Abstracts

An assessment of late fixed functional treatment and the stability of Forsus appliance effects
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Objective: To evaluate the treatment effects and stability of Forsus appliance therapy.

Methods: Thirty-one patients (15 males, 16 females) with a mean age of 15.8 ± 3.1 years (range 13 to 17.6 years, 15.3 ± 1.2 years for females and 16.5 ± 1.6 years for males) were selected. All patients had passed beyond their pubertal growth phase (after CS4 or MP3cap). Lateral cephalograms and three-dimensional (3D) models were analysed before treatment (T0), at the end of treatment (T1) and at a follow-up visit (T2). The mean period from T1 to T2 was 25 months and ranged from 17 to 32 months. Tooth position and angulations, together with maxillary and mandibular position, were measured on cephalograms. The inclinations and vertical distance changes of mandibular incisors were measured on a 3D digital model.

Results: The Forsus appliance produced significant skeletal and dental changes during treatment (from T0 to T1). In the sagittal plane, mandibular length (Co-Gn) increased 6.47 mm, the maxillary incisors and molars uprighted (∠U1-SN decreased 8.97° and ∠U6-SN decreased 3.51°), the mandibular incisors proclined (∠L1-MP increased 3.93°) and the mandibular molars advanced (L6-SP increased 3.61 mm). In the vertical plane, the maxilla and mandible rotated clockwise (∠PP-SN, ∠MP-SN, ∠OP-SN increased significantly) and the mandibular molars extruded (L6-MP increased 3.06 mm). All of the changes remained relatively stable after treatment. Cephalometric sagittal and vertical changes affecting the mandibular incisors from T1 to T2 were statistically insignificant (p > 0.05) except for lower incisor extrusion (L1-MP, p < 0.05).

Conclusion: The Forsus appliance induced significant skeletal and dental changes, which remained relatively stable during the observation period. The mandibular incisors, in particular, were stable two years after treatment.

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An evaluation of condylar and ramal vertical asymmetry in adolescents with unilateral and bilateral posterior crossbite using cone beam computed tomography (CBCT)

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Aims: The primary purpose was to evaluate condylar and ramal vertical asymmetry in adolescent patients displaying unilateral posterior (UCB) and bilateral posterior crossbite (BCB) malocclusions. A secondary aim was to compare the findings with a matched control group exhibiting normal occlusion (CG) using cone beam computed tomography (CBCT).

Material and methods: The study groups consisted of (1) 30 patients (Mean age: 14.49 ± 1.91 years) with a UCB, (2) 29 patients (Mean age: 14.57 ± 1.84 years) with a BCB, and (3) 36 patients (Mean age: 14.24 ± 2.42 years) as a matched control group (CG). Condylar, ramal, condylar-plus-ramal height and index measurements were performed using CBCT images following the method of Habets et al. A paired t-test was performed for side comparison in each group. One-way ANOVA (Analysis of Variance) was used to determine statistically-significant differences between the groups for asymmetry index measurements and Tukey’s HSD test was employed for individual group differences.

Results: There was no statistically significant difference in condylar height (CH), ramal height (RH), and condylar plus ramal height (CH + RH) measurements between the right and left sides of the UCB group and CG, except for the RH in the BCB group (p = 0.045). Tukey’s HSD test showed that the ramal asymmetry index (RAI) and the condylar plus the ramal asymmetry index (CRAI) were statistically significantly different between the UCB and BCB groups (p = 0.035 and p = 0.015, respectively).

Conclusions: Although the condylar asymmetry index (CAI) values were found to be high in the groups of UCB (13.84 ± 11.33), BCB (9.38 ± 8.56), and CG (10.58 ± 9.48), the comparisons amongst the groups were not statistically significant. The asymmetry between the UCB and BCB groups was observed for RAI and CRAI values, rather than CAI values.

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Long-term results of surgically-assisted maxillary protraction
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Objective: The long-term treatment results of surgically-assisted facemask therapy were assessed by a comparison of the immediate protraction effects with those seen at five years review.

Materials and methods: Nine patients treated with a corticotomy-assisted maxillary protraction protocol were recalled five years following protraction. Cephalometric films taken before treatment (T0), immediately after maxillary protraction (T1) and five years after treatment (T2) were compared.
Results: The short-term results of surgically-assisted facemask therapy showed significant skeletal and soft tissue changes. After five years, the profile and dental relationships were well maintained and a cephalometric analysis revealed a stable vertical increase but only partially maintained soft tissue changes with loss of sagittal advancement. There was significant upper incisor proclination providing dental camouflage.

Conclusion: Patients who are treated with corticotomy-assisted maxillary advancement should be very carefully selected. Assessment criteria include a low mandibular plane angle Class III patients who have severe maxillary retrognathism unable to be treated by conventional orthopaedic correction alone; patients who have almost completed growth and missed the chance of earlier orthopaedic correction, as well as patients who are not willing to accept bimaxillary orthognathic surgery, may be successfully treated.

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**Denervation and β2-adrenoceptor-agonist administration on craniofacial bone density**

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**Objective:** β2-agonist medications are thought to have adverse effects on bone density. Surgical denervation and intramuscular β2-agonist injections appear to have opposing effects on skeletal muscles. The present study has been designed to assess the effects of denervation of the masseter, intramuscular injection of a β2-agonist and the combination of both procedures, on bone density in the craniofacial skeleton in rats.

**Materials and methods:** Sprague-Dawley rats were prepared as four groups: 1. surgical sham + saline injection into the masseter (sham); 2. surgical denervation of the masseter (den.); 3. surgical denervation of the masseter + intramuscular formoterol injection into the affected muscle (den.+form.); 4. intramuscular formoterol injection into the masseter (form.). All specimens were submitted for CT examination and volumetric calculations of the mineralised bone tissue were performed.

**Results:** The sham and form. groups had a greater volume of mineralised bone in the zygoma on the experimental side compared with the control side. The maxilla on the experimental side had a higher volume of mineralised bone in the den.+form. and form. groups compared with the sham and den. groups. The control side of the maxilla had a higher volume of mineralised bone in the den.+form. and form. groups compared with the den. group only.

**Conclusion:** Intramuscular administration of formoterol appears to induce a bilateral increase in bone mineral density in the maxilla and the zygoma, likely explained as a secondary effect of the well-described increase in muscle mass and strength associated with β2-agonist administration.

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Permanent mandibular canine(s) impaction: expansion of our understanding
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Introduction: Eruption disturbances, tooth size and specific malocclusions are
known to be genetically influenced. The clinical association between these traits
may indicate common genetic controls.
Objectives: A cross-sectional clinical study was designed to test the null
hypothesis that the maximum mesiodistal crown diameter (MMD) of maxillary
and mandibular central and lateral incisors and the prevalence of various classes
of incisor relationships (Class I, II/1, II/2 and III) do not differ between the
subjects with and without permanent mandibular canine(s) impaction.
Methods: Dental models of 43 subjects diagnosed with mandibular canine(s)
impaction (Impaction Group - IG) were compared with those of 86 subjects of a
control reference sample (Control Group - CG). Independent t-test and chi-
square tests were used to determine the association between mandibular
canine(s) impaction and the MMD of the incisors and the incisor relationship,
respectively. The likelihood of various incisor relationships between the IG and
CG were evaluated according to odds ratios.
Results: A fourfold increase (p < 0.0001) in the overall frequency of Class II/2
incisor relationship was observed in the IG when compared to controls.
Conclusions: The null hypothesis was rejected. Subjects with mandibular
canine(s) impaction appeared to be characterised with wider incisors and a
remarkably high rate of Class II/2 malocclusion. This information assists the
understanding of genetically controlled dental anomalies, which are likely to co-
exist with mandibular canine(s) impaction.

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Treatment effects of a Twin-Force Bite Corrector versus an Activator in comparison with an untreated Class II sample: a preliminary report
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Objectives: The present study aimed to compare the treatment outcomes of a fixed-functional appliance (Twin-Force Bite Corrector - TFBC) and a conventional removable functional appliance (Activator) in the treatment of skeletal Class II malocclusions.

Methods: The TFBC and Activator Groups each included 10 young adults possessing a skeletal Class II malocclusion, and the treatment outcomes of both groups were quantified and compared, using lateral cephalometric radiographs, with an untreated skeletal Class II Control Group.

Results: A skeletal Class I relationship and a marked reduction in overjet were achieved in both treatment groups; however, the duration of treatment was significantly shorter in the TFBC Group (0.45 years) when compared with the Activator Group (1.37 years) (p < 0.001). Effective length and sagittal positioning of the mandible underwent significant changes in the TFBC and Activator Groups. Vertical facial dimensions increased in each group; however, these increases were significantly greater in the Activator Group when compared to the TFBC and Control Groups (p < 0.05). Dentoalveolar changes also contributed to the reduction in overjet.

Conclusions: Although both appliances succeeded in eliminating the Class II relationship and improving the overjet and overbite, the short treatment time in the TFBC Group raises questions regarding the long-term stability of the results.

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Cortical bone thickness of the adult alveolar process - a retrospective CBCT study
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Objectives: To investigate and compare cortical bone thickness of the posterior alveolar process in adult patients presenting with skeletal Class I, II and III malocclusions.

Methods: Cone beam computed tomographic (CBCT) images of 196 adult subjects, aged 20–45, were evaluated. Cortical bone thickness was measured 4 mm from the alveolar crest, as the shortest bucco-lingual dimension of the cortical bone at interdental sites from the distal of the maxillary canine to the mesial of the maxillary second molar.

Results: There were no differences between the malocclusion groups in mean age, gender, or vertical pattern (p > 0.05). At all sites measured, there were no statistically significant differences in the means of cortical bone thickness between the groups (p > 0.05). Maxillary palatal bone thickness was reduced in the Class I (p < 0.0001), and Class II (p < 0.001) groups; but mandibular buccal thickness increased significantly (p < 0.001) in all malocclusion groups from anterior to posterior.

Conclusions: There was no difference in cortical bone plate thickness between Class I, II and III subjects when related to mini–implant placement sites. As the measurement site moved towards the posterior, maxillary palatal cortical thickness decreased except in Class III cases, while mandibular buccal bone thickness increased in all malocclusion groups.

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Factors related to stability following the surgical correction of skeletal open bite
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Objectives: If a skeletal anterior open bite malocclusion is treated by orthognathic surgery directed only at the mandible, the lower jaw is repositioned upward in a counter-clockwise rotation. However, this procedure has a high risk of relapse. In the present study, the key factors associated with post-surgical stability of corrected skeletal anterior open bite malocclusions were investigated.

Material and methods: Eighteen orthognathic patients were subjected to cephalometric analysis to assess the dental and skeletal changes following mandibular surgery for the correction of an anterior open bite. The patients were divided into two groups, determined by an increase or decrease in nasion-menton (N-Me) distance as a consequence of surgery. Changes in overbite, the displacements of molars and positional changes in Menton were evaluated immediately before and after surgery and after a minimum of one year post-operatively.

Results: The group with a decreased N-Me distance exhibited a significantly greater backward positioning of the mandible. The group with an increased N-Me distance experienced significantly greater dentoalveolar extrusion of the lower molars.

Conclusions: A sufficient mandibular backward repositioning is an effective technique in the prevention of open bite relapse. In addition, it is important not to induce molar extrusion during post-surgical orthodontic treatment to preserve stability of the surgical open bite correction.

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An incidental finding on a diagnostic CBCT: a case report

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It is known that Cone Beam Computed Tomography (CBCT) provides reliable spatial data and has many clinical applications for dental and particularly orthodontic patients. The present article provides a short review of the literature and reports an unusual CBCT finding in an orthodontic patient referred for the assessment of impacted upper canines. A unilateral lesion in the left maxillary sinus, was an incidental finding. Following a histological examination, which revealed unilateral nasal polyps, surgical removal was performed as the treatment of choice.

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**Treatment of an asymmetric malocclusion: a case report**

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**Aim:** This case report describes an adult female patient who presented with dental asymmetry associated with bilaterally missing lower first molars, accompanied by extruded and mesially-tipped lower second and third molars. Masticatory dysfunction and temporomandibular joint (TMJ) pain were present during mouth opening and likely related to a posteriorly positioned condyle and anterior disc displacement with reduction.

**Methods:** Orthodontic treatment consisted of occlusal plane levelling and mandibular repositioning, achieved using a Multiloop Edgewise Archwire (MEAW) technique. Differential MEAW activation on each side and temporary occlusal composite bite blocks on the lower left third molar were necessary to increase the vertical dimension of the Class II side, which allowed extrusion of the left premolars to a Class I relationship.

**Results:** The bilateral uprighting of the second and third molars was achieved by tip-back wire activation to level the occlusal plane and intrude these teeth. Elastics worn vertically on the right side and Class II elastics on the left side facilitated occlusal correction. Dental implants for fixed prosthetic rehabilitation of the missing lower left first molar were placed to stabilise the posterior occlusion. Articular disc recovery removed TMJ symptoms and the case was finished with stable sagittal and vertical occlusal relationships.

**Conclusion:** Successful management of a canted occlusal plane and the stabilisation of the posterior occlusion, resulted in a recovery of a displaced articular disc and improvement of facial symmetry.

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Wassmund osteotomy for excessive gingival display: a case report with three-dimensional facial evaluation

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Aims: This case report describes the management of an adult patient presenting with a skeletal Class II malocclusion with congenitally missing lower second premolars, maxillary dentoalveolar protrusion, and an excessive gingival display in full smile.

Methods: The treatment plan consisted of a combination of a segmental osteotomy to reposition the anterior part of the maxilla after upper premolar extractions and a bilateral sagittal split osteotomy (BSSO) to advance the mandible. Because the upper left permanent second molar required extraction, the upper left third molar was moved mesially during post-surgical orthodontic treatment.

Results: After active treatment, bilateral Class I molar and canine relationships were achieved. Two years after retention, a satisfactory facial profile and dental occlusion remained with optimum overjet and overbite. Treatment also produced changes in the three-dimensional (3D) configuration of the face, which was characterised by decreased labial protrusion, increased protrusion of the chin, and increased cheek prominence.

Conclusion: A segmental osteotomy of the anterior part of the maxilla produced favourable treatment results by reducing excessive gingival display, but also by a relative improvement in cheek prominence.

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