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Efficacy and Safety of Different Interventions to Accelerate Orthodontic Tooth Movement in the First Month of Treatment: A Systematic Review and Network Meta-analysis

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Objectives: Decreasing the duration of orthodontic treatment has always been at the forefront of innovation for clinical orthodontics. This network meta-analysis aimed to determine the relative efficacy and safety of adjunctive treatments for accelerating orthodontic tooth movement in the first month.

Methods: We searched MEDLINE, EMBASE, Cochrane CENTRAL, CINAHL and SCOPUS (until May 3rd, 2019). Two investigators performed study selection and data extraction. Randomized controlled trials of healthy adolescents and adults with surgical and/or nonsurgical adjuncts to orthodontic tooth movement were included. . The primary outcome in this NMA was the rate of tooth movement (mm/month). Eligible RCTs were assessed by Cochrane risk of bias tool. A network meta-analysis was undertaken using the Bayesian hierarchical random-effects framework. Interventions were ranked for efficacy and reviewed for safety. The quality and strength of evidence was assessed following GRADE approach.

Results: From a total of 4,112 hits**,** 18 studies pertaining to eight interventions were included. Reflected in the rate of orthodontic tooth movement, in the first month of treatment and in comparison to conventional orthodontic treatment, Micro-osteoperforations in conjunction with low-level laser therapy (LLLT) (mean-difference: 1.3mm/mo, 95% CrI =0.60-2.0; SUCRA= 96.82%) was ranked as the most efficacious intervention for accelerating orthodontic tooth movement, followed by corticotomy (mean-difference: 0.78mm/mo, 95% CrI=0.42-1.1; SUCRA=78.61%,) and piezocision (mean-difference: 0.52mm/mo, 95% CrI=0.12-0.93; SUCRA= 55.64%). No major safety concerns were reported.

Conclusions: Micro-osteoperforations in conjunction with LLLT, Corticotomy and Piezocision were efficacious adjunctive treatments for accelerating orthodontic tooth movement in the first month of treatment.