

PREDICTABILITY IN COMPREHENSIVE RECONSTRUCTION
Bite registration and recovery process for comprehensive reconstructive cases.
By Matt Roberts

The most predictable comprehensive restorative techniques revolve around the concept of placing a patient in provisional restorations which are identical in form, function, and appearance to the definitive restorations. These provisionals are created from a silicone matrix of a diagnostic wax-up completed on centric relation mounted casts of the pre-operative models. The patient is allowed to wear these restorations for some time while all parameters of the case are evaluated for comfort and satisfaction. In many cases some changes are made to the provisionals for aesthetic reasons. Incisal edge position and length may be altered to address phonetic or aesthetic considerations. In many cases adjustments are made to the occlusal relationship of the provisional restorations to get the patient to a comfortable position. These adjustments may be in the form of an equilibration to correct a CR-CO discrepancy or a change of VDO to a more comfortable position for the patient.

The success of the final case is dependent upon the ceramists' ability to reproduce the form and position of these provisional restorations. This information is usually transferred to the prepared tooth model by taking a rigid silicone impression of the approved provisional model and injecting it with wax onto the prepared model. For this to happen records (bite registrations) must be taken to allow full cross-mounting of provisional models and prepared models. To successfully do this careful protocol must be followed and an understanding of the strengths and weaknesses of each step must be achieved.

Initial study models and records are taken at the diagnostic appointment. Impressions for models should be taken with a poly-vinyl material and as much care taken as with final restorative impressions. Bite registrations in the centric relation position and face-bows are recorded. A flow able resign mock-up of desired incisal edge position is completed and evaluated for aesthetics and phonetics then recorded with an incisal matrix and photographically. All of this material is used to complete a diagnostic wax-up, which in turn, is used to develop a comprehensive treatment plan for the patient.

Bite registrations are taken at the preparation appointment. Techniques and philosophies may vary with educational background, but within all schools of occlusion the assumption is made that this is a comfortable, reproducible position for the temporomandibular joint. (Realize, however that this registration is taken at the end of a long preparation appointment during which the patients mouth has been open. This can generate fatigue and inflammation to the muscles and joint. The clinician is also fatigued mentally and physically at this time.) .

The first registrations taken usually relate the CR position of the maxillary prepared teeth to that of the mandibular prepared teeth. At this time maxillary provisional restorations are fabricated. The need to cross-mount models of the provisional restorations is addressed by taking a bite registration from the lower preparations to the upper provisional restorations. Fabrication of mandibular provisional restorations is now completed followed by taking an upper provisional to lower provisional registration. For all of these bite registrations to be valid they must exactly reproduce the position achieved in the prep to prep bite. In situations where all teeth are

prepared at the same time (single phase full mouth reconstruction) the technique for obtaining these first two bite registrations must produce identical and interchangeable results. This may be achieved by sectioning the original bite to allow the removal of the inter-occlusal relationship of the most posterior opposing teeth. The corresponding section of the provisional restorations are then removed to allow the posterior segment of the original bite registration to be inserted into the patients mouth while the mandibular preparation to maxillary provisional restoration segment of the registration is taken. This assures cross-mount ability if the posterior bites are fully seated without creating interference with the rest of the maxillary provisional. *(Insert drawings or photos)*

Alternatively, if the treatment is two phased, the anterior segments, including bicuspid, are completed first and posterior bites are taken from the un-prepped most posterior teeth. These CR bites may be saved from the original diagnostic CR records, or are generated during the initial prep to prep registration and then used subsequently in the prep to provisional phase as well as the provisional to provisional registration phase which is the final registration taken to insure cross-mount ability. The careful evaluation of these posterior bites with both arches of provisional restorations in place will tell if provisional restorations are generating the same CR position as the prep to prep bite did. *Disagreement between the position of the provisional restorations and the posterior bites indicates an unintentional shift in mandibular position and a resultant change in joint position.* This phenomenon usually occurs from one of three inconsistencies; a difference in the centric relation records taken for mounting the diagnostic models and the prepared tooth centric records; incomplete seating of the silicone matrix when forming provisional restorations, or the repositioning of the mandible between the prep to prep and the prep to temp bite. *Strict compliance to record taking technique and sequencing must be adhered to in order to prevent this unacceptable situation.*

The difference between the CR position taken for the mounting of the diagnostic casts, where the wax-up is generated, and the prepared teeth, where the matrix of the wax-up is utilized may be avoided by using the original posterior bites while taking the full sequence of records, if the two-phased reconstructive sequence is chosen. Careful evaluation of the repeatability of this original CR position should be completed before use of the original posterior bites.

Incomplete seating of the silicone matrix may be detected by evaluating the thickness of the over-flash of the temporary material over the tissue, or in the two phased technique, over the un-prepared molars. The unprepared teeth in the posterior provide a more positive, hard tissue, seat for the silicone matrix when using the two-phased technique resulting in less likelihood of this problem. When the single-phased technique is employed this discrepancy is either corrected by equilibrating the provisional restorations or goes undetected to the laboratory where a wax injection of the provisional restoration is applied to the prepared tooth model and any discrepancy of arch position (mounting or bite registration) becomes obvious.

Mandibular repositioning during the bite-taking process can be avoided by using the same posterior bites thru-out the entire process as described earlier. A small window cut in the facial of this bite will make it easier to visually verify that the patient is fully closed into the posterior bite before the anterior segments are taken. Again this is much more easily achievable with the two-phased technique where some posterior teeth are left unprepared.

If provisional restorations are completed without significant occlusal adjustment and the patient is comfortably in the desired restorative position (CR), final laboratory fabrication of the definitive restorations may be completed and restorations delivered to the patient. If the patient is not comfortable or is in pain, necessary adjustments to the provisional restorations must be made. Occlusal equilibration to eliminate CR-CO discrepancies as well as changes in vertical dimension is not uncommon even in well planned and executed cases. Reductions in joint inflammation may cause a change in the centric relation position of the temporo-mandibular joint. When this type of change is observed provisional restorations should be evaluated regularly and equilibrated until stability is achieved. *If significant adjustments to occlusal aspects of the provisional restorations are made, either during the provisional fabrication process or to achieve patient satisfaction and comfort, new bite registrations must be taken.* First, provisional restorations must be evaluated to ensure all reconstructive and aesthetic goals are being met. A careful evaluation of joint position and patient comfort should be undertaken. *When it is decided that the provisional restorations are satisfying all goals of the treatment plan, a bite recovery procedure may be undertaken.*

The procedure to recover a bite registration that ensures the ability to cross-mount provisional restoration models with the definitive restoration models is fairly simple, but sequencing is critical. New impressions which reflect changes made to the provisional must be taken first. These impressions should be taken with the same degree of accuracy as the master impressions, not with alginate!!

TWO-PHASE RECONSTRUCTIVE TECHNIQUE

1. New poly-vinyl impressions of provisional restorations are taken
2. New face bow of provisional may be taken or original face bow mounting of prepared teeth may be used.
3. New posterior bite registrations are taken of the unprepared molars with provisionals in place.
4. Anterior provisional to provisional registrations are taken with the posterior bites in place. Care needs to be taken to ensure full closure into the posterior bites in all following steps.
5. Two to four lower anterior provisionals are removed.
6. A bite from lower preparation to upper provisional is taken with posterior bites in place.
7. Upper central provisionals are removed.
8. A bite from upper preparation to lower preparation with posterior bites in place.
9. Provisional restorations are re-cemented.

SINGLE PHASED FULL MOUTH RECONSTRUCTION

1. New poly-vinyl impressions of provisional restorations are taken.
2. New face bow of provisional may be taken or original face bow mounting of prepared teeth may be used.
3. New provisional to provisional bites are taken.
4. Mandibular most posterior restorations on each side are removed.
5. A posterior bite of the mandibular posterior preparations to the maxillary provisional restorations is taken.
6. Maxillary most posterior restorations on each side are removed.
7. A Prep to prep posterior registration is taken on each side.
8. A window is cut into the mesio-facial of each record to allow visual verification of seating in subsequent steps.
9. Four lower anterior temps are removed.
10. A bite registration from lower anterior prep to upper provisional is taken with the posterior bites fully seated.
11. Provisional restorations on upper centrals are removed.
12. Anterior prep to prep registrations are taken with the posterior bites in place and fully seated.
13. Provisionals are re-cemented.

Laboratory Mounting Procedure

Complete all model and die preparation utilizing a magnetic split cast mounting system. It is helpful to use the stick-bite when trimming master models so that all basing and split cast lines are parallel to the horizon.

1. Mount maxillary prepared tooth model to the articulator using the face bow provided. With permission from the clinician, correct face bow only in the rotational axis so mounted models have proper horizontal orientation.
2. Using prep to prep bite registrations, mount the mandibular prepared model to the maxillary prepared model.
3. Remove maxillary preparation model from the articulator.
4. Using the lower prep to upper provisional registrations mount the maxillary provisional model to the mandibular preparation model.
5. Remove the mandibular preparation model from the articulator.
6. Using the provisional to provisional registrations, mount the mandibular provisional model to the maxillary provisional model.

The validity of the mounting may be confirmed by verifying the interchangeability of the posterior bite registrations if the two phased treatment is being used. Margin to margin distances between specific teeth on the upper and lower models should be consistent as prep and provisional models are interchanged. With either single or two phase treatment it will become obvious if mounting or bite registration gathering are erroneous as wax is injected into a silicone matrix of the

provisional model which is placed on the prepared tooth model. As with the use of the matrix when fabricating the clinical provisionals, the accuracy of the seating of this matrix is critical and may be evaluated by the thickness of any over-flash. These wax injections should be interchangeable with provisional models and should display the same occlusal contacts etc. Slight discrepancies due to seating of the silicone stint are normal but should be very minor in nature. If several millimeters of discrepancy are observed the usage of the bite registrations in the laboratory should be reviewed first. If the same results are repeated, a bite recovery procedure described previously should be performed. Fabrication of the definitive restorations should not be undertaken until full agreement between the mounting of the provisional and prepared models is obtained.

Summary:

Most of the success or failure of a comprehensive reconstruction is assured before the first tooth is ever prepared for a restoration. Correct and complete understanding of the patient's clinical situation and more importantly, the understanding of what treatment and sequencing of treatment are necessary to improve that situation are a critical first step. Many times splint therapy needs to be implemented to achieve a stable joint position and or comfortable vertical dimension before the start of restorative treatment. The initial gathering of diagnostic models and CR bite registrations, then the subsequent diagnostic waxing of the case determine preparation design and an idea of what may be necessary in the way of changes to vertical detention. The previously mentioned splint therapy determines whether the patient can comfortably tolerate the desired vertical changes. Pre-operative gingival condition and aesthetically related position must be evaluated and possibly altered surgically prior to reconstructive treatment. Orthodontics or even maxilo-facial surgery may be necessary to achieve the patient's goals in a predictable and long lasting way. All of these options for treatment need to be presented to the patient for consideration before a treatment pathway are chosen. Once a treatment pathway is selected, a comprehensive, step by step plan must be adopted and followed exactly to insure the ultimate success of the case without the necessity of relying on luck on luck and patient adaptability. A little of both still help! Hopefully the ideas presented here will help in obtaining predictable results and recovering from unexpected inconsistencies.