth of the sulcus all the way round the periphery by 2 mm. In the post dam region the tray is extended 1mm beyond the fovea palatini.

Figure 7 The upper special tray is made to 2 mm short of the sulcus depth – avoiding the frenum

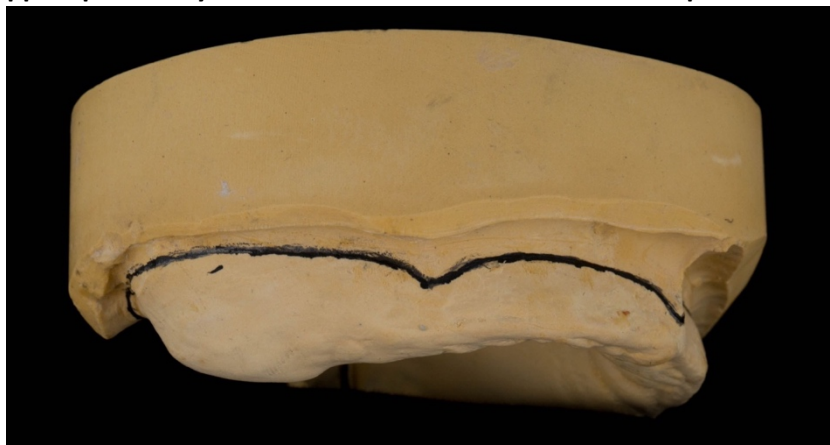


Figure 8 The upper special tray has one handle anteriorly and is held in place



Lower special tray is not spaced – for use with zinc oxide or impregum.

The lower special tray production is made to the following extensions:

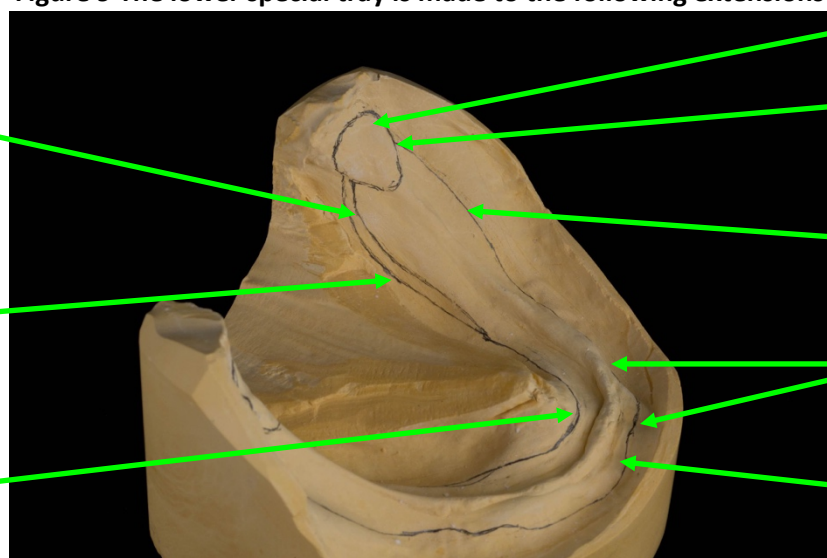
1. Draw round the left retromolar pad fully
2. Avoid the Someya sinew
3. Buccal shelf 2 mm short of the buccal edge of the mandible
4. Avoid midline and buccal frena
5. Labial sulcus 2 mm short of the full depth
6. Draw a line from the middle of the retromolar pad lingually vertically down to the edge of the mylohyoid line and forward anteriorly to the divergence point (where the sublingual gland finishes)
7. Draw a second line 2- 3mm behind line 6 and join up at the divergence point
8. Continue the line on the anteriorly on the lingual border of the mandible
9. Repeat steps 1 – 8 for the right side of the model.

Figure 9 The lower special tray is made to the following extensions

6. Draw a line from the middle of the retromolar pad vertically down to the edge of the mylohyoid line and forward anteriorly to the divergence point

7. Draw a second line 2- 3mm behind line 6 and join up at the divergence point

8. Continue the line anteriorly on the lingual border of the mandible



1. Draw round the left retromolar pad fully

2. Avoid the Someya sinew

3. Buccal shelf 2 mm short of the buccal edge of the mandible

4. Avoid midline and buccal frena

5. Labial sulcus 2 mm short of the full depth

Figure 10 The lower special tray extends to the border of the line having three stub handles



The dental technician must know exactly the requirements of the special tray design.

Definitive impression making

Using greenstick modeling compound Kerr, <http://www.kerrdental.com> is the most important aspect of the production of excellent definitive impressions.

Greenstick is placed in paper kidney dish with hot water. Tray is heated in a Bunsen and softened greenstick is placed (with Vaseline gloved fingers) on the heated tray surface.

Maxillary definitive impressions:

Greenstick is placed in the canine regions and along the post dam. This recreates the wax spacer used to produce the tray. The tray is placed calmly and confidently in the mouth over the ridge and pushed up. These greenstick stops help to locate the tray properly. If the tray is overextended, pushing into the sulci, it is trimmed back to approximately 2mm short of the reflection of the soft tissues.

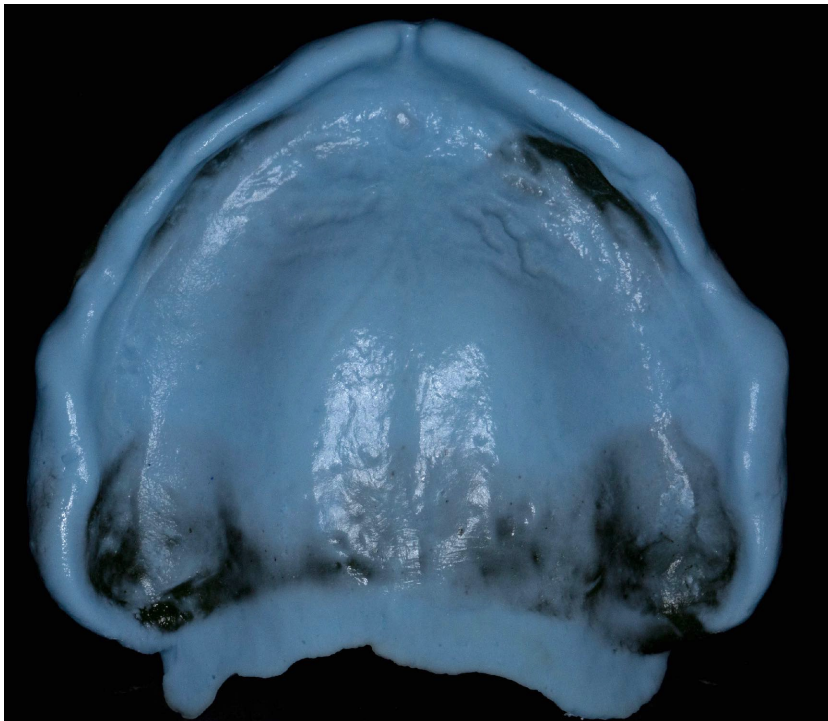
Greenstick is then applied to the borders of the tray from the 4s back to the tuberosities - this enhances suction/retention. Care is taken to keep the labial border of the impression very thin without a border moulding material, corresponding with the minimal bone loss which occurs at the top of the labial sulcus region after the anterior teeth have been extracted. This thinness will allow the upper lip to assume its pre-extraction form when the new dentures are worn. This is placed in the patient's mouth with muscle trimming and the patient is instructed to move the jaws fully, from right to left "waggle the jaws". The cheeks are muscle trimmed.

Figure 11 Greenstick application areas for maxillary definitive impression



A very thin mix of alginate (avoiding over filling the tray) is applied and glazed with water. The same trimming and movements are performed as with greenstick application, with the addition of sucking firmly for 1 second. Keep the periphery thin in the upper anterior region.

Figure 12 Definitive maxillary impression - alginate



Mandibular definitive impressions:

For the mandibular impression, the special tray is first checked for soreness on the fitting surface when seated with firm finger pressure on the posterior stub handles. The tray is adjusted until it is totally comfortable using a wash of light bodied silicone impression material on the fitting surface as fit checker. The retromolar pads are checked with a wash of light bodied silicone impression material. The tray is adjusted, using light bodied silicone impression material as a pressure check, to eliminate deformation of

the retromolar pad when the tray is in place. The extension of the tray is checked so that it is not impinging on the width or the depth of the sulci labially.

Greenstick is applied to the edge of the tray (not the fitting surface) and the tray placed in the mouth so that the tray sits firmly on the ridge as part of the following process:

1. Right and left buccal shelves from canine to second molar position – avoid the retromolar pad – this is moulded in the patients mouth by the patient saying “EEE” and “OOO” with exaggerated cheek movements.
2. Lingually from canine to canine – over the genial tubercle - this is moulded in the patients mouth by the patient by performing a powerful swallow.
3. Right and left lingually from canine to second molar – avoiding the retromolar pad - this is moulded in the patients mouth by the patient licking the upper lip from right to left commissures, pushing the tongue against the lower handle (where the lower anterior teeth would be) and a powerful swallow.

Figure 13 Greenstick application on special tray areas for mandibular definitive impression – fitting surface



Figure 14 Greenstick application on special tray areas for mandibular definitive impression – occlusal surface



Vaseline is placed on the lips. Zinc oxide, SS White <http://www.sswwhite.com/home.asp> (or use Medium viscosity Impregum) is used to finalise the impression – avoiding overfilling the tray. The tray is placed over the ridge and pushed down firmly. The patient is instructed to perform movements 1, 2 and 3 above in the same manner and more exaggerated as for the greenstick application.

Figure 15 Definitive mandibular impression – zinc oxide



Getting the plates parallel on the gothic arch tracing

The central bearing apparatus/gothic arch tracing work properly when they are approximately parallel to each other. The way that I ensure this is to do primary wax rims at the definitive impression stage. The wax rims are trimmed roughly to the correct occlusal vertical dimension and centric relation. The

This takes 5 minutes as it is only approximate and assists in the production of the central bearing apparatus.

The primary rim is trimmed around the borders to allow it to fit as closely as possible to the definitive cast. It doesn't fit perfectly, but when the upper and lower definitive casts are mounted using the primary rims it allows the central bearing apparatus to be constructed parallel to each other. When the central bearing apparatus is taken to the mouth for visit 3 – jaw registration stage it is relatively parallel - resulting in even seating of the mandibular and maxillary plates.

Jaw registration stage

The upper rim is adjusted with a post dam on the definitive cast, to enable the rim to have good retention during the registration. Pre-extraction photographs are a very important guide, even school photographs are very useful. Wedding photos are often the best.

If the patient can't find a dentate photograph with their natural teeth visible, it is still useful to have a photograph of their face, when they had their natural teeth without smiling. These photographs are still an excellent reference giving me lots of information about lip support, lower face height and indirectly their natural teeth positions.

It is much more useful than having no photograph at all.

Post dam position for maxillary complete dentures – the fovea palatini getting a good posterior seal

The posterior border of a maxillary complete denture is positioned at or around the position of the fovea palatini, by cutting a "cupids bow shaped" groove onto the master cast. The post dam groove extends from the right to the left hamular notches, enclosing the tuberosities passing across the midline of the palate within 1 mm of the fovea palatini. I cut a post dam onto on the definitive maxillary cast at the beginning of the registration appointment. The posterior border of the wax rim is warmed and pushed into the post dam on the definitive cast. This ensures that the upper rim has good retention when assessing the aesthetics of the lip support, incisal plane, occlusal plane, centre line and buccal corridors. Without the post dam on the upper rim, the rim can have a tendency to drop down, making assessing the aesthetics impossible to judge with accuracy.

95% of complete dentures I make extend to just in front of the vibrating line. This position is generally within 1 mm of the fovea palatini and produces the best suction. Before treatment I demonstrate this on a denture example and explain it with photos in the treatment plan consent letter.

Sometimes the patient cannot tolerate this extension as it makes them heave or feel sick. This will normally occur at the registration rim stage or denture try in stage. I explain to the patient that this normally resolves itself once the denture is finished and worn. Adaptation to the extension normally occurs. Occasionally though, this does not happen. In these cases I bring the posterior border forward by approximately 10mm at the midline keeping the extension around the tuberosities into the hamular notches. A post dam is added along this border to form a posterior seal.

The retention is often not quite as good as a fully extended posterior border, but it generally is sufficient for the patient to manage well with the new denture. It is particularly important that the other denture parameters are correct, such as sulci extension, tooth positions and the occlusion.

The rim is carved in the following way, the order being very important:

1. The desired lip support is created
2. The incisal plane is carved – usually parallel with the interpupillary line.
3. The occlusal plane is carved parallel with the ala- tragus line.
4. The buccal corridors are carved.

5. The centre line is placed.

The angle of the upper incisal plane

If the patient's eye position is asymmetric – lining up the incisal plane with the interpapillary line may look odd in these cases and therefore experimentation may be required.

I find it best to use a dentate photograph of the patient smiling and mimic the incisal plane of the wax registration rim and denture to the photograph. If this is what the patient wants and they are the final arbiter.

The lower rim with pivots is tried in. The correct OVD is created. This is a purely visual thing. If the OVD looks right, it is right.

Figure 16 Pivots on the lower registration rim – help greatly with registration:



Figure 17 Maxillary and mandibular rim in place



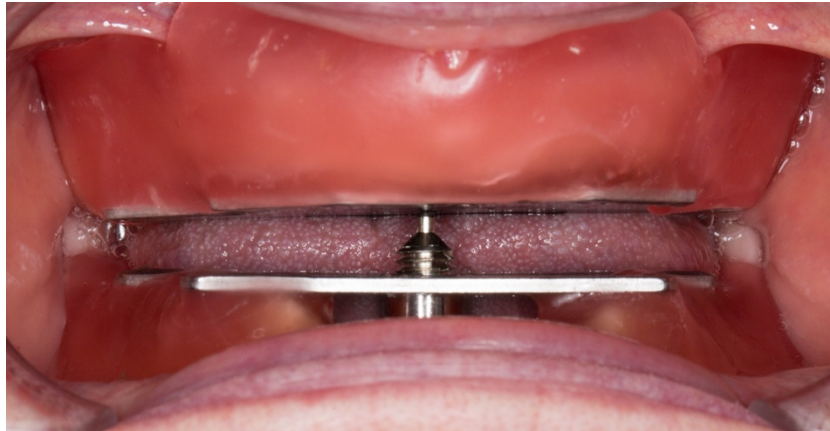
The best way to find centric relation for complete dentures

If RCP is very difficult to find, a central bearing apparatus is used to accurately record maxilla-mandibular relations.

The most reproducible and reliable way of finding centric relation (retruded axis position) is by using a [central bearing apparatus](#).

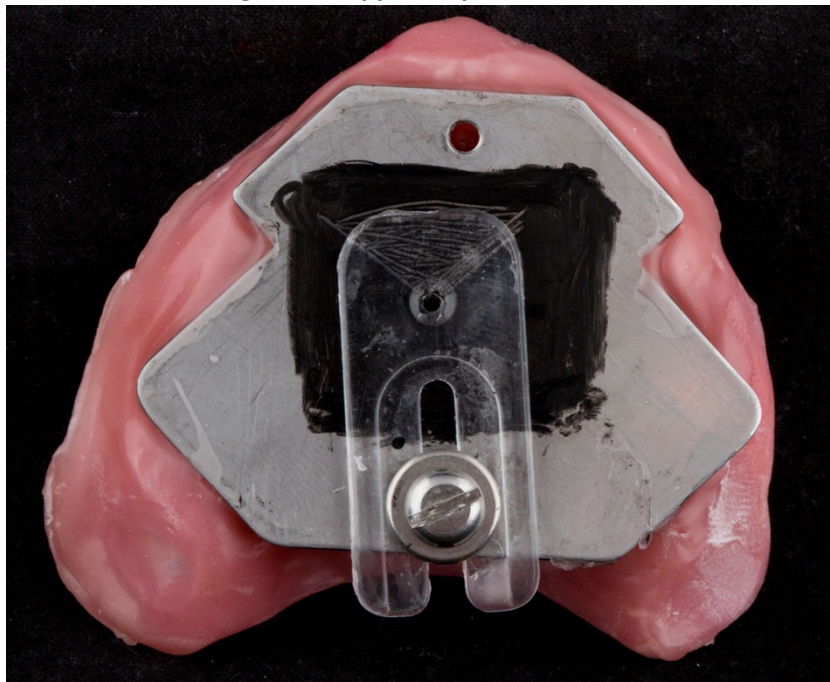
This is where a central bearing point is fixed to one arch and a plate is fixed parallel to the opposing arch. The only point of contact between the upper and lower arches is the central bearing point. The patient scribes a mark on the plate by moving the mandible forwards and backwards and side to side. The scribed mark often looks like an arrow (gothic arch), the tip of which is centric relation. This position is recorded by fixing the upper and lower plates together using an occlusal registration material.

Figure 18 Gothic arch tracing/central bearing apparatus for difficult to find RCP



The occlusal vertical dimension is established properly before the central bearing procedure is performed. The screw is turned to increase or decrease the OVD.

Figure 19 Gothic arch tracing on the upper tray. The head of the arrow indicates RCP



A plastic disc is placed over the arrow-head, in order that that the position can verified and located definitely.

Figure 20 RCP/CR verification

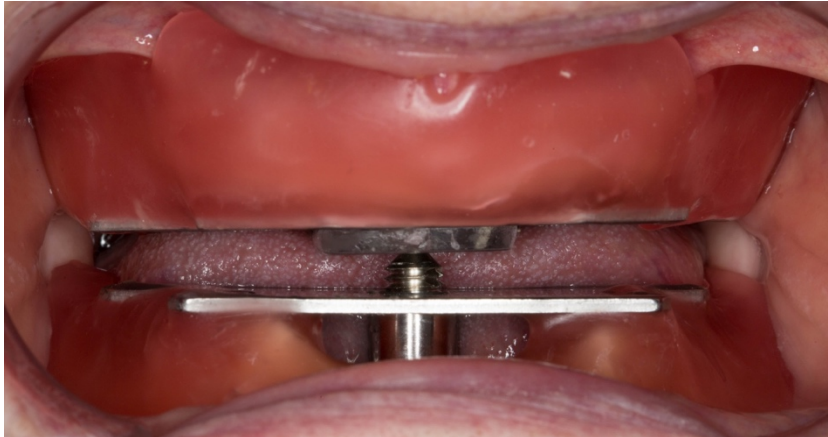
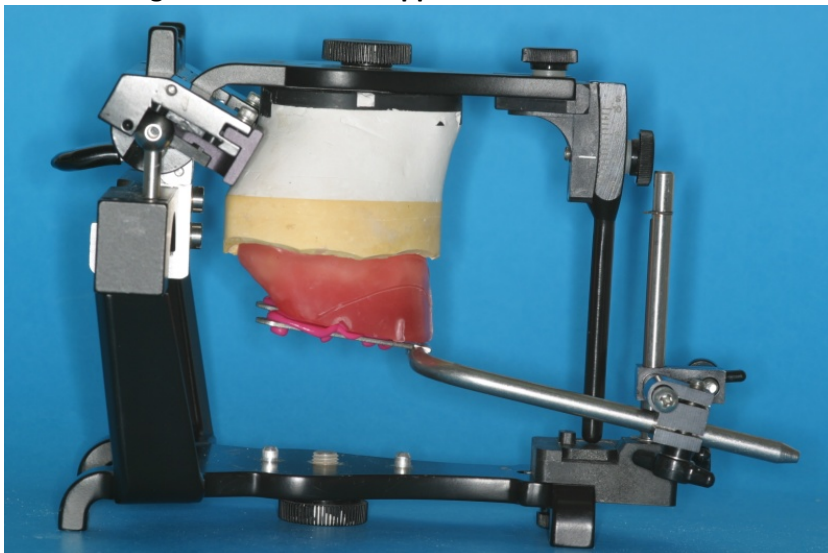


Figure 21 Maxillo-mandibular plates fixed together with plaster



A facebow transfer is routinely used for mounting the maxillary cast in the correct relationship in the articulator.

Figure 22 Mount the upper cast with a facebow



Mounting with a facebow on a semi adjustable articulator helps the development of balanced articulation. In addition, it enables alteration of OVD without needing a new jaw registration.

Photographs of the patient smiling and at rest with the shaped wax rims in place are extremely helpful for the technician. I take the following 10 photographs with the patient smiling and at rest:

1. The right and left profile
2. The right and left three quarter view
3. Portrait view

Photographs of the patient smiling with the shaped wax rims in situ – send to the technician:

Along with dentate photographs of the patient, if these are available, the above photographs are of great assistance for setting the teeth. Corrections to the prescribed tooth positions of the wax rim can be made by the dental technician with reference to these photographs, adding another check in the system.

Trial insertion

If a full frontal dentate photograph of the patient is available then Dr John Besfords tooth size calculation formula can be used to calculate the size of the prosthetic teeth:

$$\text{True width of (UR1 + UL1)} = \frac{\text{Photographic width of (UR1 + UL1)} \times \text{Actual interpupillary distance}}{\text{Photographic interpupillary distance}}$$

The mould and size can be taken from the Engima tooth chart:

<http://www.enigmacosmeticdentures.com/index.php>

The teeth are arranged as per the photograph or other specified parameters. The posterior teeth are mainly arranged into balance articulation, unless aesthetics dictate that an alternative occlusion is necessary. A very important aesthetic factor in, making the dentures life-like is to place darker canines, compared to the incisors. This is how natural teeth are.

In general, the best place to position denture teeth are in the same positions as their natural predecessors. Not only does this make the dentures look like natural teeth with correct lip support, it leads to stable dentures as the artificial teeth sit within the neutral zone.

Be brave with your tooth positioning

To make the denture tooth positioning natural it essential that the clinician and technician are brave. Setting up denture teeth unevenly and wonky in the laboratory, on the bench, does not look as obvious when tried in the mouth.

Exaggerating the teeth imbrication, irregularly and gaps on the model/cast is necessary for it to be visible in the mouth.

The following parameters are checked at try in before the patient looks at the teeth:

1. Occlusion must be the same on the articulator as in the patients mouth
2. The aesthetics.

The patient is photographed extra- orally with the trial set up in place and a short video taken. The photographs are placed on a screen and can be inspected by the patient and dental nurse, without the dentist being present. The teeth are adjusted or a new try-in carried out until the patient is completely happy. The patient can take this home to assess if they wish. It is essential that there is no pressure placed on the patient to accept the denture aesthetically until they are completely happy.

Positioning artificial teeth relative to the edentulous ridge

The upper artificial teeth are positioned outside of the ridge as the resorption pattern causes the crest of the ridge to move in a palatal direction. The labial aspect of the upper central incisors are positioning within a 5.5- 12mm envelope anterior of the centre of the incisal papillae. I think about this when shaping the upper wax rim at the registration appointment.

Lower teeth are set on the ridge as the resorption pattern is vertical leaving the crest of the ridge in the centre of where the natural predecessors were.

Not only does this position the artificial teeth in an aesthetically pleasing position, it leads to stable dentures as the artificial teeth sit within the neutral zone.

Wax try in – gaining patient acceptance of their new dentures using video

The patient sees a much more realistic appearance of themselves if they observe a video (with the sound turned down) of themselves talking, smiling and communicating with the denture try in – in place.

I have found the use of video to be very helpful in gaining patient acceptance. Since using video at the try in from 2013 onwards. Since this time just one patient has required a remake owing to not being happy with the aesthetic outcome.

Take the try in home

What happens if at the end of the try in visit (of the denture teeth set in wax) the patient remains unsure of the aesthetics?

I encourage the patient to take the try in home, along with a memory stick containing photographs and videos taken during the try in appointment (Blog 13). They can assess this at home without any time pressure and show it to close friends and family as they wish. The things they would like altering to the try in dentures are written down and discussed with me and my nurse at the next visit and any changes made. The process is repeated until the patient is completely happy with the aesthetics and only then dentures can then be finished.

The patient is team leader in the appearance of the dentures

The decisive role in creating the appearance of their dentures is made by the patient. The dentist, the dental nurse and the dental technician help to facilitate this. In fact, with all but the most assertive patients, the nurse is best cast as the *patient's* ally and advocate in aesthetic matters, rather than supporting the clinician.

This involvement of the patient inevitably brings with it a feeling of connection with the rest of the dental team and a sense of responsibility.

This is why the aesthetic try-in visits for the prototype dentures cannot be rushed.

Being good at removable prosthodontics is directly relevant to fixed prosthodontics

All of the of the aesthetic principles required for producing aesthetically superb complete dentures apply equally well to large scale fixed dental implant restorations. It is considered best practice in making full arch implant-stabilised fixed restorations, to carry out a full three-dimensional prototypes 'dress rehearsal' with complete dentures.

This has the further advantage that in some cases the patient may be able to settle for very good removable dentures and save the considerable effort and expense of implants, etc.

Complete denture occlusion

Making complete dentures in the patient's home mandibular hinge position, otherwise known as centric relation, is crucial and a major factor in achieving success. If the dentures become loose during function they can be seated back into place by gently biting together.

Balanced occlusion/articulation is a luxury, being almost impossible to achieve clinically and is very rarely necessary.

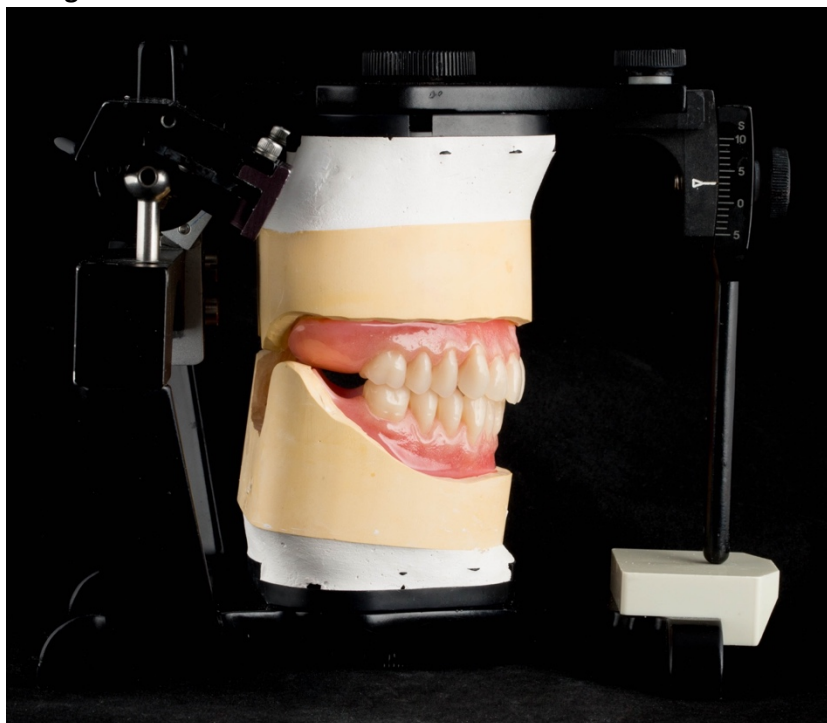
Maxillary Tori – complete dentures

Maxillary midline tori are quite often present in the palate. They are hard bony lumps which can lead to poor complete denture retention as they prevent the denture from sinking into the soft tissues fully. In addition the denture can rock on the torus during functional loading (chewing). Relieving the denture over the tori to prevent these problems.

Denture fit stage

The dentures are processed on duplicated definitive casts and remounted onto the definitive casts. This enables increased ease of fitting the prosthesis and increases the precision of fit. Schottlander Engima Colour Tones are used to create lifelike gingival appearance to the dentures.

Figure 23 Processed dentures remounted to definitive models



At the fitting appointment of new dentures I check the comfort of the denture fitting surface (intaglio) by first asking the patient - "Is it sore?" when I push down on it in the mouth. If it is sore I ask – "please point to the area ". I then place light bodied silicone impression material on the fitting surface and refit the denture in the mouth and wait for it to set. If the denture fitting surface pushes through the impression material in a place the patient has identified as being sore I use a china graph pencil on this, peel off the silicone and grind down the pencil mark. I repeat this until it is comfortable.

This method reduced the number of postoperative adjustments at the review visit by 50%.

Figure 24 Silicone fit check of fitting surface of denture – with pen indicating pressure overload

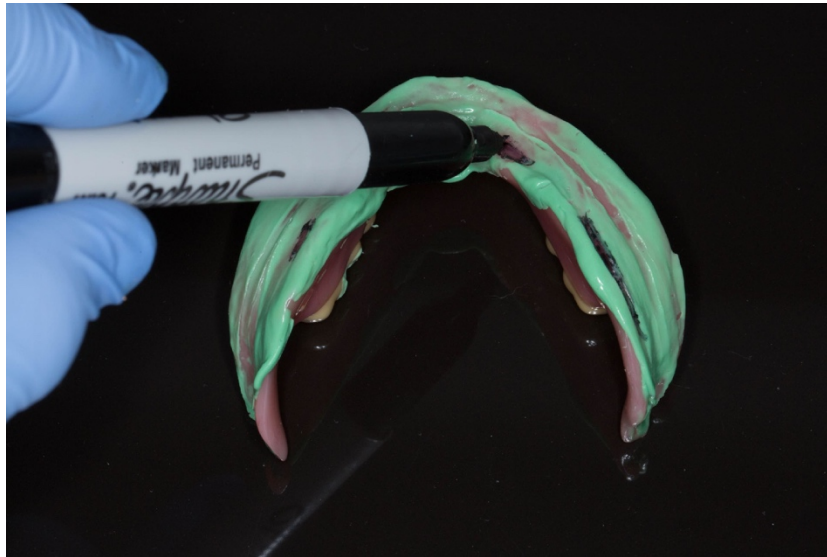
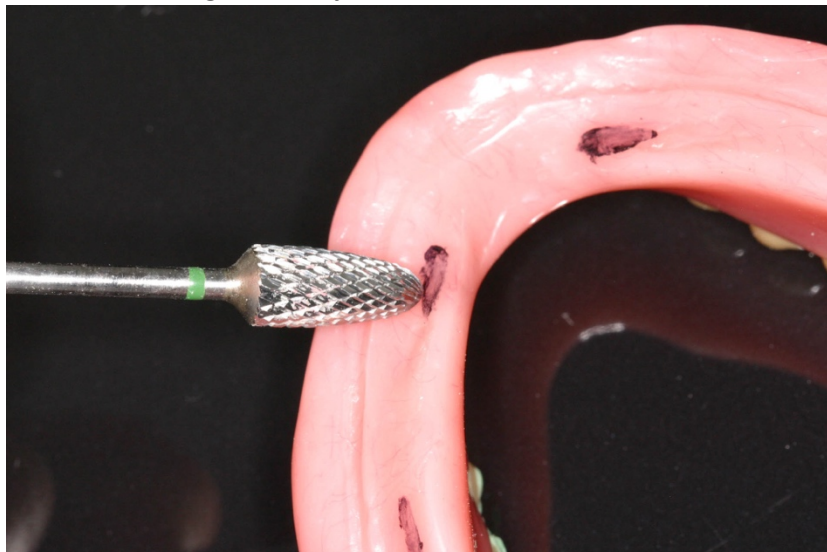


Figure 26 Adjustment of the sore areas



The occlusion is checked, by asking the patient if one side contacts before the other when closing together in retracted contacted position/habitual biting position. Miller's forceps holding articulating paper are used to mark up the contacts. The contacts adjusted are the ones on the side the patient feels is contacting earlier. This is carried out until the patient feels that the bite is even when closing together.

At the fitting appointment, I ensure that the new dentures are comfortable by the time the patient leaves, as any degree of soreness will gradually worsen as the dentures are worn.

Discussion with the patient at the fit appointment

When consenting new patients and at the fitting of new dentures I emphasise to the patient that the new dentures will require considerable amount of practice and adaptation for them to be a success.

I show them a prosthetic hand and ask them to imagine how it would feel to have an artificial hand. I say "a prosthetic hand would operate in a completely different way to a natural hand and this is no different with dentures v natural teeth. Dentures chew, bite and work in a totally different way to natural teeth and as such require considerable adaption. They are essentially well- engineered blocks of plastic"

In addition, I say “The new dentures have been made to the highest possible standards using all of our skills and knowledge, giving you the best possible chance of being able to wear them comfortably. We are, however, reliant on your adaptation to the denture and it will require considerable practice and effort on your behalf to make it work. A similar analogy is learning how to use chopsticks instead of a knife and fork.”

As the dentures are removable mechanical substitutes for missing living tissues and as such exhibit movement when chewing food, talking and when the tongue and muscles of the mouth move. This improves with time with adaptation. This normally takes between 6 weeks to 12 months.

Newly fitted dentures will become sore

At the fitting appointment, I explain that the new dentures will become sore fairly soon and this is a completely normal occurrence, even for well-crafted dentures, made to the highest technical standards. I normally review the patient 1 week after fitting.

Occasionally, during the week the patient may find the new dentures too sore to wear. In these circumstances, I advise the patient to leave them out and revert to their previous set of dentures. I instruct them to wear the new dentures for the two consecutive days before their review appointment, wearing them for the same length of time they would normally wear their dentures. This allows me to see exactly where the dentures are rubbing, thus enabling precisely accurate adjustment of the denture at the review.

Chewing and new dentures

I discuss with the patient that learning to chew satisfactorily with new dentures usually requires at least 6-8 weeks, and sometimes longer, particularly in complex dental situations such as a flat lower ridge, support problems and with cognitive learning problems, like dementia (which means adaptation and learning takes longer).

New memory patterns through neuromuscular control require time to be established in order for the muscles of the tongue, cheeks and lips to keep the dentures in position.

Biting and new dentures

The dentures are designed so that the anterior teeth do not contact when the patient brings the upper and lower teeth together in centric relation. The denture teeth will normally have good positive occlusal contacts on the premolars. This means that if a patient bites a “ham” sandwich the bread and the ham may separate, with the bread being held in the mouth and the “ham” staying in the body of the sandwich because the anterior teeth will not occlude.

The occlusion on the dentures are designed like this on purpose to encourage the patient to bite using the premolars rather than the incisors which reduces tipping forces on the dentures.

Saliva flow and new dentures

Initially new dentures often cause the patient to produce more saliva than normal. Very occasionally the saliva flow can decrease and the patient’s mouth can feel dry with the new dentures. This gradually returns to normal over time. I make sure my patients are aware of this prior commencement of treatment.

Review

The dentures are reviewed 5-7 days after insertion. Pressure sores are relieved using mizzy paste, placed on ulcers and picking up inside the denture. The dentures are adjusted until it is more comfortable. The occlusion is checked as at the fit stage.

The magic of a soft lining – Molloplast B in complete dentures

I find that patients who develop constant soreness under a well-made mandibular denture benefit greatly from a soft lining of the denture.

The transformation in their quality of life cannot be overestimated.

It is crucial in these circumstances that the rest of the denture is made well with optimal:

1. Extension of the denture base
2. Polished surfaces
3. Tooth positioning and occlusion

Figure 27 Molloplast B soft lining for patients with denture bearing support problems



Spare dentures

At the end of treatment some patients request a spare denture in case of emergency.

I discuss the process of fabricating the spare with Rowan (dental technician) looking at the laboratory work (casts) we have of the patient. We plan the treatment and number of visits carefully so that an accurate quotation can be made.

Making a well-fitting spare denture often involves 4 visits and I am mindful to concentrate on this as much as the original denture made.

Finlay Sutton and Rowan Garstang have produced this manual.

Dr Finlay Sutton

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Registered Specialist in Restorative Dentistry, Prosthodontics, Endodontics and Periodontics

Mr Rowan Garstang

BSc, Hons, HNC, OND

Registered Dental Technician

Finlay and Rowan work together in private specialist practice providing very high quality fixed and removable prosthodontics. The practice was established in 2007 and is based in Garstang, Lancashire. It has been designed so that Rowan's dental laboratory opens directly into Finlay's surgery. This enables Rowan to see patients with Finlay, ensuring the production of the best possible prostheses. This arrangement is the fulfilment of their professional vision. They particularly enjoy removable prosthodontics.

Finlay qualified as a dentist in Sheffield in 1993 and worked in General Dental Practice for 6 years. He has always had a desire to provide the best possible treatment for his patients and has continued to develop professionally through specialist training leading to; MSc in fixed and removable prosthodontics, PhD and two Specialist qualifications (MRD and FDS). He has previously been a Senior Clinical Teaching Fellow and Consultant in Restorative Dentistry at the University Dental Hospital of Manchester at Liverpool University Dental Hospital.

Rowan was previously the Chief Dental Technician in Prosthodontics at the University Dental Hospital of Manchester for ten years, having started working there in 1987. He trained Dental technicians at the University of Manchester for over 15 years. Rowan and Finlay have worked together since 1999 and have, over the years, satisfied the dental needs of many people throughout the North West of England. In addition, Rowan provided all of the invaluable technical work for Finlay's PhD.