ARTICLES FROM THE CURRENT ORTHODONTIC LITERATURE, SELECTED AND REVIEWED BY:

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Stability of overbite correction

Danz JC, Greuter C, Sifakakis I, Fayed M, Pandis N, Katsaros C. Stability and relapse after orthodontic treatment of deep bite cases—a long-term follow-up study. Eur J Orthod 2014;36:522-30.

A deepbite is defined as the vertical overlap of the maxillary incisors, when measured (either in millimeters or as a percentage) perpendicular to the occlusal plane. A deepbite can have skeletal or dental origins that will dictate the treatment approach. Therapeutic objectives for a deepbite are mainly to prevent tissue trauma from tooth contact. This retrospective study was conducted both to determine the risk factors for a deepbite, and also to evaluate the relapse tendency posttreatment. Sixty-one previously treated patients with an overbite exceeding 50% participated in the study. Patient records consisted of 3 sets of dental casts: pretreatment, posttreatment, and end of follow-up. Two lateral cephalograms taken at pretreatment and posttreatment were evaluated. Measurements on the pretreatment to the end of follow-up plaster models were done by 1 investigator. The median follow-up period was 11.9 years. The patients were treated by various treatment modalities; most received at least a mandibular fixed retainer and a maxillary removable biteplate during retention. Relapse was defined as an increase in incisor overlap from below 50% after treatment to equal to or more than 50% at the long-term follow-up. Ten percent of the patients showed relapse equal to or greater than 50% incisor overlap, and their amounts of overbite increase were low. The partial-treatment group had a significantly increased prevalence of gingival contact at the end of the follow-up compared with the complete-treatment group. It was not possible to identify important factors to predict relapse of deepbite malocclusion, since the prevalences and amounts of relapse were too low because of the sample size, outcome, and retention procedures.

Reviewed by Yasir Kachroo

Monocortical and bicortical mini-implant stability

Holberg C, Winterhalder P, Rudzki-Janson I, Wichelhaus A. Finite element analysis of mono- and bicortical mini-implant stability. Eur J Orthod 2014;36:550-6.

Many factors affect the success rate of mini-implants, and longer mini-implants are believed to have an enhanced primary stability than shorter ones. The authors of this study aimed to determine the biomechanical difference between monocortical and bicortical anchorage types and their effects on primary stability. They used a computed tomography image of a mandibular segment with a missing tooth and orthodontic elements generated with computer-aided design to construct a model. Three anchorage types were simulated: 2 lengths of monocortical anchorage (5 and 7 mm) and 1 bicortical anchorage (10 mm), all with the same diameter of 1.6 mm. Finally, using the finite element method, the effective stress was calculated within a localized area when 1.5 N of force was applied. The results showed that the short monocortical mini-implant had the greatest effective stress, whereas the long variant of the monocortical mini-implant showed somewhat lower stress values. The bicortical mini-implant had the lowest level of effective stress. When nonparametric tests were performed using the Kruskal-Wallis and Mann-Whitney U tests, highly significant differences were indicated. Rank correlation according to the Spearman test showed that the peri-implant stress values were lower when the mini-implant was longer and inserted deeper into the alveolar bone. Based on the findings, the authors concluded that the reduction of stress induced in the cortical bone indicates that bicortical anchorage seems to be superior in primary stability. However, even in monocortical anchorage, a longer length seemed to reduce the leverage effect and provide better stability.

Reviewed by Jay Sung

Color improvement and stability of white spot lesions

Yetkiner E, Wegehaupt F, Wiegand A, Attin R, Attin T. Colour improvement and stability of white spot lesions following infiltration, micro-abrasion, or fluoride treatments in vitro. Eur J Orthod 2014;36:595-602.

Subsurface enamel demineralization, known as a white spot lesion (WSL), is an undesirable yet relatively common side effect of treatment with fixed orthodontic appliances. Currently, 3 methods are used to treat WSLs: (1) low concentration of topical fluoride as a conservative method to reverse the demineralization process, (2) microabrasion with hydrochloric acid and an abrasive powder or slurry, and (3) infiltration of the deep porous part of the WSL with a low viscosity resin, which has a light fraction index similar to sound enamel. The aims of this in-vitro study were to compare the color-masking effect of these methods and the resistance of these treated surfaces against future discoloration. Artificially produced WSLs on bovine enamel (n = 96) were randomly allocated to 4 groups: infiltration, fluoride, microabrasion, and control. After treatment, the groups were then discolored for 24 hours in tea, or tea and citric acid. Changes in the enamel color were measured spectrophotometrically at baseline, after WSL formation, after treatment, and during discoloration (8, 16, and 24 hours). The authors found that the infiltration and microabrasion treatments performed better in diminishing the opaque WSL appearance compared with the fluoride treatment and the control. The greatest color improvement was obtained by infiltration, and only this treatment reduced the discoloration back to the baseline level. This color improvement was stable only for infiltration, whereas the other groups changed significantly during the discoloration period. Although this in-vitro testing cannot replicate the actual mode of color improvement or stability, it still has interesting implications for ranking the materials and techniques currently used to treat WSLs.

Reviewed by Alireza Hourfar

Torque ratio as a predictable factor on primary stability of orthodontic miniscrew implants

Inoue M, Kuroda S, Yasue A, Horiuchi S, Kyung HM, Tanaka E. Torque ratio as a predictable factor on primary stability of orthodontic miniscrew implants. Implant Dent 2014;23:576-81.

In recent years, miniscrews in orthodontic treatment have gained popularity as absolute anchorage devices. Miniscrews provide reliable anchorage control for orthodontists, with a success rate of 85% to 92%. However, it can be frustrating for the orthodontist when a miniscrew loosens or fails during treatment, since this necessitates reimplantation of the miniscrew or reconstruction of the treatment mechanics with traditional anchorage devices. Therefore, establishing both reliable and predictable factors for implant stability is important. The purpose of this study was to evaluate torque ratio as a predictable factor on the primary stability of orthodontic implants. Torque ratio was calculated by maximum insertion torque divided by maximum removal torque. Fifty-eight subjects participated in this study (17 male, 41 female; mean age, 21.9 years; SD, 8.6 years). Titanium miniscrews of 3 diameters, 1.4, 1.5, and 1.6 mm, were used. The maximum insertion torque was measured during the final screw tightening, and the maximum removal torque was measured by loosening the screw in the opposite direction. Although no significance was found between different age groups, sexes, or types of miniscrew, the torque ratio was significantly lower in the success group. Most failed implants showed small maximum removal torque values relative to maximum insertion torque. The authors concluded that torque ratio correlates to miniscrew success rate, since it can be used as a predictable factor. They suggested that miniscrew implants should be replaced if maximum removal torque is significantly lower than maximum insertion torque during placement surgery. In retrospect, more information regarding the location of implant insertion could have explained some of the variability.

Reviewed by Michael M. Chiang