

Setting Procedure of the Fully Adjustable SAM 3 Articulator

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Summary

There are various different diagnostic and reconstructive procedures that require visualization and analysis of mandibular movements, dental arch relationship and teeth contact outside the patient's mouth. Therefore, there is an indispensable need for a mechanical device that can provide mandibular movements and different jaw relations. One of the major applications of the articulator is the fixation of jaw relations and to ensure their movements so that diagnostic and reconstructive procedures can be obtained.

Key words: *fully adjustable articulator, mandibula, centric relation record, eccentric records.*

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Introduction

Use of articulators

A dental articulator is an instrument that gives certain important diagnostic information and simulates border movements of the mandible and can be helpful in many aspects of dentistry (1).

Diagnosis, the arrangement of artificial teeth, and the development of the occlusal surfaces of cast fixed restorations are common uses (2).

With the enormous range of opinions and uses, dozens of articulators have been developed over the years (1).

Dental articulators come in many sizes and shapes. It is helpful to separate the various types into three general categories according to their ability to adjust to and duplicate the patient's specific condylar movements: nonadjustable, semiadjustable and fully

adjustable. Generally, the more adjustable the articulator is, the more accurate it can be in duplicating condylar movement (3).

The semiadjustable articulator permits more variability in duplicating condylar movement than does the nonadjustable articulator. The most common adjustments found on the semiadjustable articulator are the condylar inclination, lateral translation movement (Bennet angle) and intercondylar distance (1). It accepts an arbitrary face-bow record and interocclusal records (centric relation, protrusive and both left and right laterotrusive interocclusal records) (2, 4).

Eccentric records (protrusive and laterotrusive records), or check bites, are made in the mouth for the purpose of capturing the position of the condyles in their respective fossae. These records are then used to set the condylar guides to approximate the anatomic limits of the temporomandibular joints (4).

The fully adjustable articulator is the most sophisticated instrument in dentistry for duplicating mandibular movement. By virtue of the numerous adjustments that are available, this articulator is capable of repeating most of the precise condylar movements depicted in any individual patient: condylar inclination, Bennett angle or immediate lateral shift, rotating condylar movement (i.e., working condyle) and intercondylar distance (1).

SAM 3 fully adjustable articulator

SAM 3 articulator is a fully adjustable arcon type of articulator, an instrument that has individually adjustable condylar guidance both horizontally and vertically. The condylar guidance is located in the upper (cranial) member on the articulator, and the ball (condylar analogue) is located in the lower (mandibular) member (Figure 1) (5, 6).

In order to adjust the condylar pathway of the patient in the SAM 3 articulator, three types of curved Condylar Housing Pathway Inserts are available, which are adjustable from 15 to 65 degrees of angulation (white-shallow, green-moderate and red-steep) (7). Four types of Bennett Guidance Pathway Inserts are also available, a straight metallic Insert and three coloured curved Bennett Guidance pathway Inserts (green-with side shift, blue-with extended sideshift and red-with extended and immediate sideshift) (7).

SAM articulators are often clinically used as average value articulators. In that case the articulator reproduces only one contact position (centric relation interocclusal record) and a restoration cannot be properly prepared to meet the occlusal requirements of the eccentric movements of the patients.

Green Bennett Guidance Insert, set at 0 degrees, when used with a curvature 1 condylar housing pathway at 40 degrees, represents the average value patient in SAM articulators (4).

Table 1 shows average setup information from which it is obvious that the condylar inclination and Bennett angulations differ in young and old patients, as well as in dentulous and edentulous patients.

The aim of the study

The aim of the study was to set the SAM 3 articulator from an average value articulator into a fully

adjustable articulator, using a face-bow, the patient's centric relation interocclusal record and eccentric protrusive and both laterotrusive interocclusal records.

Case report

Starting setting SAM 3 articulator

In order to start we set up the SAM 3 articulator using average values for a young dentulous patient (male, 25 years old) - moderate curved Condylar Housing Pathway (green insert) with 35° inclination and green Bennett Guidance Pathway (green insert) with 5° angulation (Figures 2 and 3).

Each condylar element was checked and placed against the posterior and superior walls of its condylar guide.

Interocclusal records

The maxillary cast was mounted on the upper member of the articulator using a facebow with condylar inclination of 35°. Left and right Bennett angulation was set at 0 degrees.

Anterior programming device

Green stick compound (Kerr..) was molded in the patient's mouth (maxilla) to form the anterior programming device (jig) to establish a predetermined stop to vertical closure with the condyles in optimum position (8). The patient's mandible was guided into a retruded position while arching the mandible closed until the mandibular incisors made an indentation in the compound and the posterior teeth were 1 mm out of contact.

Records

A piece of hard, pink baseplate wax (Bego-Modellierwachs, Germany) was trimmed and softened in hot tap water. It was placed against the maxillary arch so that the indentations of all of the maxillary cusp tips were registered in the wax. Any wax that was lying buccal to the buccal cusp tips was removed. A layer of Aluwax (Bego-Alluwachs, Germany) was added onto the inferior surface of the baseplate wax in order to increase the thickness and ensure contact of the posterior as well as the frontal teeth with the record (Figure 4).

Centric relation record

The technique of bimanual manipulation, described by Dawson, was used to locate the centric relation position (9, 10) (Figure 5).

The mandibular cast was mounted on the articulator using the centric relation record (Figure 6) with metallic straight inserts. Condylar inclination was set at average values of 35° degrees and Bennett angulation was set at 0 degrees to prevent any lateral movement of the condyles during the mounting.

During the mounting procedure the incisal guide pin on the SAM 3 articulator was raised by 5 mm.

Protrusive record

The patient was guided into the centric relation contact position at closure. Then, with the hand on the patient's chin, the patient was guided into protrusive tete a tete position with incisors lightly in touch (Figure 7). The position was registered using baseplate wax record and the mandibular movement from centric relation into tete a tete position was measured using centric relation markings on canines - 1.7 mm (Figure 8).

Left and right laterotrusive records

The patient was guided into centric relation contact position at closure. Then, with the hand on the patient's chin, the patient was guided into working excursions of the right and left sides (Figure 9). The position was registered using baseplate wax records and the mandibular movement from centric relation into both laterotrusive positions were measured using centric relation markings on central incisors. Left laterotrusive movement was 1,6 mm and right laterotrusive movement 1.8 mm (Figure 10).

Setting condylar guidance using protrusive interocclusal record

The protrusive interocclusal record was positioned on the mandibular cast (Figure 11). All the teeth of the casts were seated completely in the wax indentations of wax record.

Both condylar inclinations were set at 0 degrees. All the clamp screws were loosened.

With the protrusive interocclusal record in place, both the left and right condyle of the articulator did not contact the superior and medial wall of the condylar housing.

The condylar inclination was then increased and adjusted until each condyle contacted the superior wall of the guide.

The condylar inclination on the right side was 46° and the condylar inclination on the left side 47°.

Setting condylar guidance using left and right laterotrusive interocclusal records

Left laterotrusive interocclusal record was positioned on the mandibular cast (Figure 13). All the teeth of the casts were seated completely in the wax indentations.

Both condylar inclinations were set at 0 degrees. All the clamp screws were loosened.

With the left laterotrusive interocclusal record in place the right condyle of the articulator did not contact the superior wall of the condylar housing. The medial wall of the non-working guide was moved until it contacted the mediotrusive condyle.

The same procedure was followed for the right laterotrusive interocclusal record.

The Bennett angulation on the right condyle was 6°, and on the left condyle 7° (Figure 14).

Discussion

The dental articulator can be helpful in many aspects of dentistry. In conjunction with accurate diagnostic casts that have been properly mounted, it may be used in diagnosis, treatment planning and treatment (1).

In diagnosis, the articulator improve the visualization of both static and functional interrelationships of the teeth (second molar region, lingual examination of the patient's occlusion) and it helps us to choose the right therapy (1).

In treatment planning, the articulator is helpful when it is difficult to examine a patient clinically and determine the outcome of a particular treatment. Therefore, we can use it when we want to determine whether a selective grinding procedure can be accomplished

without damage to the teeth, in functional or aesthetic diagnostic prewax or orthodontic setup (1).

Probably the most common use of the dental articulator is in treatment. It can provide the appropriate information regarding mandibular movement that is needed to develop an appliance or restoration for occlusal harmony. Therefore, the articulator is the only reliable method for developing an appropriate occlusal condition in the dental appliance. It is an intricate part of crown and fixed prosthodontic procedures (11). It is also a necessary part of the fabrication of removable partial dentures (12, 13) and complete dentures (14). Many orthodontic appliances also require the use of an articulator.

Conclusion

No articulator is effective unless it will accurately adjust to the records. Errors in any of the maxillo-mandibular relation procedures are reproduced as errors in tooth relations and tooth movement. Setting procedure using centric relation, as well as eccentric records is then required.

The most precise way for individual measurement of the condylar inclination in the patient, as well as the measurement of the Bennett angle on both temporomandibular joints is to use the pantographic records and the axiographic measurement that requires very expensive equipment.