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Class II correction with The Carriere Motion 3D appliance – A literature review

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ABSTRACT –

Class II malocclusion is a prevalent orthodontic concern that often requires immediate treatment. Luis Carriere's Carriere Motion 3D Appliance (CMA) offers a novel approach by tackling sagittal discrepancies from the beginning of treatment. This treatment seeks to establish an ideal Class I occlusion prior to the application of brackets or aligners. This review highlights the appliance's design, clinical applications, and its effects on skeletal, dental, and soft tissue components. A modified version of the device is also available for the treatment of Class III cases. The CMA provides a reliable and patient-focused strategy for early orthodontic intervention.

Key words – Class II correction, Carriere 3D motion appliance, Distalizer.

Introduction:

Class II malocclusions represent one of the most common forms of malocclusion. The treatment approach differs based on whether the discrepancy arises from a retrognathic mandible or a prognathic maxilla. For a mandibular concern, functional appliances like twin blocks or fixed functional appliances are employed; alternatively, if just dental intervention is necessary, extractions of the upper first molars and lower second premolars are conducted. If the maxilla is compromised, a helmet for skeletal correction or distalizing devices such as the pendulum appliance and distal jet appliance for dental modifications are advised. 2 Some appliances necessitate patient compliance, while others do not. Originally developed by Luis Carriere in 2004 as the Carriere Distalizer, it was then marketed as the Carriere Motion 3D appliance. 1 The MOTION 3D Class II Appliance employs the "sagittal first philosophy" to create an ideal Class I foundation at the commencement of treatment, prior to the introduction of brackets or aligners, when patient adherence is at its highest.

Indications of the appliance

- Class I, Crowding
- Class II, Division 1
- Class II, Division 2
- Class II, Open bite → Class II, Deep bite
- Class II, Blocked out upper cuspids
- Class II, Subdivision, left or right (unilateral)
- Mixed Dentition (Phase 1)

Description of the appliance

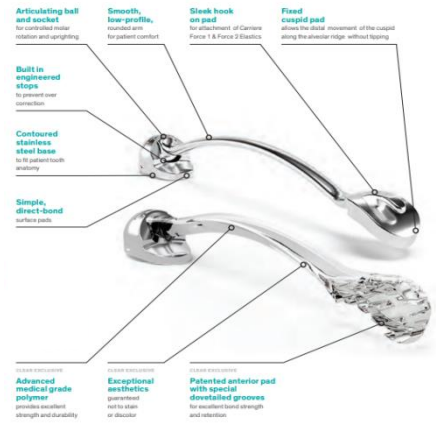

Fig 1- Parts of Carriere motion appliance

It consists of rigid bars attached to the mesial surfaces of the maxillary canines and first molars. The canine pad includes a hook attachment for the insertion of intermaxillary elastics. If the canine has not erupted or has erupted ectopically, the maxillary first premolar may be employed. A pad with a ball-and-socket joint is attached posteriorly to the first molar to enable molar de-rotation and distalization.
Intermaxillary elastics are attached to the mandibular dentition. Bonded buccal tubes with hooks are attached to the first or second molars. A modified Essix-type transparent appliance is employed for mandibular anchorage to support the bonded buccal tubes or hooks. Furthermore, a lingual arch, temporary anchorage devices, or fixed appliances may be utilized for lower anchorage.
The device is engaged with Class II elastics exerting a force of 6 to 8 ounces. The usage of intermaxillary elastics for 22 hours per day is required.[2]

Fig 2 – Carriere appliance in patient

Duration of use of appliance - The duration of appliance usage, with appropriate compliance, often ranges from 5 to 8 months for the completion of Phase I treatment (dentalization). The adolescent patient indicated a more positive overall experience, considered the CMA more pleasant to wear, and saw less adverse comfort-related side effects in comparison to alternative appliances for Class II treatment.[2]

Treatment of Carriere appliance

Skeletal effects:
A study by Hera Kim Berman et al. on young adults demonstrated that CMA therapy limited the anterior displacement of the maxilla at point A. The sagittal position of the chin at the pogonion was barely affected. The treatment group demonstrated a twofold augmentation in lower anterior face height compared to the control group. A drop of 0.8º in the ANB angle was observed.[6]

Dental effects:
A study on adolescents revealed a 2.1 mm improvement in Wits evaluation in relation to Class I. Phase I demonstrated a clockwise rotation of the functional occlusal plane in the treatment group (3.98º); Phase II revealed a significant rebound (3.6º). During the treatment, the molar relationship improved, along with enhancements in overjet and overbite; the lower incisors displayed a proclination of 4.2º. .[2]
Daniel et al.[3] conducted a study to compare the dental effects of appliances in two groups: the first group with skeletal class I and the second group with skeletal class II. The findings demonstrated that maxillary first molars had distal tipping and rotation, together with considerable distal displacement (1.92 ± 0.80 mm and 1.67 ± 1.56 mm, respectively). Additionally, mandibular molars experienced significant mesial displacement (–1.37 ± 1.23 mm and –2.51 ± 1.51 mm, respectively) along with mesial tipping, whereas maxillary canines demonstrated marked distal movement (2.34 ± 1.07 mm and 2.24 ± 1.91 mm, respectively) in conjunction with distal tipping and rotation.[3]

Soft Tissue changes:
A significant decrease in the Labrale inferius (Li) – aesthetic line measurement was noted, accompanied by an increase in the nasolabial angle and soft tissue convexity angle.[5]

Supplementary anchorage for the mandibular arch can be attained by the use of TADs or by directly applying distalizing forces from an IZC. Eight It reduces incisor proclination and facilitates maxillary molar distalization. A study by Ahmed S Fouda and colleagues revealed a non-significant anterior displacement (0.06 ± 1.45 mm) and proclination (0.86º ± 2.22º) within the miniscrew cohort. The degree of maxillary molar distalization was more pronounced in the miniscrew cohort (2.57 ± 1.52 mm).[7]

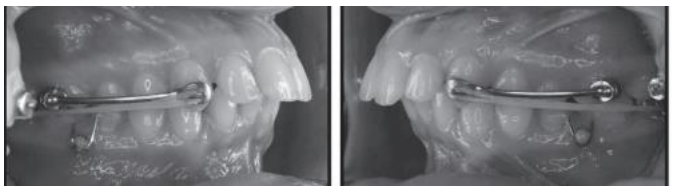

Fig 3- A- Carriere motion appliance with miniscrew anchorage.
B-Carriere motion appliance with TADs

Carriere 3D Motion Appliance for Class III correction:

. It consists of bars attached to the mandibular canines and the lower first molars. A flat, molded pad is attached to the molars. Heavy intermaxillary Class III elastics are employed between hooks projecting anteriorly from the bars on the lower canines to hooks or buttons affixed to the most distal maxillary molars. A transparent, discreet retainer is constructed for the correction of the maxillary arch.

AA research by McNamara Jr et al on adolescents and adults demonstrated notable dentoalveolar changes alongside a little increase in lower anterior facial height. The Wits appraisal increased by 4 millimeters. The molar relationship improved by 6.0 mm in phase I, but had a slight regression in phase II, resulting in a net enhancement toward Class I of 4.8 mm. Superimpositions revealed anterior displacement of the upper molars relative to the maxilla and posterior displacement of the lower molars relative to the mandible.[4]

Fig 4- Carriere motion appliance for Class III correction

Conclusion

The Carriere Motion 3D device offers a modern and efficient approach to treating Class II malocclusions by correcting sagittal discrepancies at the onset of treatment. It facilitates swift Class I molar restoration while improving patient comfort and adherence. The gadget demonstrates considerable effects on dental, skeletal, and soft tissues, yielding enhanced outcomes when utilized with sufficient anchoring. Its versatility, including applications in Class III scenarios, greatly enhances its utility. The device enhances treatment while maintaining clinical effectiveness, making it a vital tool in contemporary orthodontics.

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