Clinical Innovation CANT Identification Device in Orthodontics- Enabling Early Detection of Occlusal CANT

Jayakrishnan[1], Mithun K[2], K Nillan Shetty[3], Rohan Rai[4], Anjali Jayaraj[5]

[1,2,3,4]Department of Orthodontics and Dentofacial Orthopedics, A.J Institute of Dental Sciences, Mangalore, Karnataka, India

[5]Department of Conservative Dentistry and Endodontics, Navodaya Dental College, Raichur, Karnataka, India

Abstract:- One among the most important aesthetic feature in smile aesthetics is the canting of occlusal plane. Even though it is important, canting of occlusal plane is usually not evaluated during the routine clinical examination, mostly due to its camouflage effect by the soft tissue structures. But this might create difficulty at a later stage in treatment when its correction becomes more difficult. Therefore, identifying occlusal cant at the clinical examination phase becomes very critical. A Cant Identifying Device (CID) for occlusal cant detection is suggested in this article to equip the clinician to identify occlusal cant chairside without missing out on this finding. It proves to be a handy tool for the clinician and very effective when it comes to detection of occlusal cant.

Keywords:- CID, Occlusal CANT, Occlusal CANT Detection Device, Transverse Discrepancy.

I. INTRODUCTION

Smile aesthetics was always held high as a symbolic representation of beauty, but aesthetics was always a matter of subjective perception. Smile analysis is also a key element in Orthodontic treatment[1,] and smile designing has become an integral part in the treatment planning procedure. There are various studies that suggests different norms for the facial features for proper assessment of facial characteristics[2]. Although definitive rules cant be put up to define aesthetics, some guidelines can be formulated in order to optimize the Dentofacial aesthetics[3].

Among those characteristics, Occlusal Cant occupies a higher niche in the dentofacial features. It describes the vertical position of the teeth when the left and right sides are at different occlusal levels. This can also be defined as the rotation of the occlusal plane upwards or downwards in the transverse plan of one side over the other. Perception of smile aesthetic varies among individual, races and ethnic group. There are many studies reporting that all patients seeking treatment will have some degree of craniofacial asymmetry[4]. Shah and Joshi used measurements on Posteroanterior (PA) cephalograms to find the asymmetry in total facial structure and in the maxillary area[5].

Similarly, Peck et al used PA cephalograms to analyse the craniofacial asymmetry in a group of people thought of as having aesthetically pleasing faces[6]. The conclusion of their study was that the degree of asymmetry in facial structures increased with the distance from the cranium i.e. structures of the lower face were more asymmetrical compared to the upper face. Ferrario et al showed that variable degrees of soft tissue facial asymmetry in healthy Caucasian subjects[7]. All the studies anyways came to a common conclusion that some degree of asymmetry was often present in the craniofacial complex.

Even though most of the researches and data that are available points to the fact that a degree of facial asymmetry is present in all individuals, there is a difficulty level in identifying this asymmetry. This is usually because the soft tissues may compensate for the underlying skeletal imbalances[8]. in addition, there are reports that the individuals may mask facial asymmetry by their posture[9]. For example, tilting of the head may give the perception of no occlusal cant in an individual with occlusal cant. Therefore, it should always be a priority to assess the craniofacial and dental asymmetry as a part of clinical evaluation of the patients.

II. OBJECTIVES

The aim of the present study is to suggest an Occlusal cant evaluation tool for easy identification of the dental cant present in the patient. Severe occlusal canting can result in facial asymmetry and the extent of occlusal cant determines the complexity of Orthodontic treatment.

Furthermore, any canting of the occlusal plane is critical and needs to be identified as early as the diagnostic phase in Clinical examination in order to avoid any potential complications during the treatment. Therefore, the prime objective of this article is to invent a device or tool to enable the assessment of the occlusal cant in a patient clinically.

III. MATERIALS AND METHODS

The present invention utilises the Fox guide plane mounted with spirit levels in order to evaluate the occlusal cant. The bubble in the spirit level enables the clinicians to assess the extent of canting of occlusal plane chairside. It gives a more definitive insight of the cant both in the anteroposterior as well as the transverse dimensions.

This device is called as the Cant Identifying Device (CID) and is a simple tool which negates the use of any commercially available complicated devices for cant detection.

IV.   DESCRIPTION OF INVENTION

The Cant Identifying Device (CID) consists of a fox guide plane and a spirit level bubble leveller, which is mounted on top of the CID (Fig 1).

Fig 1:- Cant Identification Device

The clinician places the guide plane inside the mouth of the patient and instructs them to occlude normally (Fig 2).
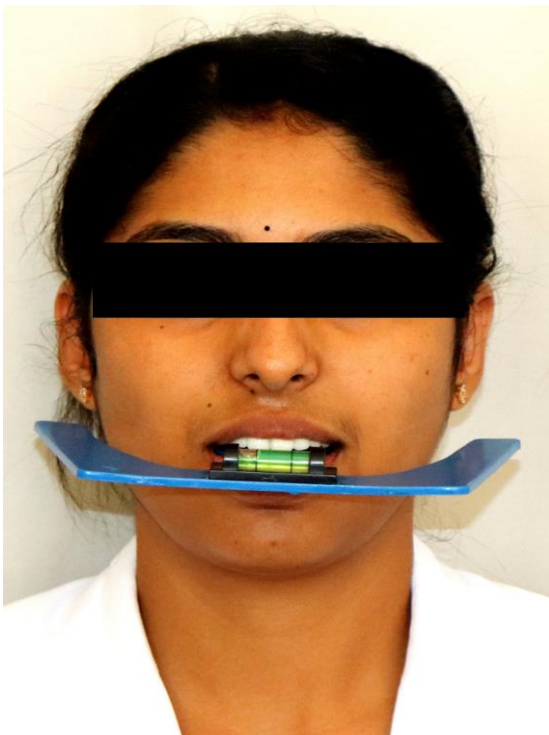

Fig: 2- Patient occluding with the CID

The patient is the examined from the frontal aspect and also from the left (Fig 3) and right lateral (Fig 4) aspects.
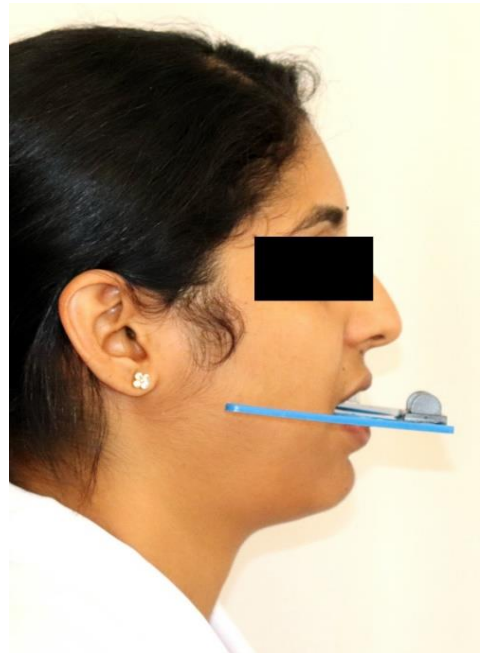

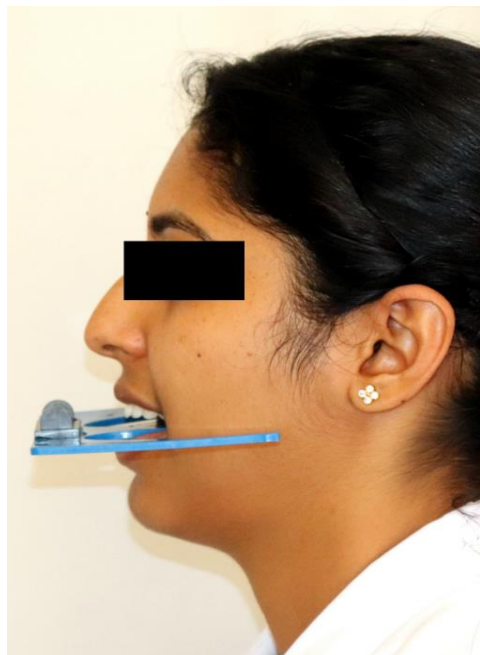Fig 3:- Right lateral aspects of the patient

Fig 4:- Left lateral aspects of the patient

The extent of occlusal canting can be identified through this method. The bubble gives an indication as to the side to which the cant is present. The lateral views give an indication in variation of the left and right anteroposterior occlusal plane in relation to the ala-tragus line. This will enable the clinician to better evaluate the patient and arrive at a proper diagnosis. It is very effective in patients whose soft tissues have compensated for the occlusal cant and in whom canting of occlusal plane is not so evident.

The advantages of this device are:
1. Clinician can easily visualize the cant of occlusal plane from the frontal and lateral views
2. Easily available
3. Less bulky
4. Comfortable to the patient
5. Economical
6. Easily recordable using the frontal and Profile Photographs

The main disadvantage with this device is that the amount of occlusal cant cannot be quantified to any measurement or the degree of canting of occlusal plane cannot be measured.

V. DISCUSSION

An occlusal cant is one of the characteristics that must be evaluated during clinical examination in all patients seeking Orthodontic treatment as it determines the severity of the treatment. Most of the commercially available devices relate the jaw to a reference point or plane regardless of the orientation of the occlusal plane. The neglect of the occlusal plane orientation usually renders these devices inaccurate. Conventionally, a wooden tongue depressor can be placed across the right and left posterior teeth to check the parallelism to the interpupillary line. The vertical distance between the maxillary canines and the medial canthi of the eyes can also be measured[4]. But these measures require the assessment of patient's eyes to ensure that discrepancies between right and left side are not related to any asymmetries of the orbits.

The analysis of the Postero-anterior Cephalogram (PA) also is used to determine occlusal cant. A line drawn connecting the occlusal surfaces of the left and right maxillary molars is compared to the transverse axis of the skull. This enables the measurement without the influence of overlying soft tissues. It has also been suggested that a level of occlusal plane is a prerequisite for the success of all orthognathic surgeries and failure to level the canting of occlusal plane during surgery may have detrimental effects on masticatory functions[10].

Patients with hemifacial microsomia typically exhibit significant occlusal canting. Here the hypoplastic mandible impedes normal vertical growth the midface and intern affect the craniofacial growth. This progressive asymmetric growth leads to increased distortion of the mandible and the midface[11]. The maxilla is usually shortened with the occlusal plane canting upward on the affected side as much as 10° or more in many patients.

Therefore, an attempt is made to make the identification of occlusal cant at the clinical examination phase of the patient, so that further detrimental effects can be avoided. A simple device is made so that the clinician finds it handy and also the patient finds it comfortable to use. The soft tissue compensation can usually deviate the attention of the clinician away from the canting of occlusal plane. The CID gives the advantage to assess even a slight change in occlusal cant. Recording of the Occlusal cant at the initial stages are very important as the development of occlusal cant at a later stage in treatment usually points to a faulty treatment biomechanics. Therefore, this device also helps to assess the changes in the occlusal canting and also helps to evaluate the success of treatment measures aimed at correcting occlusal cant.

VI. CONCLUSION

Although occlusal cant should be identified before the beginning of Orthodontic treatment, it is often overlooked due to the soft tissue compensation in most of the patients. Clinicians usually are hurried onto correction of other malocclusions, when the occlusal cant goes unnoticed initially. But the severity of treatment usually rests on the degree of occlusal cant and its correction is to be initiated in order to avoid detrimental effects on mastication. Even though esthetics is a subjective perception, the device presented in the article would enable the clinician to better judge the patient's occlusal cant easily during the clinical examination.

REFERENCES

[1]. Ackerman MB, Ackerman JL. Smile analysis and design in the digital era. J Clin Orthod. 2002; 36:221-36.

[2]. Abu Alhaija ES, Al-Shamsi NO, Al-Khateeb S. Perceptions of Jordanian laypersons and dental professionals to altered smile aesthetics. Eur J Orthod. 2011; 33:450-6.

[3]. Schabel BJ, Franchi L, Baccetti T, McNamara JA Jr. Subjective vs objective evaluations of smile esthetics. Am J Orthod Dentofacial Orthop. 2009;135: S72-9.

[4]. Erickson KL, Bell WH, Goldsmith DH: Analytical model surgery, in Bell WH (ed): Modern Practice of Orthognathic and Reconstructive Surgery. Philadelphia, PA, Saunders, 1992, p156.

[5]. Shah SM, Joshi MR: An assessment of asymmetry in the normal craniofacial complex. Angle Orthod 48:141, 1978.

[6]. Peck S, Peck L, Kataja M: Skeletal asymmetry in esthetically pleasing faces. Angle Orthod 61:43, 1991.

[7]. Ferrario VF, Sforza C, Poggio CE, et al: Distance from symmetry: A three-dimensional evaluation of facial asymmetry. J Oral Maxillofac Surg 52:1126, 1994.

[8]. Ferrario VF, Sforza C, Miani A, et al: Craniofacial morphometry by photographic evaluations. Am J Orthod Dentofac Orthoped 103:327, 1993.

[9]. Yogosawa F: Predicting soft tissue profile changes concurrent with orthodontic treatment. Angle Orthod 60: 199, 1990.

[10]. Polley JW, Figueroa A, Cohen M: New ideas and innovations: Leveling of the occlusal plane during model surgery. J Craniofac Surg 4:266, 1993.

[11]. Kaban LB, Moses MH, Mulliken JB: Surgical correction of hemifacial microsomia in the growing child. Plast Reconstr Surg 82:9, 1988.