Advanced Restorative Techniques and the Full / Partial Mouth Reconstruction. Articulator Selection and Clinical Stages. Part 4

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Introduction

The full mouth or partial reconstructions are one of the most challenging procedures in Restorative Dentistry. In order to successfully restore and maintain teeth, the dentist must find out why the teeth arrived at this state of destruction. Tooth wear can result from abrasion, attrition, and erosion as well as iatrogenic problems with previous restorations. Research has shown that these mechanisms rarely act alone and there is nearly always a combination of the processes. Evaluation and diagnosis should account for the patient’s diet, the present state of the occlusion and dental history. Emphasis must be placed on the evaluation of occlusal prematurities preventing condylar seating in RAP. Factors that may contribute to parafunctional habits or bruxism are important to understand and manage in order to successfully restore and maintain the newly restored dentition. When there is a complete understanding of the etiology of the definition’s present state a treatment plan can be established, taking into account the number of teeth to be restored, condylar position, space availability, the vertical dimension of occlusion (VDO), the choice of restorative material and the choice of articulator and ways of programming it.

Articulator Selection

There is a large choice when assessing what type of articulator is correct for the patient and restoration. In terms of classification, articulators range from hand held casts or simple hinge articulators to fixed condyle or average value articulators to semi-adjustable and to fully-adjustable.

When dealing with the complexity of the full mouth or partial reconstruction the choice narrows to average value v semi-adjustable v fully-adjustable. The accuracy of the articulator also depends upon how it is used and programmed. All of these articulators require the use of face-bow, arbitrary or kinematic (to record the true hinge axis) to mount the upper cast. Mounting the lower cast to upper cast is then done with a individual jaw registration taken at an open vertical if mounting around ICP. Finally with the semi-adjustable and fully-adjustable, programming of the posterior (condylar) determinants of occlusion can be done using lateral and protrusive check bites, cadax recording or by using a pantograph.

The more adjustable the articulator the more accurate the restoration can be but all articulators have limitations and are only as accurate as the dentist/technician that is using it.

Restorative Stages

Following on from the third article in this series which dealt mainly with the diagnostic stages of a full mouth reconstruction we now look at the clinical stages which will be illustrated by the first case study. This gentleman Fig. 1 was referred for treatment of his severe upper anterior wear. The patient was over closed and due to the wear now in a pseudo-class III edge to edge occlusion (Fig. 2). After initial diagnostic stages which included cosmetic imaging (Fig. 3), diagnostic waxing (Fig. 4) etc., the patient was ready for initial tooth preparation.

Tooth Preparation

This will be dependent upon the type of restorative material to be used eg. PFM, sintered and milled porcelain, adhesive porcelain. Whilst the shift in recent years has been to all ceramic restorations, the PFM is often the restoration of choice as it allows a more conservative preparation on both anterior and posterior teeth with only part of the gingival margin area prepared for porcelain (labial) and the rest a conservative 0.5 mm light chamfer for metal (Fig. 5). There is also the added longevity in both of these areas of the mouth. The reader is referred to the work of Shillingburg for a full description of PFM crown preparation. In this instance the classic PFM crown was used to restore the upper anterior teeth.

Tooth preparation should be done in stages so as to maintain control of the condylar position and vertical dimension. Providing the patient has adequate posterior stability (from amalgams, cores, prototype crown etc) then the initial tooth preparation should be the upper and lower anterior canine to canine teeth.

When completing a full-mouth reconstruction upper and lower preparations should done together so as to be able to establish ideal anterior guidance in both protrusive and lateral movements. Once prepared the dentine is sealed and prototypes are relined, trimmed and fitted (Fig. 6). No impressions or jaw registrations are taken at this time.

The aim of the tooth preparation stage is, over three long visits,
restorative
to place prototypes on all the teeth and then to spend time re-evaluating occlusal planes, aesthetic concerns and of course occlusal scheme and comfort of the patient.

The long term success of the final restoration is directly proportional to the skill and time in preparing and planning prototypes and their adjustments. It is easy to lose vertical dimension, occlusal stability and ideal sealing of the condyle in the fossa if this stage is hurried.

If increasing vertical dimension then either the timing of the preparation and prototypes is changed to accommodate all initial procedures in one week or full occlusal contacts need to be re-established on posterior teeth during the interval between fitting of the anterior prototypes and the final segments of the posterior.

Impressions / Jaw Relationship

Once the patient has confirmed that they are happy with the aesthetic appearance, is symptom free, having an ideal occlusal scheme with multiple contacts on all teeth and the condyles in RAP with smooth shallow anterior guidance the next stage of treatment is to take impressions and jaw registrations. This can be done in several ways. A similar sequencing of events can occur as anterior prototypes are removed, retraction cords placed, teeth re-prepared, sealed and impressions, jaw registrations and facebow recordings made with the posterior prototypes maintaining occlusal contacts, vertical dimension and a stable RAP position.

Alternately there are times when the full arch needs to be delivered to the patient at one go. This may be the case when anterior and posterior teeth are linked together in bridgework; there are limited number of appointments, patients are travelling long distances or vertical dimension is being increased on the fully adjustable articulator. This then requires the use of duralay bonnets or copings on all teeth and the use of

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Figure 14: Facebow recording

Figure 15: Cadiax recording

Figure 16: Cadiax recording

Figure 17: Restorations on the fully-adjustable articulator

Figure 18: Upper arch on the fully-adjustable articulator

Figure 11: Initial presentation showing worn upper dentition

Figure 12: Hopeless teeth removed

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a pickup impression, described later in the series.

Once anterior impressions, jaw registrations and facebow recordings are again taken the prototypes are relined, trimmed, cemented and are adjusted once more.

**Try In Stage**
The anterior restorations are now produced by the technician to the biscuit bake or "try in" stage and are tried in the mouth and the occlusion is adjusted using the mouth as the ultimate articulator.

**Cementation**
As described earlier all articulators have limitations as do the materials and techniques we use. Once upper and lower have been checked and adjusted they are sent back to the technician for glazing and then to the dentist for cementation (Fig. 7). This same sequence is then performed on one side of the mouth with upper and lower posterior and then finally the other side of the mouth.

**Conclusions**
Patients requiring full mouth or partial reconstruction are or have usually been bruxists. As such they may often brux again which is one of the limiting factors to the longevity of our restorations. Careful post restoration occlusal adjustment and refinement are essential, followed by the post restorative occlusal splint for night time wear (Fig. 8). The final smile is shown in Fig 9.10.

**Case Study 2**
This lady was referred with a failing dentition, periodontal disease and TMI dysfunction (Fig. 15). Her examination revealed several hopeless teeth and an almost edge to edge occlusion with limited anterior guidance on her anterior teeth.

In view of the limited guidance available the fully-adjustable articulator was chosen as the posterior determinants of occlusion and posterior guidance (condyles) have a greater bearing on mandibular movements and occlusal anatomy.

Following our standard diagnostic procedures, teeth prepared several teeth were removed (Fig. 12), prototypes fitted (Fig. 13), implants placed and the occlusion was adjusted so that RCP=ICP around RAP. A reorganized approach was used so as to reduce TMI dysfunction and provide the patient with the ideal 3 principles of gnathology (occlusion) as discussed in earlier articles.

The fully-adjustable was programmed by using a facebow (Fig. 14) the cadiax (Denar) (Fig. 15,16) to record intercondylar distance, immediate and progressive side shifts and the shape of the superior and posterior walls of the fossa (Fig 17,18).

The goal of the restoration was to move the maxillary teeth forwards and move the mandibular teeth posteriorly by occlusal adjustment, thereby establishing a deeper overbite and overjet and better anterior guidance (Fig. 19).

The final restoration and smile can be seen in Figs 20, 21.

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