



Hybrid tracer - A modified novel extra oral tracer

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ABSTRACT

Introduction: Gothic arch Tracing has been a common modality in the recording of centric jaw relation. There has been two ways of recording the gothic tracing. They are extra oral and intra oral tracing. Among the extra oral tracers hight tracers are the most used tracers.

Aim: Intra-oral and extra-oral tracers have a number of individual advantages and limitations. With the idea to overcome the short comings of both the tracers, hybrid tracers were made. Hybrid tracers could be a good alternative to the Hight-tracer in recording centric relation and can provide better clinical and teaching experience to the students.

Methodology: The hybrid tracer is a two-component assembly, upper and lower component. The upper component has a central bearing plate and stylus in continuation with the central bearing plate. The lower component has central bearing device with three central bearing points one anteriorly and two posteriorly, and it has a tracing platform (15 × 35 mm) in continuation with the central bearing device. The length of these upper and lower components is made to confine within the incisal rod of semi adjustable articulator.

Result: hybrid tracers showed more accuracy while recording the centric jaw relation. There was more stability and equalization of pressure during the movement due to a tripod effect of three screws. Hence it provided more precise recording and being less technique sensitive. It was also more comfortable and acceptable by the patient.

Conclusion: hybrid tracers hence will provide more accuracy and precision in recording of horizontal jaw relation. This will in turn help in fabricating a successful prosthesis and enhance the well-being of the patient. This tracer will also be significant in institutions for educational purpose.

Clinical implication: Hybrid tracers are simple, non-technique sensitive, provide balance, equalization of pressure, stabilize the occlusal rims well, are close to the centre of rotation providing precise record and provide easy access and visibility to the operator which will help the operator in guiding the patient well for a correct jaw relation.

1. Introduction

Natural teeth have individual specialized receptors in the form of periodontal ligament to transfer the information of centric occlusion. When the natural teeth are removed, many receptors, that initiate impulses resulting in positioning of mandible, are lost or destroyed.¹ Therefore, an edentulous patient cannot control the mandibular movements or avoid deflective occlusal contacts in centric occlusion in the same manner as the dentate patient can. Hence it is required to record and arrange the tooth in centric relation to harness the sensory receptors of the Tmj.¹ Acquiring and registering the centric relation is a difficult task. Registration technique significantly influenced the condyle position and muscular symmetry.²

Numerous methods of registering centric relation have been described in the literature like Static method, graphic method, physiologic or functional method and cephalometric method.³ Functional methods are further divided into intra-oral and extra-oral methods.

The Gothic arch (arrow point) tracing was first introduced to the dental profession by Gysi in 1910 for recording centric jaw relation.⁴ Gothic arch tracing has been acknowledged as one of the most reliable means of recording centric relation.^{5,6} Equalization of pressure on the rims to reproduce an accurate centric relation in a important aspect of recording.⁷ Trapezanno did not agree that the central bearing point could cause a equalization of pressure.^{8,9} He believed that it could cause equalization of pressure only in cases where the ridge relation is normal and the central bearing point is placed in the centre of the maxillary and

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mandibular denture base or if the mucosal resiliency is minimal.⁸ Kingery and Payne also showed that introduction of an apparatus in the mouth caused unequalisation of closing pressure causing discrepancies in the centric relation.^{3,9,10}

Intra oral tracer has been criticized by many researchers due to a number of reasons. Though they are more accurate due to its vicinity to the centre of rotation, visibility is hindered making it difficult for the operator.¹¹

Extra oral tracers are more accepted for Gothic arch tracing. They are larger, hence it's easier to guide and direct the patient to the correct centric relation.¹² Among the extraoral tracers, Hight tracers (Buffalo (NY): Teledyne Hanau; 1986) are the most commonly used. However the fixation of these tracers was a tedious procedure. It also resulted in a loss registered labial fullness and buccal corridor and equalization of pressure was difficult.¹¹

To overcome the disadvantages and to combine the advantages of both intraoral and extraoral tracers, we have come up with a new type of tracers called hybrid tracers. In this paper we will discuss the functioning and advantages of this new type of tracers.

Field of invention: The present invention relates to the fabrication of dental prosthetics, and more particularly to a tool for recording a dental patient's centric relation for accurate reproduction of the proper relation for the patient's upper and lower teeth in the dental prosthesis by overcoming the drawbacks of other extra oral and intraoral device.

2. Description of the hybrid tracer

The hybrid tracer is a tool for recording the centric relation of a patient's mandible in order to obtain proper occlusion to fabricate a full mouth fixed dental prosthesis.

It consists of an upper frame and a lower frame (Fig. 1).

The upper component includes a single piece consisting of an intraoral frame and an outer frame. The intraoral part of the frame consists of a semi-circular flat plate with two lateral wings from the right and left side of the tracer. This platform provides the area for the central bearing point to move intraorally. The outer frame is a continuation of the intraoral flat plate from the anterior aspect with the tracer pin at its end. The length of the upper are made to confine within the incisal rod of semi adjustable articulator. The tracing pin has a sharp end on the tracing side with adjustable machined threads every 1 mm distance. This helps to adjust the tool vertically until it touches the lower frame (Fig. 2).

The lower component includes a single piece including an intraoral frame and an outer frame. The intraoral frame consists of a triangular plate with two lateral wings to attach to the wax occlusal rims. There are three central bearing pins on the intraoral frame at equidistant from each other. The screws are adjustable with machined threads of precision of one mm distance. The central bearing pins are attached one



Fig. 2. Upper frame with the styli.

anteriorly and two posteriorly. The outer frame consists of a tracing platform (15 × 35 mm) in continuation with the central bearing device. The length lower components are made to confine within the incisal rod of semi adjustable articulator similar to the upper component of the hybrid tracer (Fig. 3).

In use, Upper component with central bearing plate and stylus is attached to upper rim in flush with the occlusal plane. It should be attached parallel to the lower rim. 3 mm wax is removed from the lower rim and lower component with central bearing device and tracing platform is attached (Fig. 4 and Fig. 5).

Prior to attaching, the entire three central bearing devices are centered in relation to the upper frame. The tracing pin should be in light contact at the centre of the tracing platform. Once both the tracers are attached, place it in the articulator (Fig. 6) and the mouth and confirm the parallelism of the tracers in relation to each other and to the ridges.

A near precise recording is reproduced for programming the articulator (Fig. 7).

3. Discussion-

This technique is an extensively used technique for recording centric jaw relation in this part of the world especially in dental institutions during the post graduate programme. Occlusal stability is an important aspect of the dental prosthesis, which can be achieved with an accurate recording of jaw relation.^{13,14} Gothic arch tracing is the most accepted method for recording centric relation, working and lateral path inclination.¹⁴ Gysi had expressed the importance of balance and equalization of pressure for recording an accurate centric relation. However, various studies of Trapozanno, Kingery and Payne have proved that a single central bearing point could not provide a good balance and equalization of pressure giving a wrong jaw relation.^{4,9-11} Hence, in this design, three central bearing point placed at equidistant in a triangular position in the hybrid tracers, will help in providing balance and equalization of pressure. In the hybrid tracer, three central bearing points are used, one anteriorly and two posteriorly, which gives a tripod effect and equalizes the pressure and prevents tipping of the lower denture base. In class 2 situations centralizing the central bearing point is difficult with hight tracers but with hybrid tracers it will become easier as it has tripod effect.

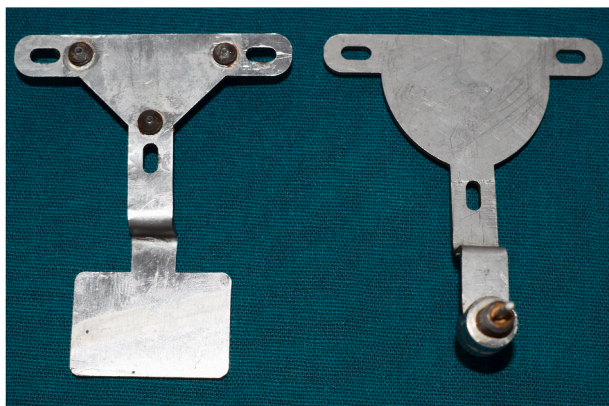


Fig. 1. Upper and lower hybrid tracer.

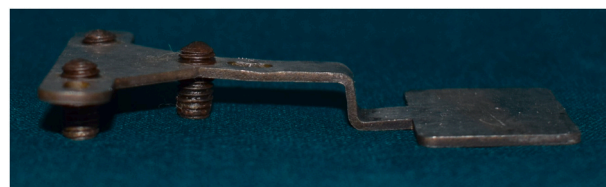


Fig. 3. Lower frame with the tracing platform.

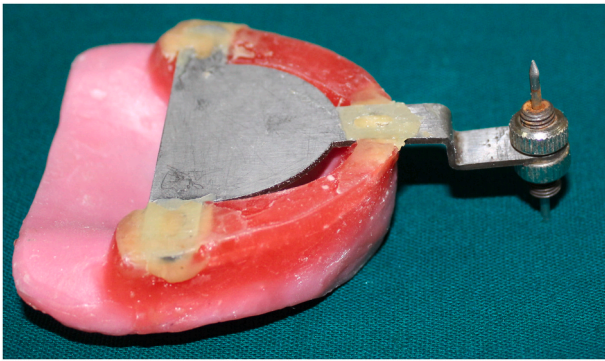


Fig. 4. Upper frame attached to the rim.

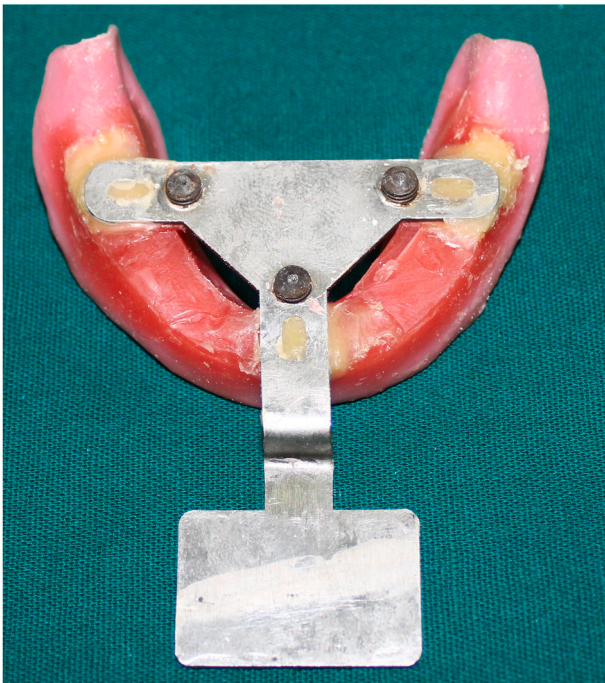


Fig. 5. Lower frame attached to the rim.

The total length of the extra oral tracers are reduced and placed closer to the centre of rotation.¹² This may help in providing a more precise record for jaw relation. This also makes the protrusive guidance more accurate than in the conventional setup record. Hybrid tracers are also easier to setup than the other conventional tracers. The advantage of hybrid tracer is that patient comfort is simple, small and less components.

A hybrid tracer may extrapolate the advantages of both the intraoral and extra oral tracers. It is both closer to the centre of rotation, making it more accurate and also has the advantage of visibility and control by the operator.^{12,13}

Many materials are available for recording Gothic arch tracing. However, while using black soot care should be taken not to overheat the tracing platform since proximity of the platform to the lips might cause irritation. Apart from black soot, materials like waxes, metallic pastes, plaster, acrylic resins, and elastomeric materials can be used for recording the tracing.¹⁵ Extra care should be provided to central bearing points to make sure all three points are contacting the central bearing plate.

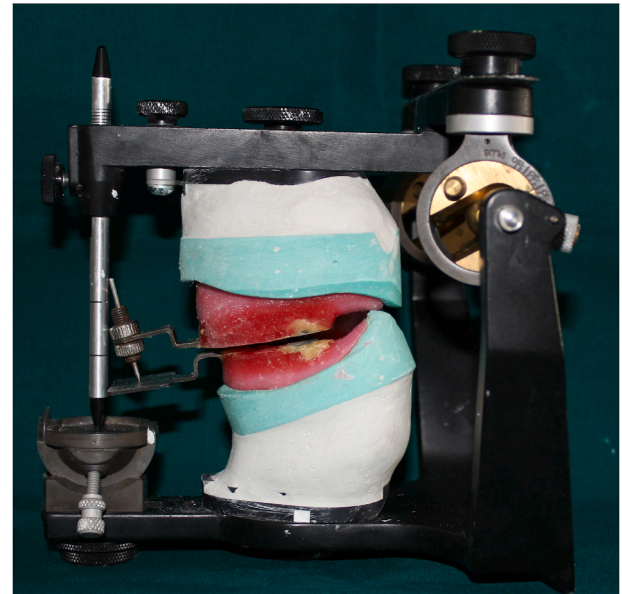


Fig. 6. Mounted cast with the tracers.

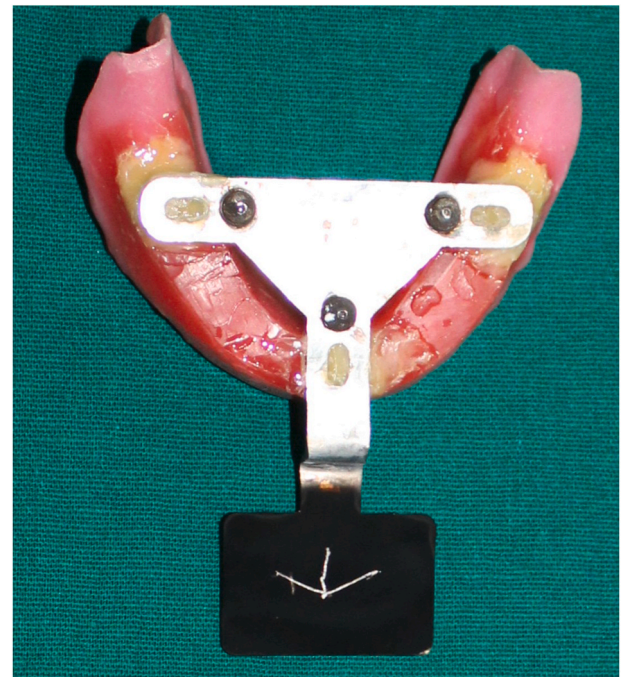


Fig. 7. Lower tracer with the tracing.

4. Conclusion

Hybrid tracers could be a good alternative to the Hight-tracer in recording centric relation. Hybrid tracers are simple, non-technique sensitive, provide balance, equalization of pressure, stabilize the occlusal rims well, are close to the centre of rotation providing precise record and provide easy access and visibility to the operator which will help the operator in guiding the patient well for a correct jaw relation.

References

- 1 Thakur M, Jain V, Parkash H, Kumar P. A comparative evaluation of static and functional methods for recording centric relation and condylar guidance: a clinical study. *J Indian Prosthodont Soc.* 2012;12(175–81).

- 2 etal Linsen. The influence of different registration techniques on condyle displacement and electromyographic activity in stomatognathically healthy subjects: a prospective study. *J Prosthet Dent.* 2012;107:47, 2.
- 3 Yurkstas AA, Kapur KK. Factors influencing centric relation records in edentulous mouths. *J Prosthet Dent.* 2005;93(4):305–310.
- 4 El-Gheriani AS, Winstanley RB. The value of the Gothic arch tracing in the positioning of denture teeth. *J Oral Rehab.* 1988;15:367–371.
- 5 Mysore AR, Aras MA. The magic slate as recording medium for Gothic arch tracing. *J Prosthet Dent.* 2012:108–160.
- 6 Keshvad A, Winstanley RB. An appraisal of the literature on centric relation. Part III. *J Oral Rehabil.* 2001;28(55-3).
- 7 Gysi A. Practical application of research results in denture construction. *J Am Dent Assoc.* 1929;16:199, 23.
- 8 Trapozanno VR. Occlusal records. *J Prosthet Dent.* 1955;5:325–332.
- 9 Kingery RH. A review of some of the problems associated with centric relation. *J Prosthet Dent.* 1952;2:307–319.
- 10 Payne SH. Selective occlusion. *J Prosthet Dent.* 1995;5:301–304.
- 11 Nandini VV, Nair KC, Sudhakar MC, Poduval TC. Comparative evaluation of hight tracer, Chandra tracer, intraoral tracer, functiograph and checkbite. A clinical study. *J Indian Prosthodont Soc.* 2005;5:26, 2.
- 12 Rahn AO, Heartwell Jr CM. *Textbook of Complete Denture.* fifth ed. New Delhi: B C Decker – Harcourt; 2002:290, 00.
- 13 Watanabe Y. Use of personal computers for Gothic arch tracing: analysis and evaluation of horizontal mandibular positions with edentulous prosthesis. *J Prosthet Dent.* 1999;82:562–572.
- 14 Villa AH. Gothic arch tracing. *J Prosthet Dent.* 1959;9:624–628.
- 15 Dua P, Gupta SH, Ramachandran S, Sandhu HS. Evaluation of four elastomeric interocclusal recording materials. *Med J Armed Forces India.* 2007 Jul;63(3):237–240.