ARTICLES FROM CURRENT ORTHODONTIC LITERATURE, SELECTED AND REVIEWED BY: RESIDENTS, DEPARTMENT OF ORTHODONTICS, SAINT BARNABAS HOSPITAL/UNION COMMUNITY HEALTH CENTER, BRONX, NY

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Third molar–induced external root resorption

Tassoker M. What are the risk factors for external root resorption of second molars associated with impacted third molars? A cone-beam computed tomography study. J Oral Maxillofac Surg 2019;77:11-7.

Prophylactic removal of third molars is still a topic for debate. In the case of impacted third molars, the decision is clearer when we consider the risk of external root resorption (ERR) or decay on the adjacent second molar. Most previous studies evaluated these side-effects on the second molar with the use of periapical and panoramic radiographs. Based on the 2-dimensional images evaluated, the prevalence of ERR ranged from 0.3% to 7%. The author of this retrospective study used cone-beam computed tomographic (CBCT) images to evaluate position and tooth type (mandibular vs maxillary) as possible risk factors for ERR on adjacent second molars. The location and severity of the ERR were also evaluated. The sample consisted of 200 impacted teeth from 200 patients. In cases of more than 1 impacted third molar, one of them was selected randomly. The prevalence of ERR in this study was 21%. A statistically significant relationship was found between the position of the third molar (mesioangular and horizontal) and the type of tooth (mandibular) in relation to ERR. Age and sex were not found to be a risk factors for ERR. The cervical region of the mandibular second molars and the middle third of maxillary second molars were most affected by ERR. Although this study highlights the importance of CBCT in the early diagnosis of ERR, more studies are needed, specifically with direct visualization of third molars at the time of extraction, to confirm the accuracy of CBCT in distinguishing ERR from a carious lesion.

Reviewed by Flor Segovia

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Low-level laser therapy for post-surgical paresthesia

Santos FT, Sciescia R, Santos PL, Weckwerth V, Dela Coleta Pizzol KE, Queiroz TP. Is low-level laser therapy effective on sensorineural recovery after bilateral sagittal split osteotomy? Randomized trial. J Oral Maxillofac Surg 2019; 77:164-73.

For patients with Class II malocclusion due to mandibular retrognathism, an accepted surgical option is the bilateral sagittal-split osteotomy (BSSO). A common complication of this treatment is paresthesia of the inferior alveolar and mental nerves, leading to altered or lost sensation in the chin and lower lip areas. Currently, the most popular treatment is low-level laser therapy (LLLT). LLLT promotes a bodily response to the injury, reducing inflammation and pain. There are multiple clinical protocols for LLLT. This randomized, double-blinded, split-mouth study investigated (1) the best timing for treatment, (2) whether the various mandibular regions would respond differently to LLLT, and (3) the level of sensorineural recovery at each treatment session. Twenty adult patients experiencing sensory abnormalities after BSSO were randomized into either an early (within 30 days after surgery) or late (6 months to 1 year after surgery) treatment group. LLLT was conducted on one side of the mandible while the other side received a placebo treatment, for a total of 5 sessions. All of the patients experienced sensorineural recovery over time. However, greater improvement occurred in the experimental versus control areas, as well in those receiving treatment earlier versus later. The greatest improvement occurred at LLLT application session 5. There was no difference in the return of sensitivity in the different mandibular regions treated. This is the first study to look at the use of LLLT for sensorineural recovery after BSSO. Given the novelty of these results, further research will be valuable. Patients with sensorineural abnormalities after BSSO may benefit from LLLT, especially if it is commenced shortly after the injury.

Reviewed by Sarah Elizabeth Prehn

Gingival recession and closed eruption of labially impacted maxillary canines

Lee JY, Choi YJ, Choi S-H, Chung CJ, Yu H-S, Kim K-H. Labially impacted maxillary canines after the closed eruption technique and orthodontic traction: a split-mouth comparison of periodontal recession. J Periodontol 2019; 90:35-43.

The periodontal sequelae of exposing labially impacted maxillary canines are important considerations in ensuring optimal functional and esthetic outcomes. Previous studies show conflicting results on the periodontal outcomes of the closed eruption technique. This study investigated the effect of the closed eruption technique on the periodontal status of labially impacted canines and identified pretreatment variables influencing the esthetic outcome. This prospective split-mouth study evaluated 54 patients with 1 labially impacted maxillary canine and 1 normally erupted maxillary canine. The normally erupted canine was used as the control. Pretreatment variables included the canine angulation, depth, mesiodistal displacement, and developmental stage of the canine. Posttreatment periodontal outcomes included probing depth, keratinized and attached gingival width, clinical crown length, cementoenamel junction (CEJ) to alveolar crest distance, and root length. All impacted canines were exposed with a closed eruption technique and aligned into the arch. Compared with the contralateral canine, impacted canines had shorter root lengths, shorter keratinized and attached gingiva, longer clinical crowns, and increased CEJ to alveolar crest distance after treatment. Impacted canines with more developed roots when they were impacted ended up with shorter roots than the control teeth after exposure. Alveolar crest height decreased in impacted canines that were more mesially angulated and that were higher up in the bone. This study showed that labially impacted canines had worse periodontal outcomes with closed eruption exposure, but the differences from control teeth were clinically insignificant (<1 mm). Although this study claims that such differences were minimal, it did shed light on important parameters that orthodontists should consider with such cases. Deeper, more mesially impacted canines with higher root development should be closely monitored during and after orthodontic treatment for adverse periodontal outcomes.

Reviewed by Hamad Burashed

White spot lesion prevention

Pithon MM, Baião FS, Sant'Anna LID, Tanaka OM, Cople-Maia L. Effectiveness of casein phosphopeptide–amorphous calcium phosphate–containing products in the prevention and treatment of white spot lesions in orthodontic patients: a systematic review. J Invest Clin Dent 2019; e12391.

White spot lesions (WSLs) are a common occurrence within the orthodontic patient population. In recent years new products containing casein phosphopeptide–amorphous calcium phosphate (CPP-ACP) have been developed that promote remineralization of carious lesions via supersaturation of the oral medium with phosphate and calcium ions and by compromising adhesion of microorganisms to the tooth surface. This systematic review aimed to clarify the effectiveness of oral agents containing CPP-ACP in preventing and treating WSLs around orthodontic braces. A comprehensive survey of electronic databases based on PRISMA guidelines was completed and each article was evaluated with the use of a risk-assessment tool. Only controlled clinical studies comparing products containing CPP-ACP with other oral agents or placebos in patients with fixed labial appliances were included. Eleven studies were ultimately included, 9 randomized and 2 nonrandomized. Heterogeneity of CPP-ACP application methods, types of control groups, and WSL evaluation methods made it difficult to compare results and perform a meta-analysis. The authors concluded that CPP-ACP topical cream is effective in prevention and treatment of WSLs in patients undergoing active orthodontic treatment or immediately after removal of fixed appliances, but there was no statistically significant difference compared with the effectiveness of fluoride products, such as rinses, varnishes, topical gels, and dentrifices. The overall results suggest that CPP-ACP–containing products are an effective treatment option for orthodontists to use in reducing the incidence of WSLs in their active patient population. Additional well designed prospective randomized controlled clinical trials using different CPP-ACP modalities and similar methods of measurement are necessary to further support this conclusion.

Reviewed by Gene Eng

Mandibular changes after surgery-first approach

Han JJ, Jung S, Park H-J, Oh H-K, Kook M-S. Evaluation of postoperative mandibular positional changes after mandibular setback surgery in a surgery-first approach: isolated mandibular surgery versus bimaxillary surgery. J Oral Maxillofac Surg 2019;77:181.e1-12.

The surgery-first approach (SFA) is a departure from traditional orthognathics. Some studies suggest that SFA may have unpredictable outcomes, leading to occlusal interferences and an associated increase in vertical dimension. The aim of this retrospective cohort study was to compare postoperative positional changes in the mandible after isolated mandibular surgery (IMS) or bimaxillary surgery (BMS) in a surgery-first approach. A secondary objective was to compare predicted postoperative mandibular forward movement due to counterclockwise rotation versus actual postoperative movement. The subjects included 30 patients with mandibular prognathism and no preoperative orthodontics. One group (n = 16; mean age 22.2 y) underwent bilatral sagittal-split osteotomy (BSSO) mandibular setback (IMS), and the other (n = 14; mean age 19.9 y) underwent BSSO and Le Fort I osteotomy (BMS). Vertical and horizontal measurements were obtained from lateral cephalographs before surgery (T0), 1 week after surgery (T1), and at debonding (T2). A prediction method was developed to determine if the amount of rotation that occurs during postoperative orthodontic elimination of occlusal interferences could be accurately predicted. No statistically significant differences were found between IMS and BMS. Significant mandibular positional changes were exhibited from T0 to T1 and from T1 to T2. No difference was found in predicted versus actual forward rotational movement. In addition to mandibular rotation, additional horizontal movement occurred as postoperative relapse. The authors concluded that IMS and BMS result in clinically significant postoperative positional changes of the mandible (>2 mm) due to a combination of postsurgical counterclockwise rotation and additional horizontal relapse. The prediction method presented here could be a useful tool in anticipating this forward movement in SFA cases.

Reviewed by Maryann Vlahos

Nasal patency and sleep apnea

An Y, Li Y, Kang D, Sharama-adhikari SK, Xu W, Li Y, Han D. The effects of nasal decongestion on obstructive sleep apnoea. Am J Otolaryngol 2019; 40:52-6.

The precise relationship of nasal patency and sleep is unclear. However, in patients with nasal obstruction–predominant OSA (NO-OSA), surgery to clear the nasal passages is a common treatment adjunct to help manage OSA. The authors performed a randomized, placebo-controlled, double-blind, crossover study evaluating the effects of nasal patency on sleep quality and breath in NO-OSA patients by applying decongestant nasal spray. Inclusion criteria included an apnea/hypopnea index (AHI) >5, chronic impaired nasal breathing confirmed by nasal endoscopy, and the absence of pharyngeal narrowing. Fifteen patients were enrolled. Two polysomnographic separated by 48 hours studies were performed on each patient. Authors randomly applied either oxymetazoline (0.05% solution, 0.4 mL) or placebo (normal saline solution, 0.9%, 0.4 mL) in each nostril at sleep onset and 3 hours after sleep onset. The study showed that the oxymetazoline resulted in a significant increase in REM sleep ($P = 0.027$), a reduction of stage 1 sleep ($P = 0.004$), and a reduction in arousal index ($P = 0.002$). Oxygen saturation during sleep was increased significantly ($P = 0.005$) and lowest oxygen saturation also increased ($P = 0.024$). Mean AHI was significantly decreased ($P < 0.001$) and mean apnea index was significantly decreased ($P = 0.001$). However the mean hypopnea index did not show a statistically significant change. In 7 out of 15 patients the number and duration of hypopnea events increased after application of oxymetazoline. The authors attribute the increase in hypopneic events to apneic events being converted into hypopneic events. AHI was significantly decreased in the supine position after nasal decongestant ($P = 0.001$). Overall, authors are optimistic that nasal decongestant can improve sleep in patients with NO-OSA who are supine and AHI predominant.

Reviewed by Grace Noh

Piezocision-assisted and conventional rapid maxillary expansion

Abdul-Aziz A, Refai W. Three-dimensional prospective evaluation of piezocision-assisted and conventional rapid maxillary expansion: a controlled clinical trial. Open Access Maced J Med Sci 2019; 7:127-33.

Very little research has been done to assess the effects of piezocision on treating posterior crossbite. This study was a controlled clinical trial that treated 14 patients with posterior crossbite via rapid maxillary expansion (RME). Half of the patients were treated with the use of conventional RME, and the other half were treated with the use of piezocision-assisted RME (PARME). For the PARME group, a scalpel blade was used to create vertical gingival incisions on the buccal aspect of the alveolar bone distal to maxillary canines, first premolars, second premolars, and first molars. Next, corticotomy cuts were made in the incisions to a depth of 3 mm with the use of a piezoelectric tip. Cone-beam computed tomographic scans were taken before expansion and 3 months after expansion. RME patients showed significant skeletal expansion, with an insignificant amount of dental tipping. Conversely, PARME patients showed significant dental tipping but limited skeletal expansion. RME typically seeks to correct skeletal transverse discrepancies, and any dental tipping that occurs is generally undesired. The authors attribute the increased dental tipping found in PARME to the regional acceleratory phenomenon. Because of significantly increased dental tipping in PARME, the authors conclude that conventional RME is best for orthodontic cases that require skeletal expansion. The authors suggest that mild transverse discrepancies could be treated with the use of PARME, but given the undesirable side-effects observed, further studies are needed to determine the benefits that PARME may offer.

Reviewed by Abraham Tang

Surgery-first and stability

Soverina D, Gasparini G, Pelo S, Doneddu P, Todaro M, Boniello R, et al. Skeletal stability in orthognathic surgery with the surgery first approach: a systematic review. Int J Oral Maxillofac Surg 2019. https://doi.org/10.1016/j.ijom.2019.01.002.

In the surgery-first approach (SFA) the jaws are surgically repositioned into the ideal position without preoperative orthodontics. After surgery, the occlusion is refined with a short course of orthodontics. Studies have reported acceptable results, but the stability of SFA is unclear. This systematic review analyzed the stability of surgical movements 1 year after surgery for SFA cases. A search of online databases was completed. Methodologic quality and risk of bias were assessed. Included studies allowed analysis of A point, B point, pogonion, and menton from vertical and horizontal reference planes drawn on cephalometric radiographs after surgery and at debonding. Fourteen studies fit the selection criteria. They included 339 SFA and 221 conventional approach (CA) patients for a total of 560 Class III orthognathic surgical patients. No randomized controlled trials were identified and all studies reported retrospective data from 2010 to 2017. Quality of the studies ranged from 4 to 7 out of 9. Owing to variation in study parameters, such as time points and reference planes, meta-analysis was not possible. Overall data showed SFA treatment to be as stable as CA. The most notable difference seen was slight counterclockwise rotation of the mandible in the SFA. The authors argue that this is not surgical relapse, but due to more extensive orthodontic tooth movement in the postsurgical phase of orthodontic treatment in SFA compared with CA. SFA often results in an open bite immediately after surgery owing to occlusal interferences that were not addressed before surgery. This study highlighted the need for RCTs and data for Class II surgical movements.

Reviewed by Angela Bukstein