Review Article

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A CLASSIFICATION OF ARTICULATORS- A REVIEW ARTICLE

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ABSTRACT:

The history of dentists trying to develop methods and instruments to duplicate the positions and movements of the dentition to relation of the human skull is 200years old. Phillip pfaff, W.G.A. Bonwill, W.E. Walker, F.G. Von Spee, G.G. Campaion and N.G. Bennett to mention only a few worked toward this goal trying to make a dream come real. A. Gysi, the genius and pioneer of modern prosthetic dentistry, wrote in 1907 that the problem of articulation could only be solved when dentistry succeeded to record and reproduce jaw movements of individual patients.

It is well adjudged that the mouth comprising bi-maxilla and the two temporo-mandibular joints as the best articulator. But due to innumerable procedures carried out to fabricate a prosthesis, a mechanical device simulating the two jaws and the temporo-mandibular joints are needed for ease of work and comfort of the patient. This device is called an ''ARTICULATOR''.

Key Words: Articulator, Facebow, Prosthesis, Mandibular Movements.

INTRODUCTION

Articulator is a mechanical device that represents the temporo-mandibular joints and the jaw members to which maxillary and mandibular casts may be attached to simulate some or all the mandibular movements. Many devices that are called articulators do not satisfy this definition. Some of these devices make no attempt to represent the temporo-mandibular joints (face bow transfer) or their paths of motion (eccentric registration)[1]. Some instrument allow eccentric motion determined by inadequate registration (positional registration). Some utilize average or equivalent pathways. Some attaempt to reproduce the eccentric pathways of the patient from three dimensional registrations. Some other articulators record even the fourth dimension, i.e., the timing of the Bennett movement [2,3].

CLASSIFICATON OF ARTICULATORS:

There are various systems of classifications i.e based on theories of occlusion, based on interocclusal record used, based on adjustability of articulators and according to different scientist. In this article we have discussed about all the classification system.

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A classification of articulator has been given.

1. GILLIS CLSSIFICATION [4] 1926:

- The adaptable (or) Adjustable
- The Average (or) Fixed type

2. BOUCHER'S CLASSIFICATION[5] 1934:

- Nonadjustable
- Adjustable

1. two-dimensional instrument
2. three-dimensional instrument

3. KINGERY'S CLASSIFICATION [6] 1934:

- Simple articulators
- Adaptable (or) adjustable articulators

4. BECK'S CLASSIFICATION [7] 1962:

- Suspension instrument
- Axis instrument
- Tripod instrument

5. WEINBERG'S CLASSIFICATION [8] 1963:

- Arbitrary [Monsoon spherical theory]
- Positional [Stanberry tripod concept]
- Semi adjustable [Hanau H concept]
- Fully adjustable [Hanau kinescope concept]

[Gysi trubyte concept]
[McCollum concept]

6. POSSELT CLASSIFICATION [9] 1968:

- Plain line
- Mean value
- Adjustable

7. THOMAS CLASSIFICATION [10] 1968:

- Arbitarary [non adjustable]
- Positional [Axis & Non axis type; static type]
- Functional [Axis & Non axis type; functional records]

8. SHARRY'S CLASSIFICATION [11] 1974:

- Simple
  Hinge type
- Fixed guided type
- Adjustable instruments

9. BOUCHER'S CLASSIFICATION [12]

A] Based on theories of occlusion

B] The type of record used for their adjustment

Those utilizing the Inter occlusal records

Those using the Graphic record adjustment

Those utilizing hinge-axis location for adjusting the articulator.

A] Articulators based on theories of occlusion:

Bonwill theory of occlusion:

Designed by *WGA Bonwill*

The teeth moves in relation to each other as guided by condylar and incisal guidance.

Also known as *theory of equilateral triangle.*

Distance between the two condyles is equal to the distance between midpoint of the mandibular incisors and condyle.

Theoretically the dimension of equilateral triangle is 4 inches.

These articulators allow lateral movements and permits the movement of the mechanism only in horizontal plane. (Figures.1,2)

- Conical theory of occlusion:

The conical theory of occlusion proposed that the lower teeth move over the surfaces of the upper teeth as over the surface of a cone with a generating angle of 45 degrees and with the central axis of the cone tipped at 45 degree angle to the occlusal plane. (Figure. 3)

Designed by R.E. Hall

Example - Hall automatic articulator. (Figure.4)

- Spherical theory of occlusion:

Lower teeth move over the surface of the upper teeth as over the surface of the sphere with a diameter of 8 inches (20cms) with the center located at the glabella and the surface of the sphere passes through the glenoid fossa along the articulating eminences or concentric with them.

Example - Maxillomandibular instrument. (Figure.5,6)

- Disadvantages of articulators based on the theory of occlusion

These are based on theoretical concepts.

There is no provision for variations from the theoretical relationships that occur in different persons.

B] Articulators based on the type of record used for their adjustment.

Inter occlusal record adjustment

Made of base plate wax, zinc oxide eugenol, POP & acrylic resin

Graphic record adjustment.

Records of extreme border positions of mandibular movements.

Face bow pantograph can be attached

Hinge axis location for adjusting articulators

10. BASED ON CONDYLAR ELEMEMT ATTACHMENT-BERGSTORM

A] Arcon

B] Non Arcon

Arcon: Articulator+condyle

The condylar element is attached to the lower member and guidance to the upper member. Eg.-Whip mix

Non arcon:

condylar element on upper member and guidance on the lower member.

Eg.- Hanau H2 series, Dentatus.

11. HEARTWELL AND RAHN'S CLASSIFICATION [13]:

Class I - Instruments that will receive and produce pantographs and graphic tracings.

Class II -

- Instruments that will not receive pantographs.

Hinge type

A. Arbitrary

B. Adjustable

C. Instruments that are designed for use in complete denture construction.

12. INT. PROSTHODONTIC WORKSHOP AT UNIVERSITY OF MICHIGAN [14] 1972:

- Class I.
- Class II.

Subdivision A

Subdivision B

Subdivision C

- Class III.

Subdivision A

Subdivision B

- Class IV.

Subdivision A

Subdivision B

1. Class I:

A Simple holding instrument capable of accepting a single static registration. Vertical motion is possible, but only for convenience.

e.g. The Verticulator (Jelenko) (Figure.7), The Corelator (Denar Corp.) (Figure.8)

2. Class II:

An instrument that permits horizontal as well as vertical motion but do not orient the motion to temporomandibular joints via facebow transfer.

- Class II A

Eccentric motion permitted is based on average or arbitrary values.

e.g. Gysi simplex articulator (Figure.9)

- Class II B

Eccentric motion permitted is based on theories of arbitrary motion.

e.g. Monsons maxillomandibular articulator (Figure.10)

- Class II C

Eccentric motion permitted is based on engraved records obtained from the patient.

e.g. The gnathic relator (Figure.11)

3. Class III:

Instruments that simulate condylar pathways by using averages or mechanical equivalents for all or part of the motion. These instruments allow for orientation of the cast via facebow transfer.

- Class III A

Instruments that accept static protrusive registrations and use equivalents for the rest of the motion.

e.g. Dentatus (Figure.12), Hanau nonarcon H2 articulator (Figure.13)

- Class III B

Instruments that accept static protrusive registrations and some lateral interocclusal records and use equivalents for the rest of the motion.

e.g. Hanau Teledyne(Figure.14), whipmix articulator(Figure.15)

4. Class IV:

Instruments that will accept three dimensional dynamic registrations. These instruments allow for orientation of the casts via facebow transfer.

- Class IV A

The condylar pathways are formed by registration engraved by the patient.

e.g. Denar Combi articulator(Figure.16), TMJ-Stereographic instrument(Figure17)

- Class IV B

Instruments that have condylar pathways that can be selectively angled and customized.

e.g. Stuart Articulator(Figure18), Denar D5 articulator(Figure19)

13. NEW SYSTEM CLASSIFICATION BY RIHANI 1980 [15]:

A. Non adjustable - A simple holding instrument capable of accepting single static registration. Only vertical motion is acceptable.

B. Semi adjustable – An instrument that simulates condylar pathways by using average or mechanical equivalents for all or part of the motion. These instruments allow for orientation of casts relative to the joints and may be arcon or non-arcon instrument.

C. Fully adjustable – An instrument that will accept three-dimensional dynamic registration. These instruments allow for orientation of the casts

to the T.M.J. and replication of all mandibular movements.

CONCLUSION

Evolution of articulators through the years has given an insight of the researchers trying to develop a mechanical device that simulate the jaw members and its movements. The purpose of using an articulator is to develop a prosthesis that will be harmonious in the oral cavity. Various articulators have been developed and are being improved upon as and when the functions of jaw are understood better. Accordingly, in the present day, the availability of articulator range from simple hinge type to fully adjustable articulators. Selection of articulators depends upon the clinical situation.

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FIGURES:

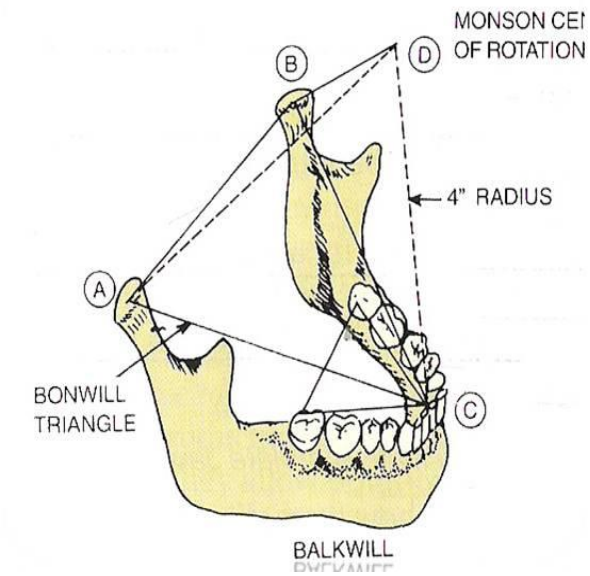

Figure 1- Bonwill Triangle

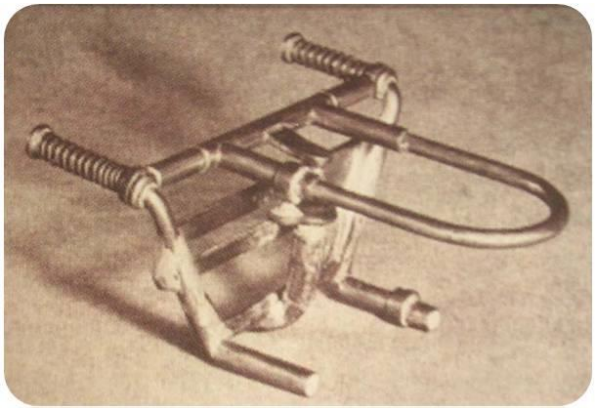

Figure 2- The Bonwill

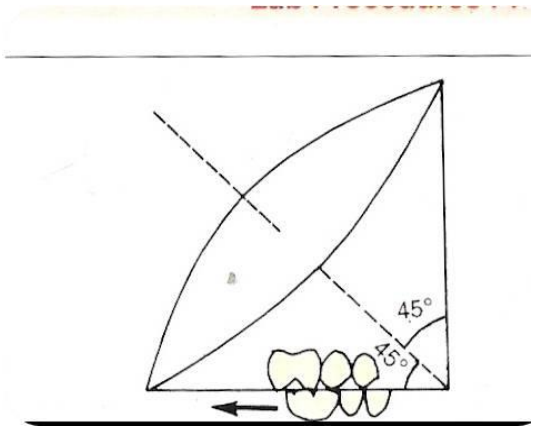

Figure 3- Conical theory

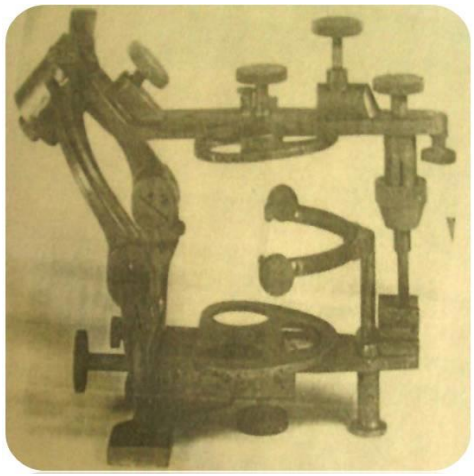

Figure 4- Hall automatic articulator

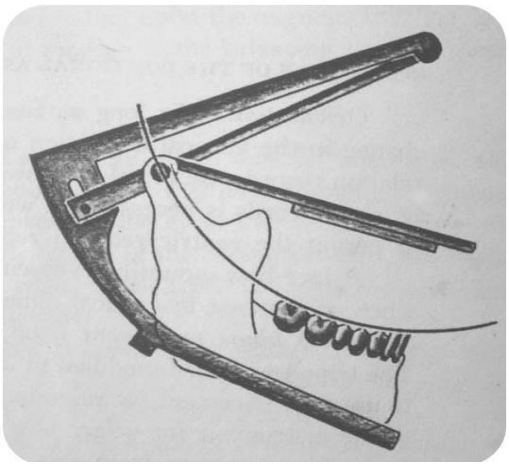

Figure 5- Maxillomandibular instrument

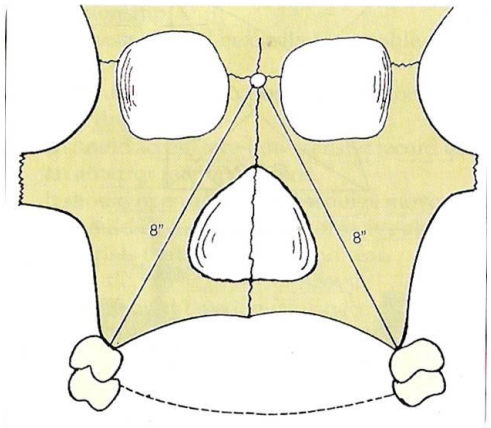

Figure 6- Spherical Theory

Figure 7- The Verticulator (Jelenko)

Figure 8- The Corelator (Denar Corp.)

Figure 9- Gysi Simplex Articulator

Figure 10- The Monson Maxillo-mandibular articulator

Figure 11- The Gnathic Relator

Figure 12- Dentatus articulator

Figure 13- Hanau Nonarcon H2 articulator

Figure 14- Hanau-Teledyne

Figure 15- Whipmix articulator

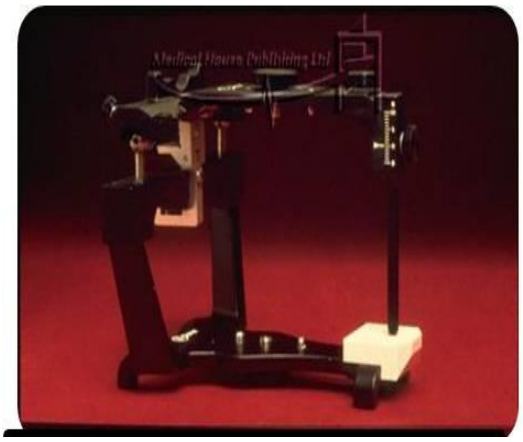

Figure 16- Denar Combi articulator

Figure 17- TMJ-Stereographic instrument

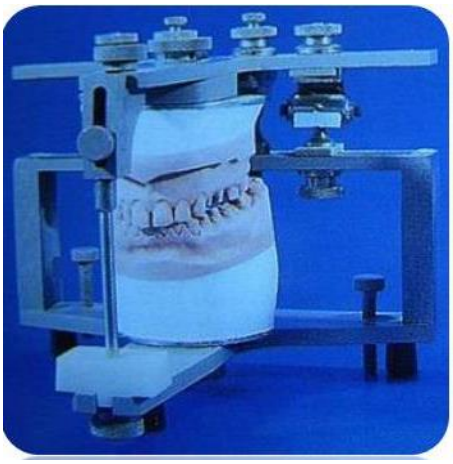

Figure 18- Stuart articulator

Figure 19- Denar D5A articulator