

## Dentistry 2019: Temporomandibular joint adaptations following functional appliance therapy in adolescent males with Angle's class II division 2 malocclusion: A prospective MRI study

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The aim of this study was to compare the temporomandibular joint disc condyle fossa relationship following pre-functional therapy and post-functional therapy in 14 adolescent males with skeletal class II and Angle's class II division 2 malocclusion. MRI scans were done at pre-treatment (stage-A), pre-functional (stage-B), post-functional (stage-C) for comparing the mandibular condyle, disc fossa relationship using various angular and linear measurements. In the pre-treatment MRI scans, posterior condylar position was found to be statistically significant.

To document the alterations within the condyle-glenoid fossa (C-GF) complex and the positional changes of the glenoid fossa in the cranium after removable functional appliance therapy and after the completion of fixed appliance therapy. The Department of Orthodontics, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi, India. The study sample consisted of 12 growing children (eight girls and four boys) between 10 and 14 years of age with skeletal Class II division 1 malocclusion selected on well defined criteria.

All patients were treated with either the dual Block or the Bionator appliance followed by fixed appliances. Mean total treatment duration was 28 months. The changes in and round the C-GF complex were evaluated using MRI at pre-treatment stage, after functional appliance therapy and at the completion of fixed mechanotherapy. Forward condylar position within the glenoid fossa and articular disc retrusion with reference to the condylar head were statistically significant after functional appliance therapy.

However, the condyles had a comparatively concentric position within the glenoid fossa, while the articular disc resumed its pre-treatment position at the top of the treatment. Linear measurements from the centre of the external acoustic meatus to the post-glenoid spine revealed a 1.3-mm forward relocation of the post-glenoid spine along the Frankfurt Horizontal plane. Forward relocation of the C-GF complex seems to be one among the mechanisms of action of functional appliances, while the interior anatomic arrangement within the mandibular joint (TMJ) complex normalizes to its pre-treatment position.

The condyle significantly shifted anteriorly within the glenoid fossa after functional appliance therapy. The articular disc remained in normal 11 to 1 O'clock position throughout all the phases of treatment. The superior joint space did not change

significantly between pre-treatment and pre-functional stage but it was increased significantly between pre-treatment and post-functional stages. The condyle had significantly shifted anteriorly by 0.89 mm between pre-treatment and post-functional stage.

The aim of this investigation was to analyse three possible adaptive TMJ growth processes contributing to the increase in mandibular prognathism accomplished by Herbst appliance therapy: (1) condylar remodelling; (2) glenoid fossa remodelling; and (3) condylefossa relationship changes. The subjects were 15 consecutive Class II malocclusions (11 males and four females, aged 11.5-17.5 years) treated with the Herbst appliance for an average period of 7 months. Condylar remodelling, glenoid fossa remodelling, and condyle-fossa relationship changes were analysed by means of magnetic resonance imaging (MRI). From each subject, four MR images were evaluated: before treatment, start of treatment (when the Herbst appliance was placed), during treatment (6-12 weeks after appliance placement), and after treatment (when the appliance was removed). 'Effective condylar growth' (= the sum of condylar remodelling, fossa remodelling, and condyle-fossa relationship changes) was analysed with the aid of pre- and post-treatment lateral cephalometric roentgenograms.