Literature
reviews

These literature reviews have been prepared by the orthodontic postgraduate students of the University of Adelaide, Adelaide, Australia.

Numbness of the lower lip does not adversely affect quality of life or patient satisfaction after mandibular orthognathic surgery

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Br J Oral Maxillofac Surg 2018; 56: 421-24

Background: Patient-reported outcomes including quality of life are important evaluation tools in the success of orthognathic surgery. A patient's perceptions and expectations of the surgery influences its physical and psychosocial success. A common risk with mandibular surgery is lip numbness due to the involvement of the inferior alveolar nerve. This can alter the sensation to the lower lip or chin and can thus affect function and social interaction. The aim of this prospective study was to assess the impact of lip numbness due to orthognathic surgery on the patient's quality of life.

Materials and method: A modified Bristol Orthognathic Patient Outcome Questionnaire was given to patients who received orthognathic surgery from 2006 to 2016. The survey was delivered immediately after the patient's final post-operative follow-up appointment and asked specific questions such as reasons for and benefits of treatment, residual lower lip numbness and if they would have the same treatment again. Patients who had a BSSO with or without maxillary surgery were included, while patients who had a genioplasty were excluded from the study to avoid confounding bias.

Results: The response rate of 68% was relatively high. Forty-five patients had a BSSO only, while 79 had bimaxillary surgery. Two patients were excluded as they received a genioplasty. There were 84 (73%) women and 31 (27%) men assessed, with a mean age of 20 years and an age range of 18–38 years. The mean period covered by the questionnaire was six months. Forty-one patients (33%) reported residual numbness of the lower lip, and five patients stated that they would not have the same treatment again. The study concluded that patients were satisfied with their treatment outcomes and noted their quality of life improvements despite residual numbness in the lower lip.

Comments: Overall, this was a simple study that achieved its main aim. However, there are several considerations that need to be acknowledged. Firstly, the gender bias in the sample may affect the applicability of the results, making them more relevant to females. Also, the timing of the questionnaire may not be sufficient to determine final sensation of the nerve as recovery can continue past that period (even past one year).

The term 'lip numbness' was not defined, which is important as it could range from an alteration in sensation (e.g., tingling) to complete paraesthesia. The location of the lip numbness was not specified (e.g., entire or partial lip) or tested; no two-point discrimination test was conducted. In addition, the authors did not note the review protocol – commonly reviewed at three, six and 12 monthly intervals – or how the lip numbness was tested or explained to patients. Another important piece of information that would be beneficial is the number of nerve repair cases (if any) during the study period, as this would also affect the outcome of the study.

In addition, for those patients who would not have the procedure again, there was no mention of whether this was related to the lip numbness or other reasons. Also, considerations such as the level of experience of the surgeon and the amount of advancement were not disclosed. Although this does not apply in all cases, a more experienced operator may be less likely to cause nerve damage, and the larger the advancement the larger the tension on the nerve and other soft tissues.

The authors also did not note (although it was possibly implied) whether patients were pre-warned that lip numbness can be experienced with varying severity for a period of time following mandibular surgery. This is important as patients who are more prepared for lip numbness prior to surgery may be more likely to be accepting of this side effect.

Amy Ho

A randomised controlled trial of orthodontist-based brief advice to prevent child obesity

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Contemp Clin Trials 2018; 70: 53-61

Background: Childhood obesity in the United States affects approximately 19% of children from 6–19 years of age. Interventions throughout school, home, medical, workplace and community settings have been undertaken to restrict foods and improve physical activity. Supportive networks to promote healthy habits have been seen as part of a prevention strategy to change what is accepted as normal weight and reduce the likelihood of individuals moving into the upper extreme of the weight distribution scale. Orthodontists were deemed to have more frequent contact with young patients than most other medical specialists, providing a powerful test of the preventative efficacy of health messages. The article outlines the outcome of 'Healthy Smiles: An Orthodontist Program' in the United States and Mexico, a program with the aim of improving dietary intake and physical activity in 8–16 year olds.

Aim: A randomised controlled trial was undertaken to assess whether brief advice given regularly at the orthodontist office regarding exercise and diet to improve body mass index (BMI) and physical activity would be effective.

Methods:

- Thirty-three orthodontic offices in southern California and Tijuana, Mexico were conscripted.
- The study incorporated 693 patients (332 in the intervention and 361 in the control group) aged 8–16 years old who were eligible for orthodontic treatment and able to participate in a two-year study.
- Eligible patients were excluded if they had participated in physical activity three or more times per week for the last nine or more months of the past year, or had been prohibited from physical activity, unable to take care of themselves, diagnosed with an eating disorder, or could not be followed up for two years.
- In the intervention group: patient education and discussion regarding physical activity and nutrition took place with positive reinforcement. Health 'prescriptions' were given 12 times over the 18 months with related material discussed. These included a personal goal and rating of the achievement of the last goal set, which was changed every six to eight weeks and aligned with orthodontic visits.
- In the control group: similar to the intervention group, participants were assigned to receiving tobacco use/exposure health related messages. This included material on tobacco's effect on health and the environment.
- In both groups, staff measured baseline, mid-intervention (12 months) and post-intervention (18 months) BMI, dietary recall and physical activity.

Results and conclusions

- 14% of participants were overweight and 10% were obese at baseline. The variables between the control and intervention group were comparable; however, 56.1% of participants in the USA were in the control group, as opposed to 36.7% in Mexico.
- BMI increased for both genders in the control group. Whilst in the intervention group, females increased, and males decreased. The intervention group also decreased junk food over time compared to the control, whilst physical activity generally declined with time in both groups.
- Unfortunately, the fidelity between the orthodontic practices was not adequate, with incomplete compliance with the planned intervention by some offices. Only 61% of the intervention group received at least one prescription (of the target 12) and 13% received no measurable intervention at all. The families recruited also had a higher than average income level, which may limit the generalisability of the findings.

- Whilst the changes were small, they hinted at what can be accomplished if more clinicians are involved in intervention efforts.

Adam Wahab

A CBCT evaluation of molar uprighting by conventional versus microimplant assisted methods: an in-vivo study

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Dental Press J Orthod 2018; 23: 35.e1-9

Background and aims: In order to avoid functional and anatomic disturbances, the loss of a permanent first molar may be addressed by prosthetic replacement or orthodontic space closure. The aim of this prospective study was to compare the three-dimensional effects of a conventional helical uprighting spring (CA) and a mini-implant assisted helical uprighting spring (MIA), using CBCT scans.

Materials and methods: Twenty patients with mesially tipped second mandibular molars were randomly divided into two groups: a CA group consisting of 10 patients and a MIA group, consisting of 10 patients. Healthy patients with missing first molars and mesially tipped second molars with a healthy periodontium were included in the study, while patients with untreated systemic conditions and a loss of periodontal attachment were excluded. Both groups utilised an uprighting spring made from 0.017 × 0.025 inch SS wire and the uprighting force was assessed using a Dontrix gauge to be 50 g. In the CA group, the anchorage unit was comprised of the canine, first and second premolars, while in the MIA group, anchorage was obtained from a self-drilling mini-implant, 1.5 mm in diameter and 8 mm in length placed inter-radicularly between the first and second premolars. Molar uprighting was carried out for a period of four months in both groups. The amount of change in mesiodistal angulation, change in buccolingual inclination and degree of molar extrusion were calculated using 11 × 5cm CBCT sections of the mandible.

Results and discussion: The amount of change in mesiodistal angulation of the second molar between the two groups after four months was not found to be statistically significant. The difference in the amount of change in the buccolingual inclination of the canine, first and second premolars was found to be statistically significant. Despite there being no appliances placed on the canine, first and second premolar in the MIA group, there were minor changes noted to their inclinations. The difference in the amount of second molar extrusion was noted as statistically significant; however, in both groups this was below 0.5 mm, hence this may be within measurement error and clinically insignificant.

Critical appraisal: While the sample size was small, the merits of this study lie in its in-vivo nature and that it measured movement in three dimensions using CBCT imaging. The authors have acknowledged limitations such as the vertical growth pattern as a confounding factor in the extrusive movements recorded. The degree of tipping of the second molar prior to uprighting is not mentioned. The type of uprighting was summarised as greater distal crown tipping with the conventional uprighting spring and larger mesial root movement using a mini-implant. However, the difference in movements was quite small: 0.5 mm in the MIA group and -0.79 mm in the CA group, which maintains the question of clinical significance.

Sanjana Baksi

Diagnosis of tooth ankylosis using panoramic views, cone beam computed tomography, and histological data: a retrospective observational case series study

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Eur J Orthod 2018; 40: 231-8

Background: Ankylosis is histologically defined as fusion of cementum/dentin to bone resulting in loss of the periodontal ligament space in that area. In cases of impacted teeth, accepted clinical tests to detect dental ankylosis, such as percussion and the assessment of tooth mobility, are not feasible. As even a very small ankylotic area of the affected tooth can inhibit tooth eruption, two-dimensional imaging such as intraoral radiographs or panoramic views (PV) is considered insufficient for proper diagnosis. An accepted method of diagnosing ankylosis in impacted teeth is the lack of orthodontic movement over a defined period of time. This method of diagnosing ankylosis may mean subjecting a patient to a surgical procedure to first bond an attachment to the tooth, followed by a second surgical procedure to extract the ankylosed tooth. This can be avoided if correct diagnosis of

ankylosis could be established early using cone beam computer tomography (CBCT).

Aim: The aim of this study was to determine whether cone beam computed tomography (CBCT) is a reliable radiological method to diagnose tooth ankylosis. For this purpose, the findings of CBCT scans and two-dimensional radiographic images (panoramic views; PV) were compared to histological sections of a series of extracted teeth clinically diagnosed as ankylosed.

Methods: A series of teeth clinically diagnosed as ankylosed in a private oral surgery practice from 2009 to 2015 were collected after extraction and analysed retrospectively. Inclusion criteria comprised permanent molars extracted due to failed tooth eruption in the absence of any visible mechanical obstruction, existing panoramic view (PV), and cone beam computed tomography (CBCT) and histological sections of sufficient quality. The CBCT scans and PVs were evaluated twice for signs of ankylosis by two independent observers using the following score: clear signs, possible signs, and no signs. The histological sections were evaluated and graded similarly to the radiographs by a specialist blinded to the radiographs and treatment.

Results: Out of 22 patients, 9 subjects and 10 affected teeth were included for final evaluation, with an age range of 8.3 to 17 years. There was no obvious agreement between PV scores and those of histological sections. Conversely, there was fair to moderate agreement between CBCT scores and those of histological sections. All histologically confirmed ankyloses were detected in CBCT by both observers but some false positive results were found.

Discussion: Results of the present study suggest that CBCT alone is not sufficient to diagnose ankylosis and further diagnostics are recommended (such as a thorough dental history including possible trauma and clinical diagnostics). On the other hand, a previous comparable study by Paris et al. using medical computer tomography reported the ability to precisely diagnose ankylosis, but at a higher radiation dose.

Conclusion: CBCT images can be a useful adjunctive tool to diagnose ankylosed teeth, but cannot be recommended as a single diagnostic modality. PVs are considered inappropriate for the diagnosis of ankylosis. Larger investigations ideally using a multi-centre approach are encouraged.

Critique: The ability to detect ankylosis using CBCTs would be helpful, particularly in cases of impacted canines. This is especially true since they are now commonly taken to assess canine position in relation to other structures. If proven accurate as a diagnostic tool for ankylosis, this can aid in orthodontic treatment planning on space opening or space closure. However, this retrospective case series is limited by a very small sample size reflecting a rare disorder, which does not provide a high level of evidence for the findings.

Celine Chan

Evaluation of orthodontically induced external root resorption following orthodontic treatment using CBCT: a systematic review and meta-analysis

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Eur J Orthod 2018: 1-13. doi: 10.1093/ejo/cjy027. [Epub ahead of print]

Introduction: Orthodontically-induced root resorption (OIRR) is a common orthodontic complication with a complex aetiology. Diagnosis is predominantly dependent on radiographic imaging as clinical symptoms do not present except in severe cases. Studies on OIRR traditionally used two-dimensional radiographs and have found less than 0.60 mm of resorption at the end of treatment, with maxillary incisors being more frequently and severely affected. However, 2D radiographs can often mask the true amount of OIRR as they are unable to provide a complete view of the root surface and are subject to magnification error. Alternatively, CBCT imaging provides a three-dimensional, reproducible and distortion free assessment of the dental roots and any OIRR.

Aims: To assess the average OIRR that can be expected after orthodontic treatment as assessed by CBCT. There was a secondary aim to identify significant patient-, treatment-, or imaging-related factors that were associated with OIRR.

Materials and methods: A total of 15 databases were electronically and manually searched, with no restriction placed on publication year, status and language. A total of 30 publications were included in this systematic review out of 3442 records. Studies were excluded due to duplicates, and based on title, abstract, and full text according to the specific inclusion

and exclusion criteria. Six of the 30 included studies were randomised clinical trials, six were prospective non-randomised studies, and the remaining 18 studies were retrospective non-randomised studies. Data were summarised and considered suitable for pooling if the studies used similar interventions and reported similar outcomes.

Results: The 30 studies included in the review compromised a total of 1219 patients with mean age range between 11.4 and 26.6 years. The studies assessing fixed appliance treatment showed an average linear OIRR of 0.8 mm, with the central incisors affected the most (0.82 mm) followed by the lateral incisors (0.72 mm), then the canines (0.37 mm), and then the first premolar (0.29 mm). Furthermore, the maxillary teeth were more affected (OIRR= 0.9) compared with the mandibular teeth (OIRR = 0.4 mm). More OIRR was also found following extraction treatment compared to non-extraction treatment, which may be explained by the associated increased treatment time. OIRR was reported to be significantly associated with treatment duration, with an average increase in OIRR by 0.36 mm for every additional year. No significant differences between self-ligating and conventional brackets were seen. The studies assessing RME treatment show an average linear OIRR of 0.4 mm, with no significant differences between conventional Hyrax RME and hybrid Hyrax RME appliances, although less in conventional Hass appliances.

Discussion: There was an apparent scarcity of randomised and prospective non-randomised studies, and therefore retrospective studies were also included in this review. The results of the systematic review should be considered with caution due to the small number of randomised trials, the methodological limitations of the studies and the potential ethical concerns for routine clinical use of CBCT. Although OIRR measured by CBCT is higher and may be more accurate than with conventional radiographs, this has little clinical relevance, and so negates any risk-benefit outcomes when considering added exposure to ionising radiation. However, the differences in OIRR seen between different teeth, jaws, extraction treatment plans and appliances may be more relevant clinical considerations.

Lasni Kumarasinghe

Bone-anchored maxillary protraction to correct a class III skeletal relationship: A multicentre retrospective analysis of 218 patients

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J Craniomaxillofac Surg 2018: 1-7

Introduction: A Class III skeletal deformity may be caused by a hypoplastic maxilla, prognathic mandible, or a combination of both. A successful treatment option to achieve orthopaedic changes is protraction of the maxilla using a Delaire facemask. The biggest disadvantage of this tooth-borne technique is that an extra-oral appliance has to be applied for at least 14–16 hours a day over 9–12 months to be effective. Bone anchorage techniques have been developed to facilitate skeletal maxillary advancement and avoid dentoalveolar compensation. This involves wearing Class III elastics to four intraoral miniplates.

Previous studies have used a small number of patients to prove the success rate of the miniplates and the rate of skeletal correction. This study aimed to examine the success rate in a larger population of patients referred for Class III elastic traction through miniplates, including those with a small Class III skeletal relationship.

Materials and methods: The sample consisted of 218 patients (112 males and 106 females; average 11.4 years) between 2008 and 2016, who received four miniplates at three maxillofacial centres in two countries. Miniplates were placed at the zygomatic buttresses in the maxilla and between the lower lateral incisors and canines. In all participating centres, plates were fixed using self-tapping or self-drilling fixation screws, 5 mm or 7 mm in length and 2.0 mm in diameter. After 10–14 days, the orthodontist started with elastic traction of 100 g and increased the force weekly until a maximum force of 250 g was reached on each side. Factors affecting the success and failure of the miniplates were retrospectively examined and skeletal changes on cephalometric radiographs examined on 52 patients. To analyse cephalometric data, the student's *t*-test was applied to find differences between the groups. A linear regression model was applied for continuous variables, such as starting age.

Results: The mean duration of elastic traction was 22.9 (SD 13.4) months. Fifty-six patients (25.7%)

experienced failure of one of the miniplates, which required replacement. The overall success rate for miniplates in both centres was 93.6%. Miniplate failure was six times higher in the upper jaw than in the lower jaw. The mean time interval between the start of treatment and miniplate failure was 8.5 months in the upper jaw and 15.2 months in the lower jaw. Failure occurred in nine patients (9.4%) with self-drilling screws and 47 patients (38.5%) with self-tapping screws. Small cephalometric changes were seen: SNA (+1.9°), SNB (+0.4°), ANB (+1.4°), Wits analysis (+1.3 mm).

Conclusions: Bone-anchored maxillary protraction is an effective treatment option for correcting a Class III skeletal relationship. The survival rate of the miniplates in this study was 93.6%, with 25.7% of the patients suffering failure of one of the miniplates. A significant difference was found between the participating centres in the failure rate of bone anchors. When postoperative antibiotics were used, and the neck of the bone anchor placed in the attached gingiva, failure rates were lower. Miniplates placed in the maxilla failed six times as often as mandibular miniplates, and self-drilling screws had significantly fewer failures than self-tapping screws for fixing the miniplate. Furthermore, cephalometric analysis revealed less skeletal effect than previously reported in the literature.

Critique: This paper presented a reasonable attempt to 'prove' that bone-anchored miniplates have a better skeletal effect than other orthopaedic modalities such as a facemask. The retrospective nature of the study, possible selection bias, unclear inclusion criteria and minimal cephalometric changes must be considered when interpreting the results and conclusions. It would have been helpful if the authors evaluated the treatment procedure and outcome as perceived by the patients, considering some of them were in treatment for 23 months. Bone anchors, not surprisingly, show great promise for true orthopaedic correction of Class III skeletal relationships, through a combination of protraction of the maxilla and restraining mandibular growth. However, the surgical morbidity, extra costs, age of the patient and the severity of the malocclusion need to be weighed up before considering this as a viable treatment option.

Premal Patel

Use of autonomous maximal smile to evaluate dental and gingival exposure

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Korean J Orthod 2018; 48: 182-8

Background: The magnitude of a smile can influence the amount of dental and gingival exposure. A posed smile usually has less dental and gingival display and may underestimate the severity of a gummy smile or excessive buccal corridor in spontaneous smiles.

Digital videography is a more reliable approach to evaluate dental and gingival exposure during smiling compared with static photography. This is because digital videography can capture and provide more information on natural maximum incisal exposure and buccal corridor.

Aim: The study aimed to use digital videography to assess the reproducibility of the autonomous maximal smile (AMS) for evaluating dental and gingival exposure. The AMS was defined as the broadest smile that a subject produced when in maximum intercuspation.

Methods: A total of 100 subjects (34 males and 66 females), all Chinese students, were included in the study. A digital camera on a tripod was used to take a 15–20 second video clip of a posed smile and an AMS. The same procedure was repeated for each subject a total of three times at one-week intervals.

Measurements were taken for the vertical distance between the inferior border of the vermilion and the edge of the maxillary central incisors and the sum of the right and left buccal corridor widths.

Results: Dental and gingival exposure of the AMS was significantly higher than that of the posed smile, 1.41 and 2.04 mm greater, respectively. The reproducibility of the AMS (0.74 to 0.77) was excellent and higher than that of the posed smile (0.62 to 0.65), which had fair-to-good reproducibility.

Conclusions: The posed smile showed fair-to-good but not excellent reproducibility. Therefore, it is recommended that the posed smile be captured twice and the average measurement taken to reach reproducibility.

The AMS had higher reproducibility than did the posed smile, which may be because the AMS does not rely on muscle memory, but instead relies on muscle limitation.

The AMS may be an adjunctive approach for evaluating dental and gingival exposure.

Critique: The tooth/gingival display measurement was cumulative and did not consider the tooth/gingival ratio. It would have been more valuable to measure both tooth and gingival display.

The fair-to-good posed smile reproducibility may be due to Chinese cultural differences in sensitivity to the smile, the frequency of posed smiles during social interactions, and genetic variations.

AMS is not a reference that an orthodontist might use to position the upper anterior teeth.

Sven Jensen

Comparison of treatment effects between four premolar extraction and total arch distalization using the modified C-palatal plate

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Korean J Orthod 2018; 48: 224-35

Scope and aim: The extraction of teeth and distalisation of the dentition are two ways to resolve crowding in orthodontics. In recent years, the tendency towards non-extraction with distalisation approaches has been increasing due to the availability of effective treatment modalities such as temporary anchorage devices (TADs). A modified C-palatal plate (MCPP) has been reported to be effective in distalising maxillary first molars up to 4 mm in adults. Such mechanics can be useful in correcting Class II malocclusions. The aim of this paper was to evaluate the skeletal, dental, and soft-tissue changes after four premolar extraction and total arch distalisation facilitated by the MCPP in adult patients with a Class II malocclusion.

Materials and methods: It was a retrospective study with a sample of 40 adult patients with a Class II division 1 malocclusion. Twenty patients were treated with MCPP appliances via a non-extraction approach (MCPP group) and the remaining 20 patients were treated with four premolar extraction (PE group) at the Department of Orthodontics, Seoul St. Mary's Hospital, The Catholic University of Korea.

The MCPPs were placed in the paramedian area of the midpalatal suture. Distalisation was initiated by engaging elastomeric chains between the notches on the MCPP arm and the hooks on the palatal bar with approximately 300 g of force per side. In the PE group, the maxillary first premolars were extracted while in the mandibular arch, either the first or second premolars were extracted. Seven patients in the PE group also had miniscrews inserted mesial to the first molars as supplemental anchorage as it was deemed necessary by the orthodontist. In both arches, the anterior teeth were retracted en masse with sliding mechanics using elastomeric chains. When necessary, interarch elastics were judiciously used throughout treatment in both groups.

Pre- and post-treatment cephalometric measurements were compared between the two groups. Many of the measurements were in regard to the linear and angular movements of the upper and lower molars as well as the upper and lower incisors but also included measurements to assess the soft tissue profile.

Results: Both the MCPP group and PE group were able to resolve the Class II malocclusion. The MCPP group exhibited less retrusion and uprighting of incisors compared to the PE group. The MCPP group had distal tipping and retraction of molars while the PE group had mesial tipping and protraction of the molars. From the soft tissue perspective, both groups produced an increased nasiolabial angle, but no significant difference between the groups was found.

Conclusion: Both methods (MCPP and premolar extractions) are capable of resolving crowded arches and the study supports the effectiveness of the MCPP as a direct anchor in the maxillary arch as well as an indirect anchor in the mandibular arch.

Critique: Overall it was a timely study that quantitatively compared the treatment outcome of Class II malocclusion between four premolar extractions and the use of MCPP. As a retrospective study, there is always a risk of selection bias. It is possible that only successful cases were selected and any non-satisfactory outcome, such as failure of the MCPP, was omitted from the study. Factors that prevent distalisation, such as the presence of upper third molars and how such cases were managed, were not mentioned. The assessment of the finished cases was also not mentioned, which makes it difficult to assess if the two groups were finished to a similar standard. An inclusion of indices such as the PAR index to assess the level of finish would have been helpful.

Yul Kim

Effects of bodily retraction of mandibular incisors versus mandibular setback surgery on pharyngeal airway space: A comparative study

Keum BT, Choi SH, Choi YJ, Baik HS and Lee KJ

Korean J Orthod 2017; 47: 344-52

Background: Pharyngeal airway space (PAS) is linked to the position of the tongue, hyoid bone and the adjacent muscles and is influenced by some orthodontic treatment such as orthognathic mandibular set-back surgery and the retraction of proclined incisors.

In the former, due to the downward and backward movement of the tongue and hyoid bone after the setback surgery, a corresponding decrease in PAS in Class III patients has been reported by some studies. This narrowing of PAS has been suggested as one of the causes of obstructive sleep apnoea.

With the latter, incisor retraction via tipping movement may have less effect on the tongue and PAS than bodily movement. Few studies have been carried out to evaluate the difference in PAS change caused only by posterior displacement of mandibular incisors, as compared to that caused by posterior displacement of both the mandible and incisors.

Aim: This comparative study aimed to compare the PAS changes caused by mandibular setback surgery and that caused by bodily retraction of the mandibular incisors.

Material and methods: The study included 32 males and 31 females comprising a total subject pool of 63. They were divided into two groups: an incisor retraction (IR) group of 33 subjects who had four-biscupid extractions and >5 mm of bodily retraction of the mandibular incisors as part of their orthodontic treatment, and a mandibular setback (MS) group of 30 patients treated by a non-extraction orthodontic approach and mandibular setback surgery. Patients with facial asymmetry of >4 mm of Menton deviation from the facial midlines and >1 mm of antero-posterior movement of maxilla were excluded, as were patients who were <17 years of age, had rapid maxillary expansion or >9 mm of incisor retraction.

Lateral cephalograms of the patients before treatment (T1) and after treatment (T2) were compared and analysed. Frankfort horizontal (FH) plane at T1 was set as the horizontal reference plane (HRP), and the vertical reference plane (VRP) was the perpendicular from Sella to HRP. Using cephalometric landmarks, the two-dimensional width of PAS was measured at posterior nasal spine (superior pharyngeal airway space – PNS-SPW), soft palate (U-MPW) and tip of the uvula (E-IPW).

Results and discussion: There was no significant change in the pharyngeal airway space (PAS) in either group during treatment. After treatment, a PAS decrease of 1.15 ± 1.17 mm in the IR group and 1.23 ± 1.35 mm in the MS group was seen. A greater decrease in inferior pharyngeal airway space (E-IPW) was detected after surgery in the MS group compared with the IR group.

As the authors acknowledged, there were several limitations to the study. One variable that was not constant was the type of malocclusion managed as the mandibular incisor retraction was done in patients with a Class I or Class II malocclusion while the mandibular set-back surgery was the treatment for a Class III malocclusion and skeletal relationship. The MS group also included patients with maxillary impaction and lacked homogeneity. Even though the authors justified this by noting that past studies found the repositioning of posterior nasal spine had no effect on PAS, there are studies that found the opposite. Jakobsone et al. reported that maxillary impaction did result in a long-term increase in airway space dimension. Moreover, a lateral cephalogram only allowed a two-dimensional evaluation of PAS and the study did not measure the change in tongue position, size or volume at T1 and T2 in both groups. Furthermore, the sample size was small and the amount of mandibular set back in the MS group was not constant. Under discussion, the authors could further elaborate on other similar studies and how those results compared.

Conclusion: This retrospective study demonstrated that the majority of the patients had a decrease in middle pharyngeal airway space (U-MPW) due to the tongue and soft palate being affected by a posterior displacement of the mandibular incisors and/or mandible. However, a reduction in E-IPW was found only in the MS group and no direct correlation was found between the amount of PAS decrease and the amount of displacement of the incisors and/or mandible. A prospective, well-controlled study with improved exclusion criteria and specific malocclusion group should be performed to derive more definitive results.

Myat Mon Thinn