

The authors of abstracts marked \*\*\* have indicated a financial interest.

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#### CP01 ORTHODONTIC TREATMENT OF AN EXTRACTION CASE WITH CLEAR ALIGNERS: A CASE REPORT

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**AIM:** Recently, adult patients seeking orthodontic treatment have expressed a preference for aesthetic treatment options, including lingual orthodontics and thermoformed appliances or removable polyurethane aligners. Invisalign is an increasingly popular technique for aesthetically aligning teeth and correcting malocclusions orthodontically. The aim of this presentation is to show the treatment of a patient with severe crowding treated with Invisalign.

**SUBJECT AND METHOD:** A 32-year-old Japanese female with the chief complaint of severe crowding. Clinical examination revealed a straight facial profile and a Class I molar and Class II canine relationship. The overjet was 2.0 mm and the overbite 1.6 mm. There was a maxillary arch length discrepancy of -14 mm and a mandibular arch length discrepancy of -9 mm. The upper laterals were lingually locked. The treatment objective was to relieve the severe crowding by extraction and to correct the malocclusion with the use of Invisalign.

**RESULTS:** Treatment was initiated by extracting the upper lateral incisors and lower first premolars. Attachments were bonded as prescribed. The Invisalign was worn, the crowding was resolved, and the arches were aligned. After 2 years 4 months of therapy, a successful treatment outcome was achieved by the correcting crowding and Class I molar relationship.

**CONCLUSIONS:** The presented case indicates that the Invisalign system can be a useful appliance to correct a dental malocclusion involving severe crowding.

#### CP02 AN AUDIT TO ASSESS THE QUALITY AND EFFECTIVENESS OF MULTIDISCIPLINARY HYPODONTIA CLINICS

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**AIM:** To assess the quality and effectiveness of joint orthodontic-restorative hypodontia clinics and in turn to implement changes in order to improve patient care and utilisation of resources.

**MATERIALS AND METHOD:** A retrospective audit was carried out of the clinical records of all patients that attended the most recent five joint clinics. There were no exclusions. These records were reviewed against a checklist of essential information. This was previously agreed by sending a questionnaire to consultants in the orthodontic and restorative departments. The checklist included: patient details; referred by; clinicians present; patient complaint/patient history; examination; summary of clinical findings; summary of the treatment options; discussion about funding and maintenance of dental implants; treatment plan in sufficient detail (for example specifying how many millimetres to open up the space for a pontic); which member of the team was responsible to provide each item of the treatment plan; follow up/outcome; letter dictated and copy to the patient and dentist. Data collection and analysis was carried out on Microsoft Excel.

**RESULTS:** Analysis of the data showed that the records were lacking in the following areas: summary of the treatment options; discussion about the funding and maintenance of dental implants; treatment plan in sufficient detail (for example specifying how many millimetres to open up the space for a pontic); which member of the team was responsible to provide each item of the treatment plan.

**CONCLUSIONS:** The findings were presented at a departmental meeting highlighting the recommendations. A hypodontia clinic proforma was then created which will now be piloted so that

clinicians have the opportunity for feedback. A re-audit will then be carried out. The joint hypodontia clinic is an extremely valuable but expensive resource and typically runs with two orthodontic consultants, one restorative consultant, three senior registrars as well as dental core trainees. Improving the efficiency and the quality of this clinic will in turn improve patient care but also enable utilisation of National Health Service resources more efficiently.

#### CP03 THREE-DIMENSIONAL CHANGES IN OROPHARYNGEAL AIRWAY SPACE AFTER TREATMENT WITH A PREFABRICATED MYOFUNCTIONAL APPLIANCE

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**AIM:** Myobrace™ (Myofunctional Research Co, Australia) is a prefabricated myofunctional orthodontic appliance recommended for use in malocclusion patients who have oral habits such as mouth breathing, tongue thrusting, thumb sucking, etc. The purpose of this study was to evaluate oropharyngeal airway space changes following Myobrace™ appliance treatment.

**MATERIALS AND METHOD:** This study investigated three-dimensional cone beam computed tomography (CBCT) measurements in Korean young patient.

**RESULTS:** A significant increase in upper airway dimension could be identified when patients used the prefabricated myofunctional appliance.

**CONCLUSIONS:** CBCT allowed more accurate assessment of anatomically complicated jaw bones and teeth. This study was conducted to confirm whether Myobrace™ can help with treatment of young patient by verifying not only malocclusion but also upper airway expansion. The number of reports is increasing on the improvement in children with obstructive sleep apnoea symptoms and no enlargement of tonsils and adenoids after oral appliance treatment instead of surgical treatment. Other study results indicate that sleep-disordered breathing can be prevented with orthodontic treatment and thus the interest in an oral appliance, which is a non-surgical treatment and can be used for young patient

#### CP04 MINISCREW ANCHORAGE FOR MESIALIZATION OF THE MANDIBULAR SECOND MOLAR INTO THE FIRST MOLAR EXTRACTION SITE: CASE REPORT

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**AIM:** The most commonly observed missing teeth are the first molars. Protraction of posterior teeth into edentulous spaces is more difficult for mandibular molars when compared with maxillary molars because the mandible is comprised of thick cortical bone and the molar roots are extremely wide bucco-lingually. Anchorage control is important for these patients to avoid lingual tipping of the mandibular incisors. The aim of this case report is to show the application of miniscrew anchorage for mesialization of mandibular second molars into the first molar extraction site.

**SUBJECT AND METHOD:** A 15 year old female referred with a complaint of crowding. She had a Class III skeletal and dental relationship, normal upper and decreased lower incisor inclinations and extraction space. Camouflage of the Class III malocclusion and mesialization of the mandibular second molar into first molar extraction site was decided. After levelling was complete, a miniscrew was placed between the roots of the right mandibular canine and first premolar. A closed coil spring was tied from the hook of sliding jig to the miniscrew exerting a force of 300 g.

**RESULTS:** After six months, the 6 mm extraction space was closed without lingual tipping of the mandibular incisors and minimal mesial tipping of the mandibular second molar. The third molar behind the mesialized molar erupted normally. Radiographic examination revealed that 1.4 degrees of mesial tipping of the second molar and 1.6 degrees proclination of the mandibular incisors had occurred.

**CONCLUSIONS:** This case demonstrates that miniscrew anchorage is an effective method for mesialization of the mandibular second molar into the first molar extraction site.

#### CP05 THE USE OF A TONGUE FLAP TO CLOSE A CLEFT PALATE – CLINICAL CASE

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**AIM:** Patients with a cleft palate frequently have bone and tissue defects with a communication with the nasal cavity. More often the defect is very large or there is local scar tissue making it difficult and unpredictable to use an adjacent mucosa flap to solve it. In such cases a distance flap can be used. The aim of this clinical poster is to describe a case where a patient was subjected to this approach using a tongue flap.

**SUBJECT AND METHOD:** A male patient with a bilateral primary cleft lip-palate was treated at 18 years of age with secondary graft surgery using a tongue flap, after several unsuccessful graft surgeries to close the fistula.

**RESULTS:** A good clinical result was achieved without any graft necrosis or fistula recurrence. This procedure also improved the quality of life of this patient by allowing closure of the fistula. The communication between the oral and nasal cavity was closed thus preventing future infections. Furthermore, it made the bone graft more predictable and easier at a later stage.

**CONCLUSIONS:** The use of a tongue flap, although requiring two steps to repair the defect (first a lingual tissue graft and, subsequently a bone graft), can be used successfully in situations where it is not possible to use a simple local mucosal tissue graft.

#### CP06 TREATMENT OF CROWDING USING SELF-LIGATING BRACKETS: A CASE REPORT

**Merve Bayel Akgul**, Burcu Ektiren, Department of Orthodontics, Inonu University, Malatya, Turkey

**AIM:** To show the effects of the Damon Q self-ligating system in a patient with crowding in the mixed dentition.

**SUBJECT AND METHOD:** A 12 year 4 month old female treated with the Damon system in both jaws. Before treatment study cast analysis was undertaken and a dental pantomograph, lateral cephalogram and intra- and extra-oral photographs were obtained. There was a lack of space of 3.12 mm in the upper and 7.6 mm in the lower jaw. The overjet was 2 mm, the overbite 6.7 mm and the patient had Class II occlusion. ANB angle was 3.9 degrees, angle U1-SN 99.3 degrees and IMPA 83.8 degrees. Post-treatment study casts, intra and extra-oral photographs and a lateral cephalogram were obtained.

**RESULTS:** The total treatment was 19 months. At the end of treatment, the mandibular teeth were aligned in their normal positions. An Angle Class I relationship and normal overjet and overbite were achieved.

**CONCLUSIONS:** Treatment resulted in a stable Class I occlusion. The patient is presently in retention without signs of relapse.

#### CP07 THREE CLINICAL CASES SHOWING AESTHETICS AFTER BIMAXILLARY SURGERY ON SKELETAL CLASS II PATIENTS

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**AIM:** A Class II skeletal deformity is frequently considered to be a unilateral maxillary problem. The purpose of this presentation is to show that solving Class II skeletal problems can be achieved with bimaxillary surgery even when the problem is unilateral. A further aim is to show the benefit of a team approach and the aesthetic results of a series of severe Class II patients who underwent bimaxillary surgery.

**SUBJECTS AND METHOD:** Three cases showing patients who underwent bimaxillary surgery.

**RESULTS:** Good aesthetic results were achieved together with a functional and stable occlusion.

**CONCLUSIONS:** Orthognathic surgery is the best option when camouflage is not possible and growth modification is limited. Bimaxillary surgery is often necessary to achieve good aesthetic results in Class II patients.

#### CP08 THE LIMITS TO ORTHODONTIC TOOTH MOVEMENTS\*\*\*

**Anna Barbara Bimler-Rhodes**, private, Wiesbaden, Germany

**AIM:** Is there only the relapse to show us the limits? The aim of this research was to determine possible evidence of a body-controlled expansion limitation mechanism.

**MATERIALS AND METHOD:** The material used was some publications on arch expansion as a response to elastic functional appliances without anchorage. The method will be a critical review of some of the different diverse opinions about the term 'functional' passive as opposed to active treatment, about the therapeutic forces induced or controlled by the patient's muscle force alone, be it by mono- or polysynaptic reflexes, which have been discussed since the introduction of removable treatment over a hundred years ago.

**RESULTS:** Notwithstanding the increasing degree of expansion control by sophisticated anchorage systems, these do not always produce the desired stability of the corrections achieved. In non-surgical cases, the tooth movements must be limited to the respective alveolar envelope. A help to find these limits is offered by old-fashioned treatment with orthodontic appliances which are loose in the mouth.

**CONCLUSIONS:** A look at the past can be worthwhile for questions of the presence and possible answers of the future.

#### CP09 EARLY TREATMENT OF CLASS III MALOCCLUSION WITH MODIFIED FRÄNKEL APPLIANCE – A THREE-DIMENSIONAL FOLLOW-UP EVALUATION

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**AIM:** To objectively evaluate changes of tongue posture in a patient with a Class III malocclusion before and after orthodontic treatment and at follow-up with the modified Fränkel III using three-dimensional (3D) ultrasonography.

**SUBJECT AND METHOD:** A patient with a Class III malocclusion during orthopaedic treatment with the modified Fränkel III appliance (Farčnik, 2008). Functional diagnosis revealed incorrect breathing through the mouth, a visceral type of swallowing pattern and incorrect tongue posture on the mouth floor. 3D ultrasonography was used to evaluate tongue posture at baseline (T0) and after 12 (T1) and 24 (T2) months of treatment with the Fränkel III appliance. An ultrasound system, Voluson 730 Expert, and a 3D convex transducer, RAB 2-5 MHz, were used to assess tongue posture.

**RESULTS:** 3D reconstruction of the tongue posture before treatment showed an incorrect tongue posture on the mouth floor (T0). At T1 a correct tongue posture was obtained which was stable at T2. 3D ultrasonographic reconstruction of the tongue revealed a correct tongue posture on the palate.

**CONCLUSIONS:** Early treatment of a Class III malocclusion with the modified Fränkel III appliance successfully modified the growth and development of the orofacial system, as well as the incorrect tongue posture on the mouth floor. The dynamic balance in the oral cavity after treatment with the functional Fränkel III appliance was established. The correct tongue posture on the palate was diagnosed using ultrasonography which could in the future become an important diagnostic tool in the functional diagnosis of orthodontic patients with functional appliances.

#### CP10 ORTHODONTIC TREATMENT OF A LATE ADOLESCENT SKELETAL CLASS II DEEP BITE PATIENT: A CASE REPORT

**Muhammed Hilmi Buyukcavus**, Ahmet Yalcin Gungor, Department of Orthodontics, Akdeniz University, Faculty of Dentistry, Antalya, Turkey

**AIM:** To present the non-extraction orthodontic treatment of a patient with a skeletal Class II malocclusion who refused surgical-orthodontic treatment.

**SUBJECT AND METHOD:** A 17-year-old female with a severe anterior overbite, overjet and excessive gingival display. She had a convex profile with competent lips. The maxillary midline was shifted 1 mm to the left side and the mandibular midline 1 mm to the right of the facial midline. The molar and canine relationship was Class II on both sides. Cephalometric analysis showed a Class II skeletal relationship due to a retrognathic mandible and low vertical pattern. Treatment was undertaken

with an MBT appliance prescription with a 0.022 inch slot bonded on the teeth. After levelling and aligning were completed in both arches, the maxillary wire was cinched back so that the cervical headgear would apply a distal orthopaedic force to the maxilla. The headgear consisted of a long outer bow bent upward 15 degrees and a large expanded inner bow. The patient used the cervical headgear for 16-18 hours a day.

**RESULTS:** After 22 months of treatment, the excessive overbite and Class II dental relationship were corrected. A Class I molar and canine relationship was achieved. The patient's smile was highly improved.

**CONCLUSIONS:** Orthodontic camouflage treatment may be an acceptable choice in treating a borderline Class II malocclusion when the skeletal discrepancy is not severe.

#### CP11 TREATMENT OF A PATIENT WITH A SKELETAL CLASS III MALOCCLUSION USING ALTERNATE RAPID MAXILLARY EXPANSIONS AND CONSTRICTIONS FOLLOWED BY A FACEMASK

**Muhammed Hilmi Buyukcavus**, Mevlut Celikoglu, Department of Orthodontics, Akdeniz University, Faculty of Dentistry, Antalya, Turkey

**AIM:** To present the orthopaedic treatment of a patient with a skeletal Class III malocclusion using alternate rapid maxillary expansions and constrictions (Alt-RAMEC) protocol followed by facemask treatment.

**SUBJECT AND METHOD:** An 11-year-old female patient with the complaint of an anterior crossbite. Clinical and radiographic examination showed a Class III skeletal pattern, -3.7 mm overjet and 4.1 mm overbite. It was decided to apply 5 weeks of Alt-RAMEC using an acrylic full cap bonded rapid maxillary expansion (RME) appliance followed by facemask treatment with a force of 500 g. During the Alt-RAMEC protocol, it was applied as one-week activation and then one-week reverse activation. A facemask was then applied from the hooks of full cap bonded RME appliance and a 4 mm positive overjet was achieved after 3 months. For retention, chin cap was used only nights during fixed orthodontic treatment.

**RESULTS:** A Class I incisor relationship was produced.

**CONCLUSIONS:** Facemask treatment with the Alt-RAMEC protocol is an alternative treatment option for skeletal Class III cases to effectively protract the maxilla.

#### CP12 EARLY TREATMENT OF MAXILLARY CANINE IMPACTION BY EXTRACTION OF THE PRIMARY CANINE: A CASE REPORT

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**AIM:** Maxillary canine impaction has an incidence of 1 in 100 in the general population and has been reported as much higher in an individual orthodontic practice. In this case report, guidance of tooth eruption was explained to the patient during the early diagnosis of an unerupted maxillary canine tooth with a horizontal position.

**SUBJECT AND METHOD:** A 9-year-old female referred at the suggestion of a dentist. It was seen that tooth age was concordant with skeletal age. Radiographically, the eruption path of right and left maxillary canine was examined with a dental pantomogram (DPT). The eruption path of the maxillary right canine was normal; however the left side was not. The horizontal and high position of the upper left canine was remarkable. In the maxillary arch, a lack of space of 10 mm was observed using Moyers analysis. The orthodontic treatment plan was extraction of the right first premolar and left canine due to the malposition of unerupted left canine. In view of its abnormal position, this tooth was also predicted to be impacted. The right first premolar, left primary canine and primary first molar were extracted. A space maintainer was fabricated. After 10 months, the maxillary left canine was assessed in its natural eruption path.

**RESULTS:** Two years later, the treatment plan was changed and extraction of left first premolar and eruption of the left canine was decided.

**CONCLUSIONS:** Caution should be taken in assessing the position of the unerupted canine on DPTs during the early mixed dentition period. The eruption path could be guided with tooth extraction.

CP13 TREATMENT OF AN ANKYLOSED MAXILLARY CENTRAL INCISOR BY SINGLE TOOTH DENTO-OSSEOS OSTEOTOMY: A CASE REPORT

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**AIM:** In recent years, surgical block osteotomy, which allows rapid movement of a tooth in a block of bone, followed by distraction osteogenesis, has been reported to cope with the difficulties of ankylosed tooth treatment. Distraction force is often applied to the crown of an ankylosed tooth. The aim of this case report is to present the treatment of an ankylosed tooth.

**SUBJECT AND METHOD:** A 16-year-old female with the chief complaint of an unaesthetic smile. A past history of trauma due to fall 8 years previously was revealed. In clinical examination, an ankylosed maxillary right central incisor (tooth 11) that was displaced 4 mm apically relative to the adjacent lateral incisor was diagnosed. A dull sound upon percussion of the crown was noted. Radiographic examination showed a significant loss of lamina dura. A skeletal Class I malocclusion and dental Class II molar relationship was determined. After an interdental osteotomy and subapical osteotomy around the maxillary right central incisor, distraction force was applied to the tooth and bone block with intraoral elastics and an archwire.

**RESULTS:** Treatment was successfully carried out. The ankylosed tooth was kept in its place while increasing vertical alveolar height.

**CONCLUSIONS:** The patient's aesthetic needs were satisfied. In future the success rate of aesthetic-prosthetic restorations may increase without requiring any other reconstruction or augmentation of the alveolar ridge.

CP14 IMPROVED SUPERELASTIC WIRE FOR TREATMENT OF A CLASS II MALOCCLUSION PATIENT WITH ADVANCED PERIODONTAL DISEASE

**Chien-cheng Chen**, Taipei Tzu Chi General Hospital, Taipei, Taiwan

**AIM:** Periodontal disease sometimes causes tooth migration and results in malocclusion. In this condition, a combination of periodontal and orthodontic treatment is necessary. In this case, improved superelastic nickel-titanium wire (ISW) was used as the main archwire. In order to avoid the deteriorating periodontal condition, a light force was used.

**SUBJECT AND METHOD:** A 78 year-old female was diagnosed with an Angle Class II malocclusion with her maxillary left incisor protruded due to periodontal disease. Following periodontal treatment, orthodontic treatment commenced. ISW was selected as the main archwire. During treatment, a light force was used in order not to deteriorate periodontal condition. After 2 years, orthodontic active treatment finished and the patient began to wear a retainer.

**RESULTS:** 1. Alignment of the protruded incisor was successful and the Class II malocclusion improved. 2. A stable periodontal condition was maintained. 3. The patient's facial profile also improved.

**CONCLUSIONS:** In this Angle Class II case with periodontal disease, ISW was effective as it could deliver suitable light forces. However, long-term follow-up still needed.

CP15 NON-EXTRACTION TREATMENT OF A CLASS III MALOCCLUSION WITH ANTERIOR CROSSBITE – A CASE REPORT

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**AIM:** The common characteristics of an Angle Class III malocclusion are an anterior crossbite, mandibular prognathism and a concave facial profile. For patients with a Class III malocclusion and an acceptable profile after a functional shift of the mandible, orthodontic camouflage treatment is usually preferred to orthognathic surgery. The aim of this presentation is to show the camouflage treatment of a Class III malocclusion without extractions with temporary anchorage devices (TADs).

**SUBJECT AND METHOD:** A 16-year-old girl diagnosed as skeletal Class III with a hypodivergent facial pattern, a Class III malocclusion with an anterior crossbite and a deep bite. Moreover, a functional

shift of the mandible was noted. The treatment plan was camouflage treatment by fixed edgewise appliances with Class III elastics. The patient was treated with TADs without extractions.

**RESULTS:** After 31 months of orthodontic treatment, a Class I occlusion with an acceptable overjet, overbite and well-aligned dentition were achieved. The mandible rotated clockwise so that her facial profile was also improved.

**CONCLUSIONS:** Mild molar extrusion may cause mandibular clockwise rotation, which can give rise to an improvement in a concave profile. However, this mechanism will increase lower anterior face height so the original facial proportion is of concern. Last but not least, when deciding on a surgical or non-surgical treatment plan, the following discriminators are of concern: symphysis width, overbite, facial pattern, functional shift of the mandible and whether or not the facial profile is acceptable.

#### CP16 LATERAL CEPHALOMETRIC ANALYSIS OF HUMAN SKULLS WITH THE USE OF MAGNETIC RESONANCE IMAGING: A PILOT *IN VITRO* STUDY

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**AIM:** To compare the accuracy of cephalometric measurements from three-dimensional (3D) magnetic resonance imaging (MRI) data with conventional lateral cephalometric radiographs (LCRs). A further aim was to estimate the feasibility of cephalometric analysis with the use of MRI technology.

**MATERIALS AND METHOD:** In this study two human skulls were measured with a 3 Tesla MRI scanner. In order to perform the cephalometric analysis on the obtained 3D datasets, cephalometric landmarks were placed by four independent assessors. All landmarks were automatically projected on a two-dimensional sagittal plane, which was positioned perpendicular to the Frankfort horizontal plane. Angles for the anteroposterior position and inclination of mandible and maxilla, for the sagittal relationship of the maxilla to mandible, gonial angle, skull base angle and intermaxillary angle were registered. The results were compared with three conventional LCRs of each skull.

**RESULTS:** No measured angle of conventional or MRI LCRs differed more than 1.3 degrees. The best accordance in analysed angles was recorded for the anteroposterior position of the mandible, whereas the values for maxillary inclination differed the most.

**CONCLUSIONS:** Within the limitations of this pilot study, the use of MRI seems to be an alternative possibility to conventional techniques for cephalometric analysis. The placement of bilateral cephalometric landmarks in 3D MRI databases requires more time, but avoids inaccuracies associated with a rotated or inclined position of the patient's head while obtaining a conventional LCR. The use of MRI avoids the ionizing radiation, which is particularly desirable in adolescent patients. More data and *in vivo* studies are needed to verify the clinical equality of both cephalometric methods.

#### CP17 TREATMENT OF A CLASS I MALOCCLUSION WITH SEVERE CROWDING AND THREE LOWER INCISORS – A CASE REPORT

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**AIM:** To demonstrate the orthodontic correction of a Class I malocclusion with severe space deficiency and only three lower incisors.

**MATERIALS AND METHOD:** When a lower incisor is congenitally missing or extracted due to pathology or trauma, it will be an issue as to whether the space should be restored by prosthetics or eliminated by orthodontics. In the present case, the crowding situation was turned into an advantage using the following method: replacement of the missing lower incisor by the ipsilateral lower canine and extraction of three premolars in the other three quarters for relief of crowding. At the same time, a temporary anchorage device was used to correct the severely deviated midline.

**RESULTS AND CONCLUSION:** The occlusion finished at a Class II canine relationship on the side of the missing incisor. Without any prosthetics, relatively symmetrical tooth alignment was achieved and thus a better occlusion using the method described above. At the same time, the crowding was relieved and the midline deviation was significantly corrected.

#### CP18 MANAGEMENT OF AESTHETIC PROBLEMS AFTER ALVEOLAR BONE DISTRACTION OSTEOGENESIS IN ADOLESCENTS†††

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**AIM:** To suggest a multidisciplinary treatment that might bring functionally and aesthetically favourable results, including alveolar bone distraction osteogenesis and decoronation of ankylosed maxillary anterior tooth with orthodontic and prosthetic treatment.

**SUBJECTS AND METHOD:** A 7-year-old female with trauma of the maxillary incisors after bumping against the corner of a table. The maxillary incisors were avulsed and replanted, but the maxillary left central incisor gradually ankylosed. Four years later, an anterior open bite (AOB) resulted from infraocclusion of the ankylosed tooth and tilting of the adjacent teeth to the ankylosed site occurred due to impeded growth of the alveolar bone. Therefore, to improve the vertical position of the ankylosed tooth, alveolar bone distraction osteogenesis, to allow movement of the alveolar bone, remodelling of both soft and hard tissues, was chosen. A customized intraoral alveolar bone distractor was manufactured and an interdental/subapical osteotomy was performed around the ankylosed tooth. Treatment was finished by repositioning the ankylosed tooth. At the 6 year-follow-up, the AOB and vertical difference in the gingival margin recurred due to alveolar bone adjacent to the ankylosed tooth showing 'late vertical growth'. The ankylosed tooth also showed a pink spot in the cervical area caused by external root resorption. Thus for aesthetic prosthetic restorations, orthodontic treatment with decoronation, a procedure that involves elevation of the mucoperiosteal flap following removal of the crown part and submergence of the root, and eventually guidance of new marginal bone regeneration, was selected to preserve the alveolar bone. After 7 months of pre-orthodontic treatment, decoronation, the coronal part of the root surface was removed 2 mm below the marginal bone. Five months post-surgery there was confirmation of gingival healing and with extraction of the remainder of the root, an immediate implant was placed and a prosthetic restoration was delivered.

**RESULTS:** The submerged ankylosed tooth was extracted and the AOB was improved. The gingival margin of both the left and right central incisor was positioned at the same level.

**CONCLUSIONS:** Unlike adult patients with an ankylosed tooth, active alveolar bone growth in adolescents poses many problems. Thus alveolar bone distraction osteogenesis and decoronation is one method for orthodontic and prosthetic treatments of an ankylosed tooth.

#### CP19 EFFECTIVE USE OF TEMPORARY ANCHORAGE DEVICES IN THE TREATMENT OF A PATIENT WITH A CLASS III MALOCCLUSION AND A SEVERE ANTERIOR OPEN BITE: CASE REPORT

**Johanna Choo**, National Dental Centre, Singapore, Singapore

**AIM:** To demonstrate the successful use of temporary anchorage devices (TADs) in the treatment of a patient with a Class III malocclusion and severe anterior open bite (AOB).

**SUBJECT AND METHOD:** An 18 year old female presented with an Angle Class III malocclusion with bimaxillary incisor protrusion and a severe AOB of 4 mm. She had grossly incompetent and protrusive lips. Her chief complaint was related mainly to her inability to bring her teeth and lips together. The surgical option was declined by the patient. As she did not have an excessive incisal show at rest or on smiling, the option of orthodontic treatment with TADs was presented to the patient. The TADs would be used to intrude the molars as well as for selective antero-posterior anchorage to enable maximum retraction of the incisors and correction of the Class III molar relationship. Treatment involved extraction of four premolars and the placement of TADs between the upper first and second molars (buccal and palatal) and lower first and second molars (buccal). Intrusion of the upper molars was done by attaching power chains from the buccal and palatal band attachments to the respective TADs. Lingual crown torque was placed on the lower molars to

counter-act buccal flaring when the power chains were attached to the buccal TADs. As the molars intruded, the mandible rotated in an anticlockwise direction and there was a transient crossbite of the incisors. This was treated by running short term Class III elastics from the lower anterior teeth to the upper buccal TADs.

**RESULTS:** Overall treatment took 27 months. Treatment results showed a drastic improvement in the occlusion (an ideal overjet and overbite was established) and profile. Three year follow-up records showed minimal relapse with maintenance of the overjet and overbite

**CONCLUSIONS:** Severe AOB cases present a challenge to the orthodontist. Before the advent of TADs, orthognathic surgery was the only predictable treatment option. Present day TADs have proven to be very effective in intruding molars. In selective AOB cases, surgery can be avoided and treated successfully with TADs.

#### CP20 REPOSITIONING OF THE REMAINING ROOT OF HEMISECTIONED LOWER FIRST MOLARS: TWO CASES

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**AIM:** To provide an alternative approach for higher stability of hemisectioned molar roots by repositioning the remaining root orthodontically.

**SUBJECTS AND METHOD:** Resection of periodontally hopeless roots of mandibular lower first molars in two different patients was performed. Following epithelial healing of the extraction site, 0.022 × 0.028 inch slot fixed appliances were bonded on the second molar, premolars and canine segmentally. The brackets and molar tube were bonded assuming that no levelling was needed in three dimensions in order to passively ligate a 0.016 × 0.016 inch stainless steel archwire. The remaining root of the hemisectioned molar was also bonded with a premolar bracket. Sliding mechanics were used to reposition the root in the centre of the molar width sagittally. Lingual coupling forces for rotational control and occlusal contact corrections with diamond burs were performed when necessary. Total treatment time varied between 15 and 20 weeks. Following the confirmation of the prosthodontist for final tooth positions, the brackets were debonded and monolithic zirconia crowns were cemented.

**RESULTS:** The remaining root of hemisectioned mandibular molars served as a premolar in the middle of the molar space avoiding any cantilever forces and more stable aproximal contacts. In addition, healing of the bone defect was enhanced by movement of the root to the defect area carrying its healthy periodontium.

**CONCLUSIONS:** Orthodontic repositioning of the remaining healthy root of hemisectioned teeth in the centre of the extraction gap may present a treatment alternative prior to prosthetic rehabilitation providing better stability.

#### CP21 PRACTICE AND MALPRACTICE IN FORCING THE ALVEOLAR ENVELOPE: WHERE IS THE LIMIT?

**Francesco Coppola**, Antonella Dovier, Cosimo Damiano Napolitano, Gabriella Ceretti, Guido Bissolotti, Department of Maxillofacial Surgery, Regional University Hospital, Udine, Italy

**AIM:** To report experiences in managing periodontal borderline cases where compensatory treatment or decompensation was undertaken. The periodontal outcome was assessed.

**SUBJECTS AND METHOD:** Clinically treated cases are described and shown, highlighting the effects and outcomes at the periodontal level and root resorption at the end of treatment

**RESULTS:** Depending on tissue biotype and other variables, there is no predictable outcome of treatment, despite careful analysis and accurate planning of orthodontic movements during treatment.

**CONCLUSIONS:** Each treatment should be individualized considering its objectives and tissue quality. Feasibility and tolerance of orthodontic movements in periodontal tissues must be programmed in advance. The result of treatment, however, depends on many variables related to patient compliance and ability to provide adequate management of oral hygiene and oral habits.

CP22 ORTHODONTIC APPLIANCES AND SURGICALLY ASSISTED ORTHODONTIC TOOTH MOVEMENT, A KEY AND A POWERFUL MIX IN OBTAINING TREATMENT GOALS

**Francesco Coppola**, Guido Bissolotti, Antonella Dovier, Cosimo Damiano Napolitano, Gabriella Ceretti, Department of Maxillofacial Surgery, Regional University Hospital, Udine, Italy

**AIM:** The introduction of surgically assisted orthodontic tooth movement and the improvement of orthodontic materials and techniques have boosted our efficiency in managing clinical cases in a multifaceted way. The effectiveness of these instruments do not exclude the importance of careful planning which presupposes careful diagnostic analysis and definition of therapeutic individualized goals

**SUBJECTS AND METHOD:** Cases handled are shown together with the clinical sequence adopted.

**RESULTS:** The skills of using a wide range of instruments and technical support to complete treatment of complex cases and meet patients' needs, optimizing time and improving results, respecting our aims and maintaining treatment quality.

**CONCLUSIONS:** Surgically assisted orthodontic movement is a further tool in the orthodontist's hands that clinicians should be able to add to traditional appliances in daily clinical practice. It is also a useful weapon to solve complex cases.

CP23 TOOTH WEAR DUE TO INTERFERENCE WITH ORTHODONTIC BRACES\*\*\*

**Arnaud Costi**, Private Practice, Paris, France

**AIM:** Orthodontic appliances can contribute to iatrogenic wear of antagonist teeth. The aim of this study was to verify how remote monitoring could inform us about the occurrence of these adverse events.

**SUBJECTS AND METHOD:** The research was carried out on over 500 monitored patients. Description of the shape change, the speed of apparition, the type of teeth and braces most frequently affected by this issue.

**RESULTS:** Due to the superimposition of photographs and initial three-dimensional models, remote monitoring allows early detection of tooth wear.

**CONCLUSIONS:** Iatrogenic tooth wear can be detected and anticipated using remote monitoring.

CP24 OSTEODISTRACTION IN THE TREATMENT OF CLEFT LIP AND PALATE

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**AIM:** Osteodistraction is the biologic process of creation of new bone between the surfaces of bone segments that are gradually separated by traction, thereby stimulating bone growth. This method is often used in the treatment of craniofacial deformities. The aim of this study was to report the application of osteodistraction in a patient with a unilateral cleft lip and palate (UCLP).

**SUBJECT AND METHOD:** The patient aged 19 years, with a marked maxillary hypoplasia as a consequence of a UCLP, underwent maxillary osteodistraction. The goal of therapy was to expand the maxilla using extraoral distractors, and the establishment of appropriate interjaw relationships. Prior to surgery, fixed orthodontic appliances were inserted in both jaws. After levelling the two dental arches, a maxillary osteotomy was performed and an extraoral distractor was placed, which was activated 1 mm a day.

**RESULTS:** After 6 weeks of distractor wear (along with a period of consolidation, which usually lasts twice as long as the active period) sufficient extension of the maxilla was noted. After removal of the distractor, a post-surgical orthodontic phase of fine adjustment of the bite lasted for 6 months, following which prosthetic treatment was undertaken.

**CONCLUSIONS:** Osteodistraction is a surgical procedure generally accepted in the treatment of craniofacial deformities. Compared to conventional surgical methods, with osteodistraction stable results are achieved, complete skeletal and soft tissue deformity corrected, with less invasive treatment. It is especially recommended for overjets greater than 10 mm. Extraoral distractors enable extremely controlled direction of extraction during the distraction, they may be used in

children from the age of four years, as well in adults with hypoplasia of the maxilla or middle third of the face which are the consequence of the cleft, injury or craniosynostosis.

**CP25 ABSOLUTE ANCHORAGE TURNS REAL: MINISCREW SUPPORTED ORTHODONTIC PSEUDO-ANKYLOSIS**

Nicola Derton<sup>1</sup>, **Daniela Lupini**<sup>2</sup>, Mauro Cozzani<sup>3</sup>, Private Practice, <sup>1</sup>Conegliano, <sup>2</sup>Giulianova and <sup>3</sup>La Spezia, Italy

**AIM:** The miniscrew supported orthodontic pseudo-ankylosis (MSOPA) technique is based on 'pseudo-ankylosis' for uprighting and mesialization of a mandibular molar.

**SUBJECT AND METHOD:** An adult patient with tooth 3.8 mesially tipped with roots in a distal position causing premature occlusal contacts. The treatment plan was to upright and mesialize the third molar and substitute the missing second molar. An alternative treatment was to upright and distalize tooth 3.8 and insertion of an implant (or bridge) to replace 3.7; 3.8 extraction and replacement by an implant. The MSOPA technique consists in bonding a rectangular stainless steel sectional wire on the head of the miniscrew and the other end of the wire on the anchorage unit teeth.

**RESULTS AND CONCLUSION:** At the end of treatment tooth 3.8 was uprighted and mesialized. There was no undesired movement on the anchorage unit.

**CP26 PRE-SURGICAL NASOALVEOLAR MOULDING IN AN INFANT WITH A CLEFT LIP AND PALATE**

**Francisco do Vale**<sup>1,2</sup>, Ana Roseiro<sup>1,2</sup>, Inês Francisco<sup>2</sup>, Luísa Maló<sup>1,2</sup>, Vanda Conceição<sup>3</sup>, <sup>1</sup>Department of Orthodontics, <sup>2</sup>Faculty of Medicine of University of Coimbra and <sup>3</sup>Hospital Pediátrico de Coimbra, Portugal

**AIM:** A cleft lip and palate (CLP) is one of the common facial deformities. Alveolar and nasal reconstruction is a challenge for the reconstructive surgeon. Pre-surgical nasoalveolar moulding (NAM) was introduced to mould the maxillary, alveolar and nasal tissues prior to first surgical repair. NAM also stimulates immature nasal chondroblasts, producing an interstitial expansion, which can improve nasal morphology. This appliance allows alignment of the intraoral alveolar segments and correction of the nasal tip, columella, the alar base and the philtrum. This presentation aims to describe the treatment of two newly born male infants where pre-surgical orthopaedic therapy was used.

**SUBJECTS AND METHOD:** Two newly born males with a left CLP. At two days old an impression for NAM was made. On day 15 day, alveolar modelling commenced for six weeks. Nasal modelling was carried out for the next six weeks. The babies were seen weekly to make adjustments to the moulding plate. The NAM appliance was secured extraorally to the cheeks bilaterally by surgical tape with orthodontic elastic bands at one end.

**RESULTS:** The tissue moulding achieved was measured on the lip approximation and was reduced from 3 to 0.9 cm in one subject and from 3 to 1.2 cm in the other.

**CONCLUSIONS:** Pre-surgical orthopaedic therapy of cleft infant is intended to reduce the severity of the oronasal deformity prior to surgery. Moulding the nasal cartilage, premaxilla and alveolar ridges in the neonatal period with surgical procedures results in better aesthetics and a reliable long-term result.

**CP27 MAXILLARY DISTRACTION IN A PATIENT WITH RIEGER SYNDROME**

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**AIM:** Rieger syndrome is a congenital anomaly from a rare autosomal dominant origin, with an estimated prevalence of 1:200,000. It affects the ocular structures preferentially and there may also be systemic involvement. The most characteristic non-ocular findings are mild craniofacial dysmorphism, dental anomalies and redundant periumbilical skin. Mid-face abnormalities include hypertelorism, telecanthus, maxillary hypoplasia with flattening of the mid-face, a prominent

forehead and a broad, flat nasal bridge. Dental abnormalities may include microdontia or hypodontia. This poster shows patient in which the technique of maxillary osteogenic distraction was applied in order to improve the skeletal discrepancy as early as possible and simultaneously improve the respiratory condition and facial aesthetics of the patient.

**SUBJECT AND METHOD:** A 14 year old male with a previous diagnosis of Rieger syndrome. A skeletal Class III with marked maxillary hypoplasia, a short face, concave profile and increased nasolabial angle was evaluated cephalometrically. The treatment plan suggested was orthodontic-surgical treatment, with a first phase of maxillary osteogenic distraction. To select the size of the distractor, volumetric measurements of each maxillary sinus were made using conical beam computed tomography. Two internal maxillary distractors with 15 mm of maximum width were placed bilaterally in the maxillary sinuses. After a 4 day latency period, two daily activations of 0.5 mm each were performed until the maximum width was reached.

**RESULTS:** The treatment was successful and there was a significant decrease in sagittal skeletal discrepancy with increased respiration and improvement of the child's facial aesthetics.

**CONCLUSIONS:** Osteogenic maxillary distraction is a more conservative alternative to the conventional Le Fort I surgical technique, and has the advantage that it can be performed at earlier ages. At this stage, a greater opening of the distraction space is achieved, because the procedure is more progressive and allows simultaneous growth of the soft tissues. There was a significant decrease in sagittal skeletal discrepancy, an increase in respiratory capacity and a substantial improvement in facial aesthetics with positive repercussions on the child's self-esteem during growth.

#### CP28 MAXILLARY EXPANSION OF UNILATERAL POSTERIOR CROSSBITE CASES: EVALUATION OF APPLICATION ACTIVITY WITH FINITE ELEMENT STRESS ANALYSIS

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**AIM:** To evaluate the effectiveness of a new method for expanding the maxilla in subjects with a unilateral posterior crossbite by three-dimensional (3D) finite element stress analysis (FESA).

**MATERIALS AND METHOD:** This study was established on the hypothesis that a new treatment procedure that involves stress relieving osteotomies in the treatment of unilateral maxillary crossbite could eliminate advanced surgery involving total anaesthesia and could be a beneficial addition to orthodontic treatment. In this study, three different scenarios were tested; first model with no relaxing segmentation osteotomy, second with bilateral segmentation and a third model with unilateral segmentation. After loading a force of 100 N formed by a rapid maxillary expansion (RME) appliance to the models, stress levels were examined by 3D FESA.

**RESULTS:** In the first scenario, high stress levels were obtained throughout the whole cranial area. In the second scenario, the force formed by the RME appliance was concentrated in the maxillary region and stress levels were decreased above the osteotomy lines. In the third model in which a unilateral relaxing osteotomy was made, the force generated by the RME helped the side with the osteotomy to move more easily and caused the other side to remain under stress which formed a resistance to unwanted expansion of this side. As a result of the relaxing incisions, lower stress levels were measured in all coronal and root surfaces of the teeth.

**CONCLUSIONS:** A unilateral crossbite malocclusion can be treated with a RME device with the help of unilateral relaxing osteotomy.

#### CP29 MESIAL ORTHODONTIC MOVEMENT OF MOLARS AFTER EXTRACTION OF LOWER FIRST PERMANENT MOLAR

**Gergana Doshkova**, Private practice, Gabrovo, Bulgaria

**AIM:** In subjects with early loss of the lower first permanent molars the orthodontic treatment plan includes mesial movement of the distal teeth. The aim of this study was to evaluate the possibilities for mesial movement of the second and third lower permanent molar after extraction of the lower first permanent molar.

**SUBJECTS AND METHOD:** Four patients aged 14-23 years with unilateral/bilateral extraction of the lower first permanent molar. After full orthodontic analysis, treatment with fixed appliances was conducted. The distances from the distal edge of the lower second permanent premolar to the mesial edge of the lower second permanent molar, the inclination of the lower second permanent molar to OcC and MP before and after treatment, were measured. A forecast for the eruption of the third molars using Naviko's method was made. The measurements were based on study models, photographic documentation and panoramic and profile radiographs.

**RESULTS:** Unilateral/bilateral movement of the second molar through the toothless alveolar crest was made. Extraction spaces of 5 to 11.8 mm were closed. The inclination of the lower second molar was uprighted so space for the eruption of the third molar is achieved (50% chance for retention). The lower incisors were not retracted.

**CONCLUSIONS:** The results obtained show that possibilities for mesial movement of the second molars through the toothless mandibular alveolar crest, in the place of the first molar, in the presence of third molars, which now can erupt in the place of the second molars, allows full rehabilitation of the dentition and normal mastication.

#### CP30 SPECIAL NEEDS AND ORTHODONTICS: A CASE REPORT OF THE ORTHODONTIC TREATMENT OF A CHILD WITH CEREBRAL PALSY

**Cansu Duzgun**, Serdar Toroğlu, Department of Orthodontics, Cukurova University, Faculty of Dentistry, Adana, Turkey

**AIM:** To describe the successful clinical management of a patient with cerebral palsy.

**SUBJECT AND METHOD:** An 11-year-old female with cerebral palsy complained of an undesirable oral appearance. She had a skeletal and dental Class II malocclusion with severe maxillary and mandibular crowding, impacted teeth and an upper midline discrepancy. The upper and lower first premolars were extracted in order to eliminate these problems and open coils were used to correct the upper midline discrepancy. The extraction spaces were closed with moderate anchorage, intermaxillary elastics were used for Class II correction and settling, then treatment was completed. The total treatment time was 3 years 6 months. During this period, her parents helped with tooth brushing and elastic use since she had muscle weakness.

**RESULTS:** The patient's oral function and aesthetic appearance were significantly improved. Aligned dental arches with a good occlusion were obtained. The patient's self-confidence improved during and after the treatment period.

**CONCLUSIONS:** Parental co-operation for patients with physical handicaps is very important. Corrective orthodontic treatment for these patients can improve not only oral function but also self-confidence and self-esteem.

#### CP31 THE EFFECTS OF A STABILIZATION APPLIANCE ON TREATMENT PLANNING OF A PATIENT WITH TEMPOROMANDIBULAR DISORDER

**Cansu Duzgun**, Aslihan Uzel, Department of Orthodontics, Cukurova University, Faculty of Dentistry, Adana, Turkey

**AIM:** To show the effects of stabilization splint therapy on treatment planning of a patient with temporomandibular dysfunction.

**SUBJECT AND METHOD:** A 25 year old female whose chief complaints were an open bite, temporomandibular joint (TMJ) pain during chewing, speaking and, under stress and clicking of the left joint. Clinical examination and cephalometric analysis confirmed that patient had a skeletal and dental Class I relationship and an anterior open bite (SNA: 76.2°, SNB: 73.6°, ANB: 2.6°, lower face height: 45.8%, overbite: -5.7 mm). The presence of TMJ pain and muscle symptoms suggested that a stabilization splint be placed as a part of diagnostic evaluation. Centric relation (CR) records were obtained using the power centric method and the stabilization splint was constructed on articulated models in centric occlusion (CO). The patient was instructed to wear the splint full time except during eating. After 3 months, a second CR-CO record was taken and premature contacts on the third molars were detected on articulator mounted models. As the patient's previous symptoms had

totally disappeared, it was decided to extract the third molars, complete the splint therapy and re-evaluate the patient for treatment planning.

**RESULTS:** After stabilizing the mandible in the seated condylar position, clinic evaluation and cephalometric analysis revealed that patient's true malocclusion was skeletal and dental Class II with a more severe open bite (SNA: 76.2°, SNB: 71.6°, ANB: 5.1°, lower face height: 47.4%, overbite: -7.2 mm). Thus, double jaw orthognathic surgery was planned in order to correct the severe open bite and skeletal Class II malocclusion while maintaining condylar stability.

**CONCLUSIONS:** This case report confirmed the importance of CR records and the use of stabilization splints on relieving muscle and TMJ symptoms associated with occlusal factors, and unmasking the true discrepancy.

### CP32 A NEW CONCEPT OF MANDIBULAR PROGNATHISM TREATMENT WITH MODIFIED FR-3

**Franc Farcnik**, Orthos, Ljubljana, Slovenia

**AIM:** To improve treatment of mandibular prognathism, the aim was to investigate how to change Fränkel's function regulator type-3 to be more effective.

**MATERIALS AND METHOD:** Fränkel reported that mandibular prognathism is characterized by a great discrepancy between the upper and lower part of the cavum oris proprium. The tongue is positioned on its larger lower part. Even with myofunctional exercises the tongue cannot be reorientated toward the palate and as a consequence this has a negative influence on the development of the lower jaw. In such cases we have to be satisfied with a partial success (Fränkel, 1967). It is difficult to understand his affirmation that the use of an appliance which diminishes the lingual volume is a great mistake (Fränkel, 1989). When it was realized that treatment of mandibular prognathism with the FR-3 cannot be brought to a successful end, a serious mistake was made in deciding to change the construction of the FR-3.

**RESULTS:** Two new elements were incorporated in the appliance, placed in the cavum oris proprium: the lingual shield standing away from the lingual surface of the lower teeth and dentoalveolar process. Because of the restricted space at the bottom of the mouth the tongue is forced to take a more upward position against the palate. The lingual shield with its volume changes the space relationship in the mouth, forces the tongue to a new position and function. A small concave plate in the middle of the palatal arch in which a source of pleasant taste and aroma can be placed to stimulate the tip of the tongue to an upright position.

**CONCLUSIONS:** With the additional elements of the appliance the negative influence of the tongue on the lingual part of the mandible was prevented and improved the position of the tongue in the mouth. With treatment of mandibular prognathism in a 7-year old girl, the effectiveness of the modified FR-3 is presented.

### CP33 HISTOLOGICAL MIDPALATAL SUTURE CHANGES AFTER RAPID MAXILLARY EXPANSION IN GROWING SUBJECTS

**Rosamaria Fastuca**<sup>1</sup>, Piero Antonio Zecca<sup>2</sup>, Matteo Beretta<sup>3</sup>, Aldo Macchi<sup>2</sup>, Alberto Caprioglio<sup>2</sup>,  
<sup>1</sup>University of Messina, <sup>2</sup>University of Insubria, Varese and <sup>3</sup>Private Practice, Varese, Italy

**AIMS:** To investigate immediate histologic changes in the midpalatal suture in humans following rapid maxillary expansion (RME) compared to a control.

**SUBJECTS/MATERIALS AND METHOD:** Three patients (mean age 8.3 ± 0.9 years) who underwent biopsy of midpalatal suture. Two patients (1 female, subject 1 and 1 male, subject 2) underwent RME treatment before biopsy. The third patient did not show transverse maxillary deficiency and was enrolled as control (subject 3). Each subject underwent only one biopsy performed at different time points among different patients. Biopsy of midpalatal suture 7 days after RME was performed in subject 1 and at 30 days after RME in subject 2. Subject 3 underwent biopsy but no treatment.

**RESULTS:** In subject 3 lamellar bone with small marrow spaces and interdigitations at the palatal suture gap was observed. At 7 days in subject 1 mature bone with small marrow spaces and trabecular bone with peculiar storiform appearance inside soft tissue and collagen fibres running parallel only in central part were present. At 30 days in subject 2, a greater number of newly formed bone trabeculae aligned parallel to each other and with a perpendicular orientation to the long axis

of the suture could be seen. At 30 days the fibrous component of bone tissue was less represented compared to the 7 day sample. Newly formed bone showed collagen fibres in a transverse orientation related to the suture long axis in comparison to the control sample, where a longitudinal orientation was observed. This orientation was suggested to be related to the response to mechanical forces as shown in mice but never reported in humans.

CONCLUSION: Data from the preliminary histological results showed that bone formation was observed in the gap after RME, although the healing process was still ongoing.

#### CP34 ORTHODONTIC TREATMENT APPROACH AFTER DENTAL TRAUMA TO THE UPPER ANTERIOR TEETH: A CASE SERIES

**Sofie Fivez**, Maria Cadenas de Llano Pérula, Guy Willems, KU Leuven, Belgium

AIM: To describe the orthodontic treatment options for patients after dental trauma in the upper anterior region. Dental trauma is a frequent problem. Patients who present with a history of dental trauma often need orthodontic treatment. Sometimes a central incisor is considered lost as a result of avulsion or severe root resorption. Orthodontists might hesitate on the treatment options.

SUBJECTS AND METHOD: In this case series the aim is to report three different treatment approaches in cases of trauma to the central incisors. The first and second patient lost either one or both central incisors and asymmetrical or symmetrical closure was performed, respectively. The last patient was treated with autotransplantation of a premolar to the receptor zone in the anterior dentition.

RESULTS: For all patients, a reasonable aesthetic result and an acceptable occlusion was achieved. For the transplantation case the long-term prognosis is not yet known. However, the literature states that survival rates for transplanted premolars in the upper anterior region are high. If a transplanted tooth fails, at least the goal of bone preservation has been met.

CONCLUSIONS: All options should be carefully considered; there is no standard solution for all cases. The choice will be patient and practitioner dependent. The following factors can help the professional to make a decision: What is the condition of the rest of the dentition?; Would extraction of premolars be necessary without the trauma?; Will transplantation impede the stability of the occlusion?; Is transplantation possible?; How large are the adjacent teeth and what colour do they have?; Is there a reason why the prognosis of an adjacent tooth could be poor?

#### CP35 TRACTION OF AN IMPACTED MAXILLARY CENTRAL INCISOR

Inês Francisco, **Margarida Bastos Lopes**, António Bettencourt Lucas, Luísa Maló, Francisco do Vale, Department of Orthodontics, Faculty of Medicine of University of Coimbra, Portugal

AIM: Impaction of a permanent tooth is rarely diagnosed during the mixed dentition period. Nevertheless, general or paediatric dentists refer many patients with an impacted maxillary central incisor to orthodontists, because parents are concerned about this missing tooth. Andreasen *et al.* stated that the prevalence of impacted permanent maxillary central incisors has been estimated in a range between 0.06 and 0.2 per cent. This presentation aims to show a treatment of a clinical case with this situation.

SUBJECT AND METHOD: A 9-year-old girl with a vertically inverted and impacted central incisor.

RESULTS: The impacted maxillary central incisor was brought into correct alignment. After orthodontic treatment, the periodontal status of the incisor revealed an acceptable gingival contour and attached gingiva. The post-treatment radiograph showed no root resorption or periodontal bone loss.

CONCLUSIONS: The treatment approach for impacted maxillary teeth is a clinical challenge and requires the cooperation of dental specialties such as orthodontics, oral surgery, periodontics and prosthodontics. Combining the closed-eruption surgical technique with orthodontic traction may provide an effective approach for treating an impacted maxillary central incisor.

#### CP36 TREATMENT OF ADULTS WITH HIGH-ANGLE CLASS I AND II AND CLASS III OPEN BITE USING MINISCREWS AND MAXILLARY SKELETAL EXPANDER

**Ryuzo Fukawa**, Fukawa Orthodontic Office, Osaka, Japan

AIM: To introduce a Class I case treated with a maxillary skeletal expander (MSE) attached to four miniscrews for expansion of the maxilla and nasal cavity, and Class II and Class III open bite cases where intrusive forces were applied to the maxillary and mandibular posterior areas using miniscrews.

SUBJECTS AND METHOD: Lingual brackets (Ormco STb) were used in all cases. In the Class I patient, two (1.5 mm diameter, 11 mm long) OrthoAnchors were placed on each side of the palate to secure an MSE, which was activated twice daily for 20 consecutive days and retained for 6 months. In the Class II subject, a 1.3 mm diameter, 6 mm long miniscrew was placed in the posterior alveolar bone in each quadrant, palatally in the maxilla and buccally in the mandible. In the Class III case, a miniscrew of the same size was inserted in the buccal posterior alveolar bone in each quadrant for anchorage in space closure.

RESULTS: In the Class I non-extraction case, harmony between the maxillary and mandibular arch widths was achieved with skeletal expansion of the maxilla. In the Class II extraction case, the maxillary and mandibular posterior areas were intruded effectively using OrthoAnchors during space closure. In the Class III extraction case, use of OrthoAnchors allowed for intrusion of the mandibular posterior area and uprighting of the mandibular incisors without point B advancement, resulting in closure of the open bite. The mandibular plane rotated closed in all these high-angle cases, producing dramatic facial changes and added benefits of airway and tongue position improvements.

CONCLUSIONS: Adult high-angle Class I, Class II, and Class III open bite cases were treated using OrthoAnchors as temporary anchorage devices to achieve improvements in occlusal relationship, as well as in facial profile and tongue position associated with airway volume increase. Particularly in the Class III open bite case, cephalometric comparison revealed uprighting of the mandibular anterior teeth with bending-like elevation of the surrounding alveolar bone (alveolar migration effect).

#### CP37 MANDIBULAR GROWTH OF CLASS II DIVISION 1 WITH SEVERE OVERBITE TREATED BY OCCIPITAL HEADGEAR AND THREE-PIECE BASE ARCH MECHANICS

Hatice Gokalp, **Asli Senol**, Department of Orthodontics, Ankara University Faculty of Dentistry, Turkey

AIM: To present a patient with a Class II division 1 associated with a deep overbite treated with high pull occipital headgear and three-piece base arch mechanic.

SUBJECT AND METHOD: An 11 year old adolescent boy at the time of consultation. His chief complaint was the unaesthetic appearance of his smile. He also mentioned frequent irritation of his palate, as well as having difficulty eating sunflower seeds. He had a symmetrical, brachyfacial pattern. The profile was convex with a retrognathic mandible. The chin-throat angle was hard to identify. The patient had a Class II division 1 malocclusion associated with a deep overbite in the late mixed dentition stage. According to Steiner analysis, the maxilla was prognathic (SNA, 83.5°) and the mandible was severely retrognathic (SNB, 77°; ANB: 5.5°). The treatment objectives for this patient were to improve facial aesthetics, reduce the overbite and overjet; and place the buccal segments in a Class I relationship. Because he was an adolescent with significant growth potential, to assist in establishing the treatment goals, occipital high pull headgear was applied by an appliance covered with acrylic.

RESULTS: This approach allowed forward growth of the maxilla to be restricted and to provoke forward growth of mandible. After orthopaedic therapy, for intrusion of the upper anteriors and establishing an aesthetic view between the upper lip contour and incisors, three-piece base arch mechanics were used.

CONCLUSIONS: While maxillary orthopaedic force allowed for correction of the skeletal discrepancy, an ideal upper lip-incisor relationship was established by three-piece base arch mechanics.

#### CP38 TREATMENT OF MANDIBULAR MIDLINE ASYMMETRY WITH MANDIBULAR SURGERY AND SURGICALLY ASSISTED MAXILLARY EXPANSION WITH THE DRESDEN DISTRACTOR: A CASE REPORT

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**AIM:** Facial asymmetry is one of the most difficult malocclusions to treat and to maintain stability in orthodontics. The aim of this case report is to present the surgical and orthodontic treatment of an adult with severe mandibular asymmetry and an unaesthetic facial appearance.

**SUBJECT AND METHOD:** A 25-year-old male with the chief complaints of facial asymmetry and an unaesthetic smile. The patient had suffered mandibular trauma at 6 years of age. Clinical examination revealed that he had severe facial asymmetry, a concave profile, a dolichocephalic facial pattern, an anterior crossbite and a posterior crossbite in the right region. The mandibular midline was not coincided with facial midline and the chin was positioned to the right side according to the facial midline. The mandibular midline was shifted 6 mm to the right. Cephalometric measurements, supporting the clinical examination findings, revealed a high angled skeletal pattern (GoGn/SN, 38.5°; ANS-Me, 78 mm). Although the patient had a concave profile, he was diagnosed as skeletal Class I (SNA, 84°; SNB, 83°; ANB, 1°). Evaluation of the anteroposterior cephalometric radiograph with Grummons postero-anterior analysis revealed that the mandible was deviated 8 degrees to the right side according to the skeletal midline. The treatment objectives were to eliminate the posterior crossbite and dark buccal corridors and to correct the mandibular midline discrepancy. Treatment progress was expansion of the maxilla with surgically assisted rapid maxillary expansion (SARPE) using a Dresden distractor for skeletal anchorage. After that, mandibular rotation and set-back were performed by sagittal split mandibular surgery (SPMS) both to arrange the facial midline and to establish an ideal overjet and profile.

**RESULTS:** The transverse discrepancy and mandibular asymmetry were eliminated by SARPE and SPMS combined with orthodontic treatment. An Angle Class I occlusion, ideal overjet/overbite and an aesthetic profile was established.

**CONCLUSIONS:** SARPE and SPMS are a successful treatment combination in adult patients for correcting skeletal discrepancy in the sagittal and transverse dimensions.

#### CP39 ERUPTION OF A PALATALLY IMPACTED CANINE WITH A FISH ROD SPRING: A CASE REPORT WITH A NEW METHOD†††

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**AIM:** The impaction of maxillary permanent canines in the palatal region is a common clinical problem in orthodontics. Although some cases have iatrogenic origins, aetiological factors such as transverse maxillary deficiencies, dentoalveolar discrepancies, prolonged retention of primary canines and physical obstacles also lead to this clinical problem. The aim of this case report is to describe the orthodontic treatment for the eruption of an impacted right maxillary canine with a new method: the fish rod spring.

**SUBJECT AND METHOD:** A 16 year old male with a complaint of an impacted canine. Intraoral clinical examination revealed that the patient had an Angle Class III molar relationship as well as an anterior crossbite. Cephalometric evaluation did not agree with a dental Class III relationship and classified the patient as skeletal Class I (SNA: 86.5°, SNB: 85°, ANB: 1.5°). As the right maxillary canine was absent in the arch, further radiographic examinations were carried out except periapical and panoramic radiographs. Cone beam computed tomography showed that the right maxillary canine was situated completely horizontal in a palatal position. Treatment planning consisted of fixed orthodontic treatment with a retruded maxillary arch to protrude the maxillary dental arch as a block to obtain an Angle Class I molar relationship as well as an ideal overjet. After a Class I molar relationship was obtained, the impacted canine was directed into the arch with a removable unit, called the fish rod spring which was inserted in the sheathed bands on the maxillary molars from the palatal side with a spring attached on the anterior part of the removable unit with composite. The unit was bent from 1 mm stainless steel in form of the maxilla and the spring bent from Australian wire of 0.16 mm diameter. The spring was activated monthly.

**RESULTS:** At the end of the treatment, the palatally impacted canine was erupted and placed into the dental arch. There was no mobilisation or any complaints.

**CONCLUSIONS:** The fish rod spring is a successful new alternative treatment method for impacted canines which did not cause root resorption. This easy and effective method should be taken into consideration in cases of impacted canines.

**CP40 ORTHOPAEDIC-ORTHODONTIC TREATMENT OF AN ANGLE CLASS II MALOCCLUSION WITH AN ANTERIOR OPEN-BITE: CASE REPORT**

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**AIM:** To present the orthodontic treatment of a subject with a skeletal Angle Class II malocclusion with a severe anterior open-bite (AOB).

**SUBJECT AND METHOD:** A 9 year 6 month old female referred with the chief complaint of a severe AOB. Clinical examination showed a dental Angle Class III relationship, a crossbite in the right and left posterior regions and an AOB of 2 mm. When asked, the patient confirmed that she had a thumb sucking habit in the past, which was obviously the main cause of the AOB. Pre-treatment cephalometric evaluation indicated SNA: 77°, SNB: 71°, ANB: 6° and SN/GoGn: 48°. Congenital absence of the upper and lower left second premolars could be seen on the panoramic radiograph. The patient showed no signs of temporomandibular joint dysfunction.

**RESULTS:** A custom-made acrylic orthodontic expander was fabricated. The occlusal surfaces of the upper posterior teeth were fully covered with acrylic and an additional acrylic part was added to the anterior region in order to generate a tongue thrust habit breaking function. The expansion screw of the removable appliance was activated twice a week, creating 0.25 mm of activation each time, until the bilateral posterior crossbite was eliminated. Occipital headgear was used with this appliance to control posterior vertical growth. Moreover, the patient was asked to practice lip training exercises in order to compensate for the lip incompetence. After 9 months of active functional and orthopaedic treatment, the AOB was eliminated; a 2 mm overbite was obtained. Cephalometric evaluation showed obvious improvements in all skeletal parameters (SNA: 77.5°, SNB: 73°, ANB: 4.5°, SN/GoGn: 43°).

**CONCLUSIONS:** Successful orthopaedic treatment can be undertaken in growing patients with the use of removable orthodontic appliances. The orofacial musculature and oral habits may have crucial effects on orthodontic malocclusions, therefore it is vital to diagnose accurately and perform the appropriate treatment plan.

**CP41 CONE-BEAM COMPUTERIZED TOMOGRAPHY ASSESSMENT OF BUCCAL BONE AFTER CONSECUTIVELY MAXILLARY EXPANSIONS AND CONSTRICTIONS: A PRELIMINARY CLINICAL STUDY**

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**AIM:** Rapid palatal expansion routinely used to correct transverse deficiencies in the maxilla tends to result in buccal maxillary alveolar bending. Recently, a new protocol named alternate rapid maxillary expansions and constrictions has to obtain maxillary expansion in addition to maxillary protraction. However, it is not well-known whether this procedure causes alveolar bending or not. The aim of the study was to assess the effects of consecutively rapid maxillary expansions and constrictions (CRMEC) on buccal alveolar bone thickness and buccal alveolar bending by cone-beam computerized tomography (CBCT) scans.

**MATERIALS AND METHOD:** CBCT scans taken from six adolescents with Class III malocclusions associated with maxillary sagittal and transverse deficiencies treated by CRMEC. After obtaining ethical approval from ethical committee of Ankara University, CBCT scans were obtained before and after CRMEC. The patients were treated with a banded type double hinge maxillary expander. In the first week, appliance was opened twice in the morning and twice in the evening. During the second week, it was closed similarly. The daily opened/closed amount was 1 mm. The process was continued consecutively during 7 weeks. At the end of 7 weeks, both processed were ended by opening of the screw and the required expansion was obtained. Stabilization was undertaken with a transpalatal arch or quadhelix for at least 3 months after expansion. The scans were imported, and cross-sectional slices were made. The slices were coronal bisections through the buccal grooves and

the palatal roots of the upper first molars. Transverse and angular measurements were recorded for each scan. Descriptive statistics were obtained for each measurement before and after CRMEC. Data were compared with the Wilcoxon non-parametric rank test.

**RESULTS:** On the right side, the maxillary palatal bone width at the level with the middle of the first molar palatal root was statistically significant decreased. On the left side, the maxillary palatal bone width at the level of the root apex of the first molar was statistically significantly decreased.

**CONCLUSIONS:** In the light of these findings, it is stated that CRMEC protocol also causes maxillary buccal tooth bending.

#### CP42 BILATERAL MANDIBULAR DISTRACTION OSTEOGENESIS TREATMENT OF A SKELETAL CLASS II MALOCCLUSION: A CASE REPORT

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**AIM:** Mandibular distraction osteogenesis has been widely adopted in modern maxillofacial surgery due to its less invasive approach and the consistent aesthetic and functional improvements obtained. This case report presents the treatment of mandibular retrognathism with an internal bilateral mandibular distraction device

**SUBJECT AND METHOD:** A 15.11 year old female with the complaint of mandibular retrognathism. She had an Angle Class II molar and canine relationship, a 13.5 mm overjet and 5.5 mm overbite. Cephalometric evaluation revealed a retrognathic mandible with an ANB angle of 9 degrees and a low angle pattern. Hand-wrist radiograph showed that the patient was in the Ru stage.

**RESULTS:** Orthodontic treatment was performed with mandibular first premolar extractions. The internal mandibular distraction device was surgically implanted under general anaesthesia. Distraction of 1 mm per day was applied following a one-week latency period. Activation of 14.5 mm of distraction was applied until a Class I canine relationship was established.

**CONCLUSIONS:** After a total treatment period of 2 years 7 months, a skeletal and dental Class I relationship and a well-balanced profile was obtained

#### CP43 SEVERE FACIAL ASYMMETRY DUE TO UNILATERAL CONDYLAR OVERGROWTH: A CASE REPORT

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**AIM:** Unilateral condylar overgrowth induces severe facial asymmetry. Therefore, treatment focuses on both elimination of the condyle lesion and correction of facial asymmetry. This case report presents the combined orthodontic and surgical treatment of facial asymmetry due to unilateral condylar overgrowth.

**SUBJECT AND METHOD:** A 17 year 7 month old female with the complaint of increasing facial asymmetry. She had an Angle Class I relationship on the right and an Angle Class III relationship on the left, a 2 mm overjet and a 2 mm overbite with a mandibular dental midline shift of 3.5 mm to the right. Lateral cephalometric evaluation revealed a skeletal Class I and normodivergent pattern. Postero-anterior cephalometric evaluation showed that an occlusal cant was present. More activation was observed in the left condyle zone in a single photon emission computerized tomography scan when compared with the patient's right side.

**RESULTS:** Condylar and orthognathic surgery following non-extraction orthodontic therapy was planned. After 1 year 7 months of orthodontic treatment, the growth zone in the left condyle was removed under general anaesthesia. The asymmetric growth was stopped after removal of the left condyle zone.

**CONCLUSIONS:** Asymmetry and single sided growth was eliminated after the treatment period. A well balanced profile was achieved after the combined surgical and orthodontic treatment.

#### CP44 BONE REGENERATION BY ORTHODONTIC TOOTH MOVEMENT– A 4-YEAR FOLLOW-UP OF A CASE WITH CONE-BEAM COMPUTED TOMOGRAPHY

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**AIM:** To evaluate the long-term stability of orthodontic bone regeneration at the early edentulous alveolar bone region of a case 4 years after orthodontic treatment.

**SUBJECT AND METHOD:** Four years after finishing orthodontic treatment a cone beam computed tomograph was taken to determine third molar extractions for the same case. Tomographic images and measurements were also used to evaluate the long-term stability of orthodontic bone regeneration at the early edentulous alveolar bone region. The previous orthodontic treatment included moving the tooth 34, 10 mm mesial through the edentulous alveolar bone defect, which showed severe buccolingual and moderate vertical bone loss.

**RESULTS:** No alveolar bone collapse was observed; the bone at the early edentulous region retained its stability in quality and quantity.

**CONCLUSIONS:** As long as orthodontic tooth movement is performed within the genetically determined boundaries of the jaw, the tooth will maintain the original height of its supporting connective tissue attachment level and its alveolar bone height. The regenerated bone due to orthodontic tooth movement at the bone defect regions shows long-term stability.

#### CP45 SURGICALLY ASSISTED ORTHODONTIC PROCEDURES FOR IMPROVED CLINICAL EFFICIENCY

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**AIM:** To describe surgically assisted orthodontic procedures to help overcome issues such as patient compliance, duration of treatment and biological limitations in orthodontic treatment of adult patients.

**SUBJECTS AND METHOD:** Four patients with a thin periodontal biotype who had undergone orthodontic treatment in conjunction with selective alveolar decortication combined with hard and/or soft tissue grafting were investigated on the pre- and post-treatment condition of the periodontium. The subjects were evaluated in terms of treatment duration and periodontal condition using cone beam computed tomographic (CBCT) images obtained at two different time points: before and at least 6 to 9 months after surgically assisted orthodontic procedures. A single examiner compared the pre- and post-treatment CBCT images

**RESULTS:** Treatment time was reduced to one-third or one-fourth of the time of conventional orthodontics. There was an increase in volume and thickness of periodontal tissues in all patients at the end of the treatment compared with the initial situation. Stability of the augmented areas was evidenced on CBCT images.

**CONCLUSIONS:** Surgically assisted orthodontic procedures remain the safest and most effective method to accelerate tooth movement of all methods currently proposed. The technique gives the orthodontist the ability to extend the limits of orthodontic therapy by reshaping and improving the architecture of the alveolar base and reducing the incidence of associated side effects. Combining corticotomies with hard and/or soft tissue grafting appears to be an effective method to decrease the risk of marginal bone resorption and fenestration when the tooth is tilted or moved towards the cortical plates. The use of corticotomies as a routine intervention would be unjustified in terms of costs versus benefits when we report only the total duration of orthodontic treatment; the main benefit of surgically assisted orthodontic treatment should be evaluated from the perspective of decreasing side effects and risks associated with orthodontic treatment in adults. Surgically assisted orthodontic treatment is not an indication for all cases and it cannot replace orthognathic surgery for those with severe skeletal discrepancies.

#### CP46 PREMOLAR DISTALIZATION USING A MODIFIED PENDULUM APPLIANCE: A CASE REPORT

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**AIM:** To present the effects of a modified pendulum appliance for premolar distalization in a unilateral upper first molar extraction case.

**SUBJECT AND METHOD:** A 13-year-old male patient whose chief complaints were upper midline deviation and a palatally displaced upper right lateral incisor. Clinical and cephalometric examination confirmed that he had a dental Class II subdivision malocclusion on the left side with upper anterior crowding and a 3 mm upper midline discrepancy to the right. His upper left first molar has been over-extruded (due to an eruption problem in the lower left molar region). It was decided to extract the over extruded upper left molar and distalize the left premolars with a modified pendulum appliance to correct the upper midline discrepancy and crowding. First and second premolars were cemented together in a single molar band and the TMA spring of the pendulum appliance applied directly to the sheath of this molar band.

**RESULTS:** Total treatment time was 1 year 6 months. Class I molar and canine relationships, midline harmony, optimal overjet and overbite with optimal alignment of both arches were obtained. There was no significant upper incisor protrusion (U1-FH: t0:110°-t1:111°).

**CONCLUSIONS:** A modified pendulum appliance can be a good treatment choice for upper premolar distalization in selected cases.

#### CP47 INTRUSION OF POSTERIOR TEETH USING TITANIUM MINIPLATE ANCHORAGE ASSISTED BY A MODIFIED BONDED HYRAX: A CASE REPORT

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**AIM:** To present the treatment of a patient with an anterior open bite (AOB) using zygomatic miniplates assisted by a modified bonded hyrax.

**SUBJECT AND METHOD:** An 18 year-old female with the chief complaint of an AOB. She had a skeletal and dental Class I, minimal crowding in the lower arch and a 4 mm AOB. During smiling, there was 100 per cent incisor display with a posterior gummy smile. In addition lateral cephalometric analysis showed an increased vertical dimension (FMA: 34.3 degrees). Titanium miniplates were placed bilaterally to the zygomatic buttress. A bonded hyrax was used as this had less buccal tipping of the maxillary molar during intrusion. To correct possible buccal tipping, the screw was activated two turns before the bonded hyrax was produced. After placement of the bonded hyrax, the AOB was measured again and noted as 11 mm. A force of 200 g was applied unilaterally with 9 mm nickel titanium springs between the vertical extension of the plate and hooks which were added to acrylic base of the hyrax.

**RESULTS:** The maxillary molar teeth effectively intruded without any buccal tipping. Smile aesthetics were improved. A normal overjet and overbite were achieved. Cephalometrically, the vertical dimension was decreased (FMA: 32.1 degrees). Cephalometric superimposition confirmed that there was no upper incisor extrusion.

**CONCLUSIONS:** The presented method can be used since there are fewer complications during intrusion and satisfactory results in occlusion and smile aesthetics.

#### CP48 EFFECTS OF RAPID MAXILLARY EXPANSION WITH TWO PALATAL MINISCREWS IN A PREADOLESCENT PATIENT: CASE REPORT

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**AIM:** To evaluate the effects of rapid maxillary expansion (RME) with two palatal miniscrews in a preadolescent patient.

**SUBJECT AND METHOD:** An 11 year-old female referred with the chief complaint of retrusion of the upper anterior teeth. Cephalometric and posteroanterior (PA) radiography were used to compare the differences between the initial and final skeletal and dental structures after RME application. ANB: -3.0°, Wits appraisal: -9.8 mm, intermolar width (upper): 62.4 mm and nasal width: 23.2 mm, maxillary width: 70.5 mm were found on initial cephalometric tracing. The RME appliance was activated two turns per day for three weeks until adequate expansion was obtained.

RESULTS: Final evaluation of the cephalometric and PA radiographs showed: ANB:  $-1.4^\circ$ , Wits appraisal:  $-8.3$  mm; intermolar width (upper): 68.7 mm and nasal width: 25.7 mm. The maxillary width was 76.0 mm. The posterior crossbite was treated with hybrid RME appliance.

CONCLUSIONS: RME appliances are used for maxillary constriction. They are especially effective in preadolescents who have narrow maxilla. In this patient, RME appliances with palatal miniscrews provided skeletal anchorage, minimized dental tipping and solved a posterior crossbite problem.

#### CP49 CASE PRESENTATION OF THE 39TH POSTGRADUATE ORTHODONTIC COURSE IN TOKYO DENTAL COLLEGE

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AIM: Tokyo Dental College postgraduate training course of orthodontics established in 1975 had 319 students graduated as at the end of March, 2016. This course is aimed at training of orthodontic specialists. A 3-year curriculum has been set in order to study the basic diagnosis, treatment, and evaluation method on orthodontic treatment for acquisition of the physician qualification certificate. Particularly with regard to clinical skills, we primarily conduct treatment and management of functional appliance and fixed device out of jaw in the first stage and learning pre-adjusted appliance in the second phase of treatment (including surgical orthodontics). Cases are included of jaw deformity, lip chin cleft palate, various syndrome, periodontal disease, temporomandibular joint disease. Upon further graduation of training, one set of research papers and clinical trial example four cases, the report of one case of more than two years of retention are required. This presentation will report on the 40 cases of clinical trial example submitted by 10 graduates who completed the postgraduate training course in March, 2016.

MATERIALS AND METHOD: Forty clinical trial example cases before treatment, cases after treatment and the cephalometric, facial and intraoral photographs, submitted by 10 graduates. Sixteen were extraction cases, 14 non-extraction cases and 10 surgical orthodontic treatment (including tooth extraction cases: 2). The breakdown was: grade I, 13 cases in the Angle classification, grade II, 13 cases, grade III, 14 cases. Regarding gender, there were 11 males and 29 females. The dynamic treatment period, was on average 1 year 7 months (1 year 2 months to 2 years 11 months). The self-evaluation for the treatment for all 40 cases was using the Gottlieb's Grading Analysis.

RESULTS: Thirty cases were classified as 'good' and 10 cases as 'satisfactory'.

CONCLUSIONS: Students can achieve the basic knowledge and skills necessary for the present orthodontic treatment.

#### CP50 MULTIDISCIPLINARY APPROACH FOR A PATIENT WITH A UNILATERAL CLEFT LIP AND PALATE

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AIM: The oral rehabilitation of patients with a cleft lip and palate (CLP) is one of the most difficult challenges with which a clinician has to deal. The aim of this presentation is to underline the importance of a sequential interdisciplinary approach to correct functional problems and improve facial aesthetics of a unilateral CLP (UCLP) teenager.

SUBJECT AND METHOD: A 12.6 year-old female presented a right complete CLP with a Class II molar tendency, a full Class II canine on the right side, and a full Class II molar relationship with a canine Class I on the left. The maxillary arch had a bilateral crossbite with a lower midline deviation. The overbite and the overjet were decreased. The upper incisors were rotated towards the cleft side, the upper right canine was buccally ectopic, whereas both primary canines were still present. Severe crowding of about 10 mm was present in the upper arch, whereas mild crowding of 4 mm was observed in the lower arch. The panoramic radiograph showed transposed and anomalous shaped lateral incisors, an impacted upper left canine and a severely mesio-inclined lower left second molar. The patient was treated with maxillary expansion with the extraction of upper lateral incisors and lower first premolars.

**RESULTS:** The overall treatment objectives were achieved. The patient appeared with an improved smile and profile. The occlusion showed a well-aligned dentition with a Class I molar relationship, a consonant smile arch, and good tooth interdigitation. The crossbite and midline deviation were corrected and a normal overjet and overbite were achieved. The initial crowding was completely resolved in both upper and lower arches and the post-treatment panoramic radiograph showed good root inclination. Superimpositions revealed good sagittal and vertical control with the correction of upper and lower incisor inclination. The treatment lasted 3 years, and the patient was motivated and cooperative throughout. After 24-months retention, the occlusion was well maintained.

**CONCLUSIONS:** An interdisciplinary approach was necessary to plan the correct treatment and to achieve a proper occlusion and better aesthetics.

#### CP51 IMPACTED CANINES AND ORTHODONTIC TREATMENT – CASE REPORTS

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**AIM:** To show the successful surgical-orthodontic treatment of impacted upper canines.

**SUBJECT AND METHOD:** The boy was admitted in October 2013. He showed no signs of pain. Clinical examination and dental pantomographic recording confirmed that both permanent canines were positioned high in the maxilla. The patient underwent treatment with orthodontic appliances, in order to create more space for accommodation of the permanent canines. This was followed by surgical release, and treatment to bring the canines into a correct position in the dental arch.

**RESULTS:** After 30 months the canines were positioned correctly in the dental arch.

**CONCLUSIONS:** If the removal of impacted canine is not necessary due to ankylosis, external resorption or multiple dilacerations then the canine should be positioned in dental arch. The problems caused by impacted canines can be successfully resolved using orthodontic-surgical treatment.

#### CP52 CYSTIC MALFORMATION IN THE UPPER AND LOWER JAW: CASE REPORTS

**Katrien Jaeken**, Joseph Schoenaerts, Titiaan Dormaar, Maria Cadenas de Llano Pérula, Anna Verdonck, Katholieke universiteit Leuven, Belgium

**AIM:** To describe the treatment of a cyst malformation in the upper and lower jaw, observed in two patients, respectively.

**SUBJECTS AND METHOD:** The first patient was a 10 year-old boy, with no previous medical history. Medical files, radiographs and dental casts were collected. The panoramic radiograph revealed a cystic structure with widening and radiolucency in the maxillary sinus. The second patient was an 18 year-old girl, with no previous medical history, in retention follow-up after orthodontic treatment. When upgrading the medical files and collecting radiographs and dental casts a radiolucency was seen on the panoramic radiograph at the retromolar space. In both cases an additional cone beam computed tomograph (CBCT) as well as a biopsy were taken.

**RESULTS:** In the first case the CBCT confirmed an extensive radiolucency located in the left sinus. The histology report gave evidence of an inflammatory dentigerous cyst. The cyst was treated by marsupialization. After healing, orthodontic treatment was commenced and finished with satisfactory results. In the second case the CBCT showed a substantial radiolucency located in the right mandibular ramus. Histology revealed a giant cell reaction on the follicle of the lower right third molar. Treatment consisted of marsupialization with frequent recalls.

**CONCLUSIONS:** The use of radiographs, especially panoramic radiographs, in orthodontic practice is of great importance in the diagnosis of bone pathology without any clinical symptoms.

#### CP53 PREDICTION OF PERMANENT CANINE AND PREMOLAR WIDTH USING A NEW ANALYSIS WITH CALIBRATED DIGITAL DENTAL PANTOMOGRAM – PILOT STUDY

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AIM: To test a new method of prediction for the permanent canine and premolar width using calibrated a digital dental pantomogram (DPT).

SUBJECTS AND METHOD: This pilot study included seven patients all in the late mixed dentition at the time when the DPT was taken by the same person using the Soredex Cranex 3D X-ray DPT. Alginate impression were obtained in the mixed dentition and after the loss of all deciduous teeth. Two orthodontic specialists measured the teeth on the dental casts using digital callipers. Measurements were repeated after 7 days to test inter- and intra-examiner reliability. The same persons carried out the measurements on the DPT using Scannora Dental Imaging Software which was calibrated using the width of the second primary molar. The dimensions of the premolars and canines measured on DPT were compared with the exact dimensions of the teeth on the final dental cast and with prediction of Moyer's analysis.

RESULTS: Intraexaminer measurement error was small and acceptable ( $\leq 0.2$  mm for cast measurement,  $\leq 0.3$  mm for measurement of DPT). Intraclass correlation coefficient was very high  $\geq 0.91$ . The average discrepancy between Moyer's analysis and real tooth size was  $1.07 \pm 0.44$  mm and in all cases Moyer's analysis overestimated real tooth size. With calibrated DPT the average discrepancy was  $0.8 \pm 0.36$  mm, but this was reduced to just 0.4 mm if the rotated canine tooth was used for measurement of the contra-lateral side.

CONCLUSIONS: This pilot study showed that this new method had potential to replace Moyer's method and will give better prediction results of canine and premolar width. Prospective studies with a larger sample size will be conducted at a later period.

#### CP54 TREATMENT OF A POSTERIOR CROSSBITE WITH PALATAL MINISCREW AIDED RAPID MAXILLARY EXPANSION: CASE REPORT

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AIM: To present the treatment of a patient who had maxillary constriction treated with a hybrid rapid maxillary expansion (RME) appliance supported by palatal miniscrews.

SUBJECT AND METHOD: A 12 year-old female with the chief complaint of crowded upper anterior teeth. On clinical examination, a Class I molar and canine relationship, posterior crossbite and retrusion of upper lip were detected. Cephalometric evaluation showed: SNA:  $75.3^\circ$ , SNB  $73.3^\circ$ , ANB:  $2.0^\circ$ , U1-SN:  $103.2^\circ$  and IMPA:  $101.8^\circ$ . Maxillary width was 61.4 mm. A RME appliance supported by two palatal miniscrews was placed in the bilateral palatal paramedian area of the anterior maxilla. The appliance was activated twice a day until maxillary expansion was obtained. The retention period after RME was 3 months. Fixed orthodontic treatment was initiated using a self-ligating metal bracket in a 0.022 inch slot for 14 months.

RESULTS: The posterior crossbite was corrected at the end of the RME period. Final cephalometric evaluations showed: SNA:  $78.0^\circ$ , SNB:  $74.5^\circ$ , ANB:  $2.5^\circ$  U1-SN:  $104.4^\circ$  and IMPA:  $100.6^\circ$ . The maxillary width was 72.9 mm. The total treatment duration was 18 months.

CONCLUSIONS: A posterior crossbite was treated with hybrid RME appliance supported by two miniscrews. A satisfying improvement of the patient's facial profile was achieved.

#### CP55 SHORT-TERM TREATMENT OUTCOME OF A CLASS II MALOCCLUSION PATIENT WITH OVERGROWN ADENOIDS†††

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AIM: Existing studies claim that overgrown adenoids are one of main factors causing mouth breathing and when mouth respiration is continued for a long time, it causes changes in facial form and malocclusion of teeth by affecting growth of the facial skeleton and occlusion. The aim of this study was to evaluate the short-term treatment outcome using a prefabricated myofunctional appliance.

**SUBJECT AND METHOD:** An 11-year girl whose chief complaint was protrusion of the maxillary anterior teeth. Clinically, there was a bilateral Class II molar relationship, a 10 mm overjet and a 5 mm overbite, which were higher than average. During clinical examination, hyperactivity of the chin, cheeks and lip musculature was observed. A combined skeletal analysis following the analyses of Downs, McNamara, and Steiner was conducted. This patient was diagnosed with a Class II, division 1 malocclusion. The treatment plan aimed to reposition the mandible forward and improve the tooth position and slope of the dental axis. In the first stage, an appliance was used for at least 1-2 hours during the day and 10 hours at night. In order to analyze the results from the first phase of treatment, a cephalometric radiograph was taken after one year of treatment. The differences between cephalometric measurements before and after treatment were computed and analyzed.

**RESULTS:** The excessive overjet and overbite were improved. The mandibular position was moved forwards using the maxillary anterior teeth as an anchorage thus gaining an improvement of the axial angle.

**CONCLUSIONS:** This case report demonstrates a satisfactory outcome on Class II patients with overgrown tonsil and adenoids.

#### CP56 SINGLE TOOTH DENTO-OSSEOUS OSTEOTOMY AND CORTICOTOMY WITH A CAD/CAM SURGICAL GUIDE FOR SURGICAL ORTHODONTIC TOOTH MOVEMENT OF AN ANKYLOSED TOOTH

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**AIM:** Trauma-induced bony ankylosis that occurs during the growth period can hamper vertical growth of the alveolar bones. This condition results in an open bite that poses aesthetic and functional problems. A single tooth dento-osseous osteotomy and corticotomy may be the optimal treatment plan. Here, a method is introduced for performing a single tooth dento-osseous osteotomy and corticotomy with a surgical guide created with CAD/CAM technology.

**SUBJECT AND METHOD:** A 13-year-old female requiring treatment of an open bite in the anterior maxilla. She had a history of reduction, caused by trauma-induced avulsion of the maxillary central incisor. The maxillary central incisor was affected by bony ankylosis and could not be displaced even with orthodontic therapy. Thus, it was decided to distract it by cutting the central incisor area by a single tooth osteotomy. The osteotomy plan was based on a surgical simulation. Surgical guide design was based on pre-operative surgical simulation data. The surgical guide was then manufactured from biocompatible materials with a three-dimensional printer. The apical region of the maxillary central incisor was cut with a piezo saw, using a groove in the surgical guide. The maxillary incisor with bone segment was displaced to the planned position.

**RESULTS:** The maxillary central incisor bone segment was distracted towards the occlusal plane with an orthodontic device after surgery. The orthodontic movement was performed in consideration of the upper displacement and the axis of the tooth with orthodontic brackets. In the 6 month follow-up, there were no signs of gingival recession, and appropriate wound healing with adequate mobility was observed.

**CONCLUSIONS:** This method can assist surgeons in performing a single tooth dento-osseous osteotomy and surgical orthodontic tooth movement in bony ankylosis in the maxillary anterior teeth.

#### CP57 ECTOPIC ERUPTION OF CENTRAL INCISORS. USE OF CONE BEAM COMPUTED TOMOGRAPHY IN DIAGNOSIS AND TREATMENT PLANNING

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**AIM:** Cone beam computed tomography (CBCT) is a relatively new diagnostic technique, which combines low-dose radiation and high resolution imaging of the craniofacial complex in three dimensions. The most frequent clinical applications of CBCT in orthodontics include imaging of erupted and unerupted teeth, tooth root orientation, TMJ bony structures and condylar position, facial discrepancies such as asymmetries which require orthodontic-surgical treatment and

placement sites for temporary anchorage devices (TADs). The aim of this poster is to present two cases where CBCT contributed to diagnosis and treatment of ectopic eruption of central incisors.

**SUBJECTS AND METHOD:** Two boys with ectopic eruption of the maxillary left central incisor. In both cases, a CBCT was used to determine the exact position and orientation of the impacted incisor. The impacted incisors were severely inclined towards the anterior nasal spine at a 40- and 70-degree angle to the occlusal plane for the first and the second patient, respectively. Furthermore, in the second patient as the incisor presented with a severely dilacerated root angulated at approximately 180 degrees to the crown extraction of the tooth was decided. In the first patient, the incisor was surgically exposed and successfully brought into occlusion. Both patients underwent orthodontic treatment with edgewise appliances.

**RESULTS:** These cases confirm that CBCT is determinant in treatment planning of severe clinical problems and can be applied where two-dimensional techniques are insufficient. In the first patient three-dimensional (3D) imaging proved to be a valuable tool for the surgical approach in order to ensure proper access and indicate the direction of later orthodontic forces. In the second patient the information provided about the tooth's anatomy and inclination concluded to a very poor prognosis and subsequently extraction of the impacted incisor and mesial movement of all the dental units of the maxillary left quadrant was decided.

**CONCLUSIONS:** When conventional orthodontic radiographs cannot provide adequate information, CBCT is the imaging modality of choice. In ectopic eruptions cases the 3D information provided by a CBCT is considered of paramount importance for correct diagnosis and treatment planning.

#### CP58 TEMPORARY ANCHORAGE DEVICES: BIOMECHANICAL FACILITATORS IN ORTHODONTICS

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**AIM:** Traditionally, in orthodontics an overabundance of extra- or intraoral appliances have been used to control anchorage. However, the use of temporary anchorage devices (TADs) has recently become popular in a wide spectrum of clinical orthodontic approaches. Besides TADs being a device that provide absolute anchorage, they also offer many more advantages such as easy placement and removal, immediate loading, biocompatibility all in the context of non-compliance treatment. The aim of this poster is to present several cases where TADs were utilized in order to facilitate the biomechanics implemented in addressing severe discrepancies.

**SUBJECTS AND METHOD:** Several patients with different types of malocclusions all treated with different types of fixed appliances and TADs. TADs were used to achieve tooth movements such as molar intrusion; mesialization; distalization, correction of canted occlusal planes and vertical corrections.

**RESULTS:** The treatment goals achieved proved that TADs are indispensable treatment adjuncts in cases where maximum anchorage is required. In some of these cases the use of TADs offered other benefits such as making orthognathic surgery unnecessary, eliminating patient cooperation in elastic or headgear use and shortening overall treatment time.

**CONCLUSIONS:** Among the many tools available in modern orthodontics, TADs are considered a reliable choice, which can secure anchorage when needed. They can therefore be established as a necessary treatment option in complex cases that would have otherwise been very difficult to treat successfully.

#### CP59 ALVEOLAR CLEFT REPAIR BY UNILATERAL TRANSPORT DISTRACTION OSTEOGENESIS: A CASE REPORT

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**AIM:** The main treatment goals for cleft lip and palate (CLP) patients include providing dentoalveolar continuity and successful closure of the oronasal fistula. Different surgical procedures may be used for repair of cleft areas. Autogenous bone grafting is a commonly preferred method for treatment of

alveolar clefts. However distraction osteogenesis (DO) offers more successful results in patients who have a large cleft, or inappropriate oral mucoperiosteal flaps. The purpose of this report is to present a patient with a unilateral alveolar cleft successfully treated by transport DO.

**SUBJECT AND METHOD:** A 12 year old female with unilateral CLP with a severe alveolar defect on the left side. Lip surgery had been performed before orthodontic treatment. DO was used to close the cleft area by distraction of the left alveolar segment. Maxillary dentoalveolar expansion, eruption of the impacted canine and levelling of teeth were achieved before DO. Tooth-supported, custom made distractors were designed that included the canine, premolars and first molar teeth unilaterally. Distraction osteotomies were performed between the first and second premolars. Distraction activations were initiated five days after surgery at a rate of 0.6 mm/day until an 8 mm distraction was achieved. After the cleft space was closed, the distraction device was left *in situ* for 12 weeks to allow for bony consolidation.

**RESULTS:** After the consolidation period, bone grafting of the reduced alveolar defect was successfully performed. Space for the missing teeth was prepared for prosthetic restorations. Significant functional and aesthetic improvements were achieved.

**CONCLUSIONS:** The quality of life of the patient has been improved.

#### CP60 A HYBRID CANINE DISTALIZATION APPLIANCE: A CASE REPORT

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**AIM:** Canine teeth are important because of aesthetics, stability and function. Parallel tooth movement is quite difficult due to anchorage loss. There are many different protocols and force types in the literature about canine distalization. To avoid hyalinization with accelerated tooth movement is a general concern for orthodontists. The common idea is that interrupted forces are more biological than other force types. The purpose of this case report is to describe a new appliance for canine distalization.

**SUBJECT AND METHOD:** A 16 year old male with a complaint about crowded teeth. The canine teeth were high vestibularly and the molar relationship was Class II. It was decided to extract the two first premolars after cephalometric and clinical evaluation. The maxillary arch was bonded segmentally and first molars were banded. Miniscrews were placed between the first and second molar to provide maximum anchorage. A hybrid canine distalization appliance was used to produce a force of 210 g for each activation with interrupted force. The patient turned the screw twice every three days at the same time for 15 weeks.

**RESULTS:** Treatment was completed when a Class I canine relationship was achieved. There was no anchorage loss at the first molars. All teeth were bonded for levelling after the distalization period and the appliances and miniscrews were removed.

**CONCLUSIONS:** The hybrid appliance can be new option for orthodontists in canine distalization.

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#### CP61 EVALUATION OF FIXED SLOW MAXILLARY EXPANSION IN YOUNG ADULTS USING CONE-BEAM COMPUTED TOMOGRAPHY

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**AIM:** To evaluate the changes after fixed slow maxillary expansion (SME) in young adults who had maxillary transverse deficiency.

**SUBJECTS AND METHOD:** Transverse skeletodental changes in the maxillary first premolar and first molar regions were evaluated. All patients underwent SME with a Hyrax-type expander. Measurements related to the maxillary transverse width were performed using superimposed images.

RESULTS: SME increased the root tip width, furcation width, central fossa width, basal bone width, nasal cavity and palatal width, buccal bone width as well as tooth angulations, and decreased the height of the buccal alveolar crest and buccal cusp tip in the interpremolar and intermolar regions.

CONCLUSIONS: After SME in young adults, there was transverse maxillary expansion in the interpremolar and intermolar regions. Considering the mean amount of expansion in this study and no clinically significant side effects, SME could be a way to resolve maxillary transverse deficiency in young adults.

#### CP62 THE CHALLENGE OF ALIGNING A DEEP PALATAL IMPACTED MAXILLARY CANINE WITH SURGICAL EXPOSURE IN A PATIENT WITH LATERAL INCISOR HYPODONTIA

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AIM: To show the challenges of aligning a rotated impacted maxillary canine with a very limited technique.

SUBJECT AND METHOD: A 24 year old female who requested treatment only in the upper jaw. Following 8 months of treatment to prepare the arch and create space, surgical exposure using an open flap technique; bone was removed and the flap was sutured. The canine was deep so the bracket was bonded with an eruption chain (Forestadent, Pforzheim, Germany) to facilitate traction. The chain was ligated in the stainless steel wire and pulled with light forces. The total treatment time was 36 months to reposition the canine, align, level and rotate and add a prosthetic crown to replace the missing lateral incisor

RESULTS: Treatment resulted in a nice alignment with optimum results considering the early extraction of 14 and hypodontia of 22. The results included an intact, properly functioning occlusion, pleasing aesthetics, as well as healthy periodontal supporting tissues.

CONCLUSIONS: By creating space and then exposing surgically with direct bonding of an eruption chain, the canine can be brought safely into a correct position with predictable results.

#### CP63 IMPLEMENTATION OF ALTERNATE RAPID MAXILLARY EXPANSION AND CONSTRICTION PROCEDURES IN A SKELETAL III MALOCCLUSION BASED ON MAXILLARY RETROGNATHIA

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AIM: To present two cases treated with the alternate rapid maxillary expansions and constrictions (Alt-RAMEC) procedure for maxillary retrognathia.

SUBJECTS AND METHOD: Case 1: A 16-year-old male with a complaint of inferiority of the upper jaw. According to cephalometric analysis ANB, SNA and Max1-SN angles were measured as  $-1.7$ ,  $+73.0$  and  $+92.7$  degrees, respectively. Vertebral growth age assessment revealed that the patient had completed the growth spurt. Considering the skeletal age of the patient, the application of Alt-RAMEC was planned because using a facemask together with rapid maxillary expansion was considered to be insufficient. At the end of the procedure ANB, SNA and Max1-SN angles were measured as  $+1.2$ ,  $+75.4$  and  $+93.1$  degrees, respectively. Case 2: A 16-year-old male complained of discordance between the lower and upper jaws. According to cephalometric analysis ANB, SNA and Max1-SN angles were measured as  $-2.2$ ,  $+80.0$  and  $+104.2$  degrees, respectively. The hand wrist radiograph was shown that growth had been completed. As in the other patient, the Alt-RAMEC procedure was deemed appropriate for this patient. At the end of the procedure, the ANB, SNA and Max1-SN angles were measured as  $+2.17$ ,  $+82.0$  and  $+105$  degrees, respectively.

RESULTS: As a result of the applied treatment, an increase of 2.9 degrees in the first case and 4.3 degrees in the second case was obtained at the ANB angles. The mandible underwent some posterior rotation. There has not been a change in the cut-off angle.

CONCLUSIONS: For these two patients whose growth spurt was over, the upper jaw moved forward conservatively without the need for surgery. The skeletal Class III relationship was changed to a Class I. The facial aesthetics of the patients were provided and their expectations were met.

CP64 MULTIDISCIPLINARY TREATMENT OF A PATIENT WITH TWO MESIODENS: A CASE REPORT

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**AIM:** A mesiodens is a supernumerary tooth located in the maxillary central incisor region which can delay or prevent eruption of the central incisors and cause ectopic eruption, displacement or rotation of a central incisor and labially displaced incisors. The purpose of this study is to show a patient who had two mesiodens that caused crowding.

**SUBJECT AND METHOD:** A 9-year-old male with complaints of two excessive central teeth. Intraorally it was found that the two mesiodens had caused axial rotation of the permanent central incisors. According to information received from the patient, he had limited financial resources and was not able to pay for orthodontic treatment. Initial intraoral photographs were taken and upper and lower measurement models were carried obtained. Removable appliance therapy was planned that included a modified vestibular arch with buttons placed on the teeth that did not require to be moved. The central tooth was rotated 90 degrees and mesialised and space opened for the permanent canine.

**RESULTS:** Before the patient's permanent dentition period, treatment was performed conservatively and at low-cost. The patient's aesthetic requirement was achieved.

**CONCLUSIONS:** Early diagnosis is crucial for effective and low-cost conservative treatment. Patients must be treated with an interdisciplinary approach in order to achieve this. Therefore, paediatric dentistry is important for early diagnosis.

CP65 IMPORTANCE OF EARLY DIAGNOSIS IN A GENETIC SKELETAL CLASS III-CIRCULAR OPEN BITE: A CASE REPORT

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**AIM:** Skeletal Class III open bite cases are difficult to treat orthodontically if the anomaly is not corrected in the stage of growth and development. Orthognathic surgery gives good results in cases that cannot be corrected orthodontically. Inheritance plays an important role in the formation of bad habits and tongue thrust and it is habit that causes anomalies needs to be corrected.

**SUBJECT AND METHOD:** A 13-year-old male patient with a narrow maxilla, mandibular prognathism, and a circular open bite which was 3 mm at anterior region. Class III is hereditary and increased by tongue thrusting. A facemask was used with a rapid palatal expander device in the first month exerting a force of 400-500 g. Two months later a 2.5 mm overjet was obtained and the appliance was left *in situ*. A vertical holding appliance, with a tongue inhibitor, was designed for constant treatment and chin cup use was continued. In the first stage of treatment planning, facemasks and vertical chin cups were used to inhibit maxillary incompetence and excessive mandibular growth. In the second stage, treatment with fixed mechanics was planned to provide a Class I canine and molar relationship.

**RESULTS:** Superimposition of the pre- and post-treatment cephalograms showed an anterior-downward direction of the upper jaw, and the lower jaw moved backwards and forwards. There was an increase in SNA angle and upper incisor axis and a decrease in SNB angle and the vertical dimensions. When the changes in the soft tissues were examined, the upper lip was forward and the lower lip had moved backward.

**CONCLUSIONS:** The case, with a high probability of surgery, was treated more conservatively with early diagnosis, correction of the bad habit and co-operation.

CP66 CARDIOVASCULAR DISORDERS AND ORTHODONTIC PROCEDURES

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**AIM:** Considerations in orthodontic patients with cardiovascular disorders.

**MATERIALS AND METHOD:** The current bibliography was thoroughly reviewed for the latest developments in the field of cardiovascular disorders which have an effect on orthodontic treatment.

**RESULTS:** According to the bibliography, some orthodontic procedures, especially banding and debanding, may induce bacteraemia. For patients with certain cardiac disorders (i.e.: endocarditis, prosthetic cardiac valve or prosthetic material used in valve repair, congenital heart diseases and cardiac transplantation recipients) this may cause serious implications. Also, patients with hypertension who take calcium-channel blocking drugs may have gingival hyperplasia which can affect orthodontic treatment.

**CONCLUSIONS:** The orthodontist should be aware of the cardiovascular disorders which affect the course and outcome of orthodontic treatment and be able to efficiently manage them in order to avoid any complications.

#### CP67 NON-SURGICAL TREATMENT OF SKELETAL OPEN BITES WITH THE USE OF MINIPLATES

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**AIM:** To present a different non-surgical treatment approach for the treatment of a skeletal anterior open bite (AOB) in adults

**SUBJECTS AND METHOD:** Three female adults aged 24, 24 and 25 years, respectively with an initial diagnosis of a skeletal AOB. Their initial, progress and final facial and intraoral photographs as well as the initial and final lateral cephalograms with superimposition on three different levels, were studied and compared on the computer.

**RESULTS:** There was a correction of the AOB, an improvement (reduction) of the mandibular plane angle (FH-mandibular plane), an improvement of the canting of the occlusal plane, a reduction of lower anterior face height and a striking improvement of the facial profile and facial aesthetics in general.

**CONCLUSIONS:** Use of miniplates for the correction of a skeletal AOB in adults provides very similar treatment results obtained by surgical correction of these cases with a promising stability two years post-treatment.

#### CP68 EVIDENCE-BASED AETIOLOGY OF SUPERNUMERARY TEETH: REPORT OF TWO FAMILIES WITH AFFECTED FAMILY MEMBERS

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**AIM:** Supernumerary teeth, a dental condition presenting in addition to the normal complement of teeth, occur as frequently as up to 3.8 per cent. While theories such as dichotomy of the tooth bud and hyperactivity of the dental lamina exist, the genetic factor increasingly appears to play a major role in the aetiology of the condition. The aim of this poster is to support the genetic hypothesis by presenting two family related individuals with supernumerary teeth.

**SUBJECTS AND METHOD:** The first group of patients (A) comprised two preadolescent brothers with unerupted maxillary central incisors. On evaluation of the panoramic radiographs each brother was found with two supernumerary teeth at the anterior maxillary region. The second group (B) comprised two preadolescent boys, offspring of two brothers. The panoramic radiographs showed three supernumerary teeth in the anterior maxillary region of one of the cousins and a mesiodens in the other one. All patients sought orthodontic treatment.

**RESULTS:** All patients underwent maxillary surgery, which aimed at the removal of the supernumerary teeth. In group A the patients are seen on a 6 month recall basis in order to assess the need for orthodontic treatment. In group B orthodontic treatment was accomplished with the use of cervical headgear and fixed appliances for the first boy and fixed appliances for the second one.

**CONCLUSIONS:** A comprehensive report of the literature reveals that the supernumerary tooth forming process, as part of a syndrome, involves the APC, RUNX2, TRPS1 and other WNT family genes. While the genetics of non-syndromic supernumerary teeth remain to be elucidated, clinical

evidence suggests a strong genetic link and can greatly enhance our understanding of the condition. Supernumeraries are more common in the relatives of affected individuals than in the general population. As clinicians we should be on the lookout for familial cases for early detection of associated anomalies, to better manage our patients and to provide the relevant clues for genetic association studies.

#### CP69 THREE-DIMENSIONAL EVALUATION OF CLASS III TREATMENT OF A 6 YEAR OLD BOY WITH THE FRÄNKEL FUNCTION REGULATOR III MODIFIED APPLIANCE

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**AIM:** To objectively demonstrate the changes of soft tissues after use of a Fränkel functional regulator III (FFR III) modified appliance (Farčnik, 2008) of a skeletal Class III malocclusion.

**SUBJECT AND METHOD:** Clinical examination of the 6 year old boy revealed a Class III facial appearance in the middle third of the face, an anterior crossbite, a Class III molar relationship, a unilateral posterior crossbite on the right side, midline deviations intraorally, a Class III relationship skeletally and normal growth type. Treatment consisted of full-time wear of the FFR III modified appliance for about 2 years. The patient showed a good level of compliance. Pre-treatment (T0) and 2 year (T1) follow-up facial surface images were obtained, using stereophotogrammetry (3dMD system). The facial appearance and soft tissue analysis were then assessed, by superimposing the faces at T0 and T1. Due to growth a new FFR III modified appliance was made and worn full-time. After 2 years a Class I molar relationship was achieved and no midline deviations were present. Three-dimensional scans were taken at T0 and T1. The facial soft tissue differences were assessed qualitatively and quantitatively. The shell to shell differences were measured and the average distances between the observed regions were calculated at T0 and T1. A colour deviation map was generated to show shell-shell deviations of the superimposed images

**RESULTS:** A positive overjet and overbite were achieved in 9 months. In the following year the posterior crossbite was corrected. Changes were greatest in the middle region. Changes in the nose and upper lip regions were smaller than those in the lower lip and chin region. The result was an improvement of the mid-facial retrognathic appearance.

**CONCLUSIONS:** Treatment of Class III in the early mixed dentition is necessary to create conditions for normal occlusal and facial development. With facial surface images accurate measurements of facial morphology and changes associated with treatment were achieved.

#### CP70 TREATMENT OF UNILATERAL FUNCTIONAL POSTERIOR CROSSBITE – A LONG-TERM FOLLOW-UP

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**AIM:** To present and objectively evaluate the long-term follow-up of soft tissue and palatal volume changes after orthodontic treatment of a unilateral functional posterior crossbite with palatal expansion in the early mixed dentition using a non-invasive three-dimensional (3D) method.

**SUBJECT AND METHOD:** A 7½ year-old boy with a unilateral functional posterior crossbite. A clinical examination, facial and intraoral photographs, dental casts, dental pantomogram, lateral cephalogram, 3D laser facial and study casts scans were taken at baseline (T0), after 6 months of orthodontic treatment with a quadhelix, one activation per month including 6 months retention period without activation (T1), after 1 (T2) and 5 (T3) years follow-up. Asymmetry of the face and palatal volume changes were assessed at T0, T1, T2 and T3, the percentage of overlapping of the left and the right side of the face and changes of palatal volume were recorded. Differences in facial morphology and palatal volume were assessed quantitatively and qualitatively.

**RESULTS:** At T0 analysis of the boy's face showed asymmetry in the lower third of the face, especially in the chin area showing more prominence on the left side. After T1 the facial asymmetry

had decreased, while palatal volume increased. At T2 and T3 no significant changes were registered regarding facial asymmetry while palatal volume increased due to skeletal growth.

**CONCLUSIONS:** Treatment of a unilateral functional posterior crossbite in the early mixed dentition period improved palatal volume of the upper arch, the occlusion as well as the facial asymmetry, particularly in the lower facial third. Early treatment of a unilateral functional posterior crossbite in the mixed dentition period corrected facial asymmetry as well as the transverse discrepancy of the jaws and dentition and provided long-term stability.

#### CP71 CAMOUFLAGE ORTHODONTIC TREATMENT OF SKELETAL CLASS III WITH AN IMPACTED CANINE AND TWO MISSING FIRST MOLARS USING THREE-DIMENSIONAL SIMULATION

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**AIM:** To introduce the case of a skeletal Class III patient with impacted maxillary canine and two missing first molars treated by forced eruption of the canine and protraction of the posterior teeth into missing spaces using temporary anchorage devices (TADs) and a three-dimensional (3D) simulation programme.

**SUBJECT AND METHOD:** A 20-year-old female with a skeletal Class III malocclusion. On computed tomographic images, the maxillary canine was horizontally impacted on the palatal side and the crown was positioned close to the root apex of the maxillary central incisor. Using a 3D simulation programme, the eruption path was suspicious of damage to the root of the central incisor. Therefore, it was planned to move the impacted canine first in a disto-palatal direction. After the canine had moved away from the root of central incisor, correct orthodontic positioning of the canine was performed. The maxillary and mandibular first molars were extracted due to advanced dental caries. Because the patient had no protrusion or crowding of the anterior teeth, it was decided to protract the second and third molars to prevent worsening of retrusive profile. Two TADs were inserted into the buccal side of the first and second premolars and a lever arm was attached to the mandibular second molar brackets to protract the molars through their centres of resistance. The second and third molars were then protracted with sliding mechanics without extrusion, tipping or rotation of the molars.

**RESULTS:** The impacted maxillary canine appeared in the oral cavity and excellent alignment was obtained without any damage to the roots of adjacent teeth or gingival recession. The missing spaces were completely closed by protraction of the second and third molars and a good functional occlusion was achieved without periodontal problems. The harmonious facial profile was preserved after treatment.

**CONCLUSIONS:** Using 3D simulation, the direction, path of eruption and distance of bodily movement can be more precisely predicted. If the first molars were lost, orthodontic replacement with second and third molars would be a great treatment option, making extra prosthodontic treatment unnecessary. With 3D simulation it was possible to make an exact diagnosis and establish a biomechanically correct treatment plan and obtain satisfactory results.

#### CP72 MANAGEMENT OF A GUMMY SMILE USING THE LIP REPOSITIONING TECHNIQUE: A CASE REPORT

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**AIM:** A wide variety of treatment options are available for correction of excessive gingival display (EGD) based on the aetiology. This case report shows a young woman with an EGD larger than 4 mm during smiling treated by means of lip repositioning associated with a gingivectomy.

**SUBJECT AND METHOD:** A 19-year-old female dissatisfied with the aesthetics of her smile; her complaint was related primarily to the significant amount of gingiva that appeared when she smiled. She was in good periodontal health, with a Class II molar relationship, a posterior unilateral crossbite, a 2.4 mm anterior open bite, complicated by accentuated vertical maxillary growth, and a thin upper lip. She refused orthognathic surgical treatment. Twenty three months after the start of orthodontic treatment, a wax-up of the anterior maxillary teeth was done to determine the

incisogingival length, the mesiodistal width and the contour of the teeth that would lead to an appropriate appearance. The amount of gingival contouring and osteotomy was guided by a surgical stent. Osseous resection, performed on the buccal surface to a depth of approximately 2 mm. The flap was repositioned and sutured with 5-0 propylene. After recovery of the gingiva, lip lowering surgery was started with infiltration of local anaesthesia. The surgical area to be operated on started at the mucogingival junction, which extended 9-10 mm superiorly in the vestibule. The epithelium of oral mucosa was then removed within the border of the incision leaving the underlying connective tissue exposed. After ensuring correct alignment of the lip with the midline of the teeth and philtrum, a suture was made.

**RESULTS:** The patient had her aesthetic complaint resolved. After a week she complained of slight pain and tension of the upper lip. There was no significant difference in gingival display in the observation period.

**CONCLUSIONS:** Understanding the aetiology and possibilities of treatment is essential to define treatment protocol in EGD cases. Lip repositioning after orthodontic treatment is an acceptable minimally invasive procedure in managing a gummy smile in patients who desire non-invasive camouflage treatment. However, follow-up studies are necessary to establish its use as a long-term treatment option.

#### CP73 METHODOLOGY FOR THE REALIZATION OF A FUNCTIONAL ORTHODONTIC APPLIANCE FOR THE TREATMENT OF FACIAL ASYMMETRIES

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**AIM:** To evaluate treatment of facial asymmetry.

**MATERIALS AND METHOD:** Facial asymmetry is an alteration of the determined skeletal growth. Among the asymmetries of underdevelopment exist congenital forms such as hemifacial microsomia, and acquired forms as the outcomes of condylar fractures. The objectives of functional orthopaedic treatment are to stimulate the affected apparatus. Today different orthodontic appliances, unlike that invented by the author (Italian patent 100016000066033) require long periods of use, the therapy start too late and for long time. Those appliances also require excessive patient compliance. The proposed device is constructed using the frontal view of a cephalometric tracing of a completely automated patient using the techniques of three-dimensional (3D) printing.

**RESULTS:** The outcome was satisfactory.

**CONCLUSIONS:** This invention allows achieving the functional appliance also remotely, simply by transmitting data relating to the frontal cephalometric tracing generated by a computer. The methodology is innovative and allows achievement of a simple device that is convenient and easy to manage.

#### CP74 THREE-DIMENSIONAL DENTAL MODELS GENERATED FROM DENTAL COMPUTED TOMOGRAPHY IMAGES: A PRELIMINARY STUDY

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**AIM:** To investigate the accuracy of three-dimensional (3D) dental models generated from dental computed tomography (CT) images.

**MATERIALS AND METHOD:** DICOM format CT images of two orthodontic patients were used to construct digital models by 3D image processing and editing software (ITK-SNAP open source software). The mesio-distal widths of the left upper central incisor, lateral incisor, canine, second premolar, and first molar were measured on both CT and 3D digital models. The differences in millimetres and percentage differences were obtained.

**RESULTS:** The differences in the mesio-distal width of each tooth between 3D models and CT images ranged from 0.05-0.34 mm. The percentage difference ranged from 0.70-3.46. The size measured from 3D models showed both smaller and larger magnitudes compared with CT images. The position of the teeth seemed to have no relation to the differences between CT and 3D measurement.

CONCLUSIONS: 3D dental models generated from dental CT may be acceptable for use in orthodontic treatment procedures.

CP75 THE EFFECT OF MOUTHRINSES ON THE MICROHARDNESS OF ORTHODONTIC ARCHWIRES

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AIM: During orthodontic treatment not only mechanical tooth cleaning but also the use of mouthrinses can help to keep perfect oral hygiene of the patient in order to prevent caries and gingivitis. In saliva galvanic corrosion evolves on the surface of orthodontic brackets and archwires. It has been reported that with the use of mouthwashes this corrosion increases, which causes physical changes of the wires, affecting the friction curve and the power delivery curve. In previous research it was proven that material composition changes occurred on archwires soaked for 3 months in different mouthwashes. The aim of this study was to detect further physical changes of archwires caused by mouthwashes, this time their effect on the hardness of the wires.

MATERIALS AND METHOD: Different brackets-archwires combinations were examined after 3 months immersion in mouthrinses. The microhardness of the samples (nickel-titanium and titanium-molybdenum archwires, longitudinal and cross-sections) was determined with the Vickers hardness test.

RESULTS: Due to an electrochemical reaction between the metals (brackets-archwires) and the electrolyte (mouthwash) the microhardness of the archwires increased.

CONCLUSIONS: The observed microhardness changes may affect the mechanical properties of the archwires, which can influence their power delivery curve and thus the success of tooth movement. Further research can help to find the optimal mouthrinse during orthodontic treatment, which not only reduces the risk of caries, but also ensures successful treatment.

CP76 WHEN TRADITION MEETS INNOVATION: CLASS II MALOCCLUSION TREATMENT COMBINING SKELETAL ANCHORAGE WITH INTERMAXILLARY ELASTICS

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AIM: To investigate a combination of temporary anchorage devices (TADs) and tooth-borne elastics for Class II malocclusion correction.

SUBJECT AND METHOD: An adolescent Class II division 1 patient with protruding teeth and lower crowding. Treatment alternatives: upper jaw widening, mandibular advancement and occlusal relationship correction. A rapid palatal expander (Hyrax) and straightwire brackets were used. Two TADs were placed in the mandibular buccal bone between the first molar and second premolar. A power chain between the TAD and canine (anchorage reinforcement and lower incisor flaring control) was used together with sequential Class II elastics with rectangular stainless steel wires for sagittal correction. Treatment alternatives were rejected for reasons of therapeutic convenience.

RESULTS: After 26 months of treatment a balanced facial aesthetics and good occlusion were obtained.

CONCLUSIONS: The dual anchorage set-up produced a protrusive action on the mandible, minimal side effects and no significant change in the vertical dimension (SN/OP +2°; 1i/GoGn +5°; SN/GoGn 0°; SN/Pog +2°).

CP77 WHY TEETH FAIL TO ERUPT? A CLINICAL PERSPECTIVE

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AIM: Eruption is the axial movement of the tooth from the bony environment of the jaws to a position of functional occlusion in the dental arches. It is a dynamic biological process, strictly genetically predetermined, spatially and temporally. Gender, race, individual growth pattern,

socioeconomic and phylogenetic background are some of the most prevalent factors influencing the eruption process. Local factors impeding normal tooth movement are supernumerary teeth, odontomas, cystic formations, gingival hyperplasia, ectopic tooth buds, primary tooth ankylosis, trauma and space deficiency. Tooth eruption can also be altered by systematic conditions such as endocrine disorders and specific genetic syndromes. The aim of this poster is to present a selective group of relevant clinical cases associated with the most common forms of tooth eruption aberrations and their treatment approach.

**MATERIALS AND METHOD:** Clinical cases from the Postgraduate Orthodontic Clinic of the National and Kapodistrian University of Athens and from a private practice presenting anomalies in the eruptive process were collected.

**RESULTS:** In most of the cases, eruption failure was due to mechanical obstruction and was addressed with removal of the aetiological factor, followed by comprehensive orthodontic treatment.

**CONCLUSIONS:** Tooth eruption anomalies appear often in daily practice and they demand our vigilance. Delayed tooth eruption, the most commonly encountered deviation from normal eruption time, may be the primary or sole manifestation of local or systemic pathology. It may affect the accurate diagnosis, initiation of treatment and overall management of the orthodontic patient.

#### CP78 TREATMENT EFFECTS OF THE TRANSVERSE REDUCTION APPLIANCE ON THE UPPER DENTAL ARCH

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**AIM:** To describe the treatment effects of the transverse reduction appliance (TRA). The TRA is used for the non-invasive reduction of upper dental arch width. It is suitable for patients showing a Brodie bite caused by maxillary macrognathia.

**SUBJECT AND METHOD:** A male with a Class II division 1 malocclusion who showed maxillary macrognathia in the sagittal and transverse directions. A Brodie bite on the right side, an enlarged overbite (14 mm) and overjet (8 mm) were present (t0). Firstly, therapy involved reduction of the arch width with the TRA (t1). Secondly, the mandible was advanced through a sagittal split osteotomy (t2). Maxillary transverse arch constriction was continued post-operatively with the TRA. Three-dimensional cast analysis was used to evaluate dentoalveolar and skeletal treatment effects.

**RESULTS:** Treatment led to an upper arch constriction of 7 mm anteriorly and posteriorly (anterior: t0: 45 mm, t2: 38 mm, posterior: t0: 53 mm; t2: 46 mm). During the course of treatment, whilst anterior and posterior reduction occurred asymmetrically, the final values corresponded. A transverse neutral occlusion was achieved.

**CONCLUSIONS:** The TRA appears to be a successful treatment modality for patients with a Brodie bite caused by maxillary macrognathia. Both constriction of the upper dental arch and uprighting of tipped molars can be achieved. Thus, the TRA can be an alternative to surgery for the reduction of an overexpanded maxillary arch.

#### CP79 WHAT DO ORTHODONTISTS MEAN BY EXPANSION OF THE MANDIBULAR ARCH, WHAT THERAPEUTIC MEANS ARE AT OUR DISPOSAL AND HOW STABLE IS THE RESULT?

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**AIM:** In all orthodontic treatments, there are two types of goals: 1. Those set by patients, usually represented by correction of the chief complaint which determined them to seek an orthodontic treatment and 2. Those of the orthodontist after a thorough assessment of the case. For the first category the most common are aligning teeth and re-establishing smile aesthetics and for the second the goals are more precise due to specific orthodontic training. Tooth alignment and achievement of all orthodontic goals is usually linked to the amount of alveolar space. While some orthodontic philosophies emphasize the importance of the setting of the upper central incisors in the facial pattern, others focus on the limitations offered by the mandibular alveolar process and the

importance of respecting these boundaries. The aim of the present study was to determine the factors influencing tooth movement and positioning in the mandibular arch and where are the limits. **MATERIALS AND METHOD:** A thorough review of the literature regarding the subject of mandibular tooth movement and limitations was undertaken and the different concepts of treatment were synthesized. An observational study of the morphology of the mandible and focused on the alveolar bone.

**RESULTS:** There were statistically significant differences between different facial typologies and alveolar bone characteristics for the studied population. It was found that there are more treatment limitations in hyperdivergent subjects than in hypo- and normo-divergent ones.

**CONCLUSIONS:** For precise and accurate mandibular tooth movement, the orthodontist needs to consider the individual bone characteristics of the patient.

#### CP80 SURGERY FIRST FOR A CLASS III PATIENT

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**AIM:** To present a clinical case of a patient who underwent a surgery first approach

**SUBJECT AND METHOD:** An 18 year old Asian male with no medical/dental background history of interest presented with a severe skeletal and dental Class III malocclusion. According to the cephalometric measurements he had a dolico-facial biotype, a skeletal Class III with a normoplastic and orthognathic maxillary and hyperplastic and prognathic jaw, an Angle molar Class III relationship, protruded and proclined incisors, an inverted overjet of 12 mm and increased airways. Study model surgery revealed complete stability in a Class I occlusion, so it was decided to perform combined surgical orthodontic-surgical treatment first (surgery first). Fixed appliances were cemented and pre-surgical three-dimensional simulation was performed for surgical splints. Bimaxillary orthognathic surgery was performed, a maxillary advancement Le Fort of 6 mm forward (not segmented), Obwegeser mandibular 6 mm set-back, and rhomboidal mentoplasty for shortening the lower facial third.

**RESULTS:** Post-surgery a very favourable facial aesthetic result was observed with a Class I occlusion with a slight open bite which was resolved with intermaxillary elastics during the duration of the regional acceleration phenomenon. Later on, brackets were rebonded and the case was detailed. A well balanced occlusion was obtained after surgery and orthodontic treatment.

**CONCLUSIONS:** The surgery first approach offers an alternative for shorter orthodontic treatment.

#### CP81 ORTHODONTIC TREATMENT WITH CLEAR ALIGNERS FOR A YOUNG PATIENT: A CASE REPORT

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**AIM:** Recently, treatment with Invisalign orthodontic devices has also been aimed at young patients. Invisalign therapy is an orthodontic treatment method using removable polyurethane aligners. The aim of this poster is to present the treatment of a young patient with crowding treated with Invisalign.

**SUBJECT AND METHOD:** A 16-year-old Japanese female with the chief complaint of crowding. Clinical examination revealed a straight facial profile and a Class I molar relationship. The overjet was 5.0 mm and the overbite 4.0 mm.

**RESULTS:** Treatment was initiated by disking, expansion and placing the attachments. Each time trays were worn, chewies were used to tightly place the Invisalign on each tooth. Intermaxillary elastics were worn to aid tooth movement. After 1 year 2 months of therapy, a successful treatment outcome was achieved by correcting crowding and the Class I molar relationship.

**CONCLUSIONS:** The Invisalign system can be a useful appliance to correct a dental malocclusion involving crowding in young patients.

CP82 COMPREHENSIVE ORTHODONTIC TREATMENT OF LEPRECHAUN SYNDROME WITH ANTERIOR OPEN BITE AND SEVERE CROWDING: A CASE REPORT

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**AIM:** Leprechaunism is an autosomal recessive disease characterized by elfin-like faces, loss of glucose homeostasis, and severe insulin resistance due to a mutation in the insulin receptor gene. Because this disease is lethal in early life, there have so far been no reports regarding the orthodontic treatment for such cases. This case report shows the comprehensive orthodontic treatment which was carried out in a patient demonstrating leprechaunism with severe crowding.

**SUBJECT AND METHOD:** An 11 year 11 month old boy with leprechaunism presented with the chief complaint of crowded teeth and an anterior open bite (AOB). He was diagnosed with leprechaunism due to an extremely high degree of insulin resistance, hirsutism, acanthosis nigricans, and delayed mental development. He had been treated with rhIGF-1 from the age of 1 year 7 months. The patient was diagnosed with an Angle Class III malocclusion, a skeletal Class I jaw relationship, a high angle, AOB, severe crowding in both arches because of extremely enlarged teeth, and leprechaunism. The objectives of interceptive orthodontics were to inhibit the mandibular clockwise rotation due to the small bite force and to extract the malformed upper second molars. Although orthodontic surgery was planned to improve his facial profile after the completion of mandibular growth, this surgery could not be undertaken due to the patient's severe insulin resistance. Therefore, the objectives of second phase treatment were to eliminate crowding and to establish an ideal incisor relationship and molar interdigitation. The upper first premolars and lower canines were extracted and temporary anchorage devices (TADs) were inserted at the buccal gingival area of the lower molars for distalization of the lower dentition.

**RESULTS:** As a result of treatment, the severe crowding was relieved and an acceptable occlusion with an ideal incisor relationship was achieved. Although slight relapses were observed 1 year after treatment completion, an acceptable occlusion was maintained.

**CONCLUSIONS:** These findings suggest that the mandibular growth control by chin cup might be important for the treatment of leprechaunism with reduced bite force to maintain the facial axis and TADs might be useful to correct a malocclusion with extremely enlarged teeth.

CP83 CORTICOTOMY FOR ENHANCING TOOTH MOVEMENT; A SHORT OVERVIEW

**Mohammadamin Narimani**, Department of Orthodontics, Islamic Azad University, Dental Branch, Tehran, Iran

**AIM:** A long treatment time has been a disadvantage for orthodontic treatment especially in adults. Different methods have been introduced to shorten treatment time such as surgical intervention, pharmacological approaches, gene engineering, low-level laser therapy, devices for vibrating the teeth and corticotomy or corticocision. Orthodontists, as dentoalveolar orthopaedists, have tried minor alveolar corticotomies to enhanced tooth movements in different areas. Approaches in which orthodontists themselves perform adjunctive surgically assisted tooth movement are preferred to those that need to be referred to a surgeon or periodontist. In this overview a look at these different methods will be presented.

**MATERIALS AND METHOD:** For a more complete search the following words were searched on Ovid, PubMed and Elsevier search engines: corticotomy, corticocision, accelerated tooth movement and surgically assisted tooth movement. In the obtained articles the following subjects were overviewed and techniques, advantages and disadvantages of these techniques were evaluated.

**RESULTS:** Seventeen articles including 10 case reports and six review articles and one editor's corner were found and the applied technique, advantages and disadvantages compared.

**CONCLUSIONS:** According to the articles tooth movement can be enhanced up to four times compared to conventional orthodontics, so overall treatment times can be significantly reduced by many months.

**CP84 THE NEW POSTFUNCTIONAL RETAINER**

**Werner Noeke**, Felix Noeke, Private office, Meschede, Germany

**AIM:** After functional or combined therapy in Angle Class II or III cases, the position of the jaws as well as every single tooth need to be fixed simultaneously. Since its introduction in 1996, the post functional retainer (PFR), fabricated according to the pressure moulding technique, is an alternative for the long-term retention of the jumped bite and tooth movement in Class II and III cases. The aim of this presentation is to show the technical progress and how the appliance has been improved for better patient comfort and a better cost-benefit-relationship in the office.

**MATERIALS AND METHOD:** The technical advancement and improvement of the production process from 1996 until today was compared using a newly developed foil and less chemical products, an important benefit for the patient.

**RESULTS:** The improvements lead to a better patient acceptance. They do not mind wearing the PFR during the afternoon and night. Most of them found out that the PFR was a very discreet and nearly invisible appliance and would recommend it. It contains less chemicals (e.g. Perlibond®, Osamubond®), a new bisphenol-A free material and therefore the PFR is much more useful, compared to the former version.

**CONCLUSIONS:** The new appliance is an advancement in health protection, comfort, chairtime and cost of production.

**CP85 SUBSTITUTION OF MAXILLARY PREMOLARS FOR AN ABSENT LATERAL INCISOR AND ABSENT CANINES**

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**AIMS:** To present an alternative treatment in a patient with previously extracted maxillary lateral incisor and bilateral maxillary canines.

**SUBJECTS AND METHOD:** A 15-year-old girl was referred with the chief complaint of an unaesthetic appearance due to the earlier extraction of her bilateral maxillary canines and left lateral incisor because of crowding by a previous clinician who planned prosthesis for the extracted sites. Clinical and radiographic examination revealed a Class II malocclusion due to mandibular retrognathism, a deep bite, mild crowding in the mandibular arch, coronal fracture of the lower left lateral and a high position of the alveolar crests in the extraction sites. The treatment plan included closing the edentulous spaces orthodontically by mezialization of the posterior teeth, open an implant space in the right second premolar region and substitution of premolars for a lateral incisor and canines.

**RESULTS:** A stable occlusion with a satisfactory facial profile was achieved after multidisciplinary treatment.

**CONCLUSION:** Substitution of maxillary premolars for an absent lateral incisor and absent canines could be a valid alternative approach in adolescent patients with anterior tooth loss.

**CP86 AN ELASTIC APPLIANCE – NEW PROPOSAL FOR THE TREATMENT OF TONGUE THRUSTING###**

**Sandra Osiewacz**, Elżbieta Pawłowska, Medical University of Lodz, Poland

**AIM:** To introduce an elastic orthodontic appliance that is intended to re-educate the tongue to restore its function, and correct the relaxed position and eliminate parafunctions, such as thumb, lip and cheek sucking. It is especially designed for patients aged 4-6 years where preparation of conventional orthodontics appliance is not possible. Additionally, it could be used in adult patients during the retention period, after fixed appliance treatment. The appliance can support speech therapy as a result of strengthening the transverse tongue muscle. The new appliance is intended to treat tongue disorders in children from early childhood so that the following issues do not deteriorate: malocclusion, speech impediment, transverse tongue muscle hypotonia and increased

tension in the mentalis muscle. As a retention appliance, it could be used in adult patients diagnosed with tongue function and position disorders. It also reduces the risk of disorder relapse and supports the results of orthodontic treatment.

**MATERIALS AND METHOD:** Standard orthodontic appliances are usually used in children aged 8-9 years when the second molars and incisors erupt. As a result tongue disorders deteriorate and its treatment requires prolonged orthodontic and speech therapy. The new elastic appliance could be used in children as early as 4 years of age at each step of tooth replacement which shortens long-term treatment with functional appliances. A simple alginate impression is required to build the appliance. The appliance consists of the main appliance and a tunnel guiding the medial and frontal part of the tongue towards the palatal surface of the upper incisors in the anterior of the palate. The additional tunnel element was successfully used in an industrial prototype of appliance designed by the same authors.

**RESULTS:** Early tongue-thrusting therapy can significantly prevent the development of malocclusion and facilitate cooperation with the speech therapist.

**CONCLUSIONS:** The elastic orthodontic appliance enforces correct tongue position during relaxation and swallowing. The appliance shortens treatment and mitigates the risk of relapse.

#### CP87 EARLY TREATMENT OF A CLASS III MALOCCLUSION WITH THE MODIFIED FRÄNKEL III APPLIANCE – A THREE-DIMENSIONAL EVALUATION

**Rok Ovsenik**, Zavod Orthos, Ljubljana, Slovenia

**AIM:** To objectively evaluate facial and jaw morphology as well as changes of tongue posture in a patient with a Class III malocclusion before and after orthopaedic treatment and at follow-up using three-dimensional (3D) technology.

**SUBJECT AND METHOD:** A child with a skeletal Class III malocclusion in the primary dentition. 3D ultrasonography of the tongue posture, face and jaw morphology were performed at baseline (T0), after 6 months of treatment (T1) and after 24 months follow-up (T2) using the modified Fränkel III function regulator (Farčnik, 2008). An ultrasound system, Voluson 730 Expert, and a 3D convex transducer, RAB 2-5 MHz, were used to assess tongue posture. Facial and jaw morphology were assessed using a 3D laser scanning technique. The face and jaw morphology differences were assessed both quantitatively and qualitatively.

**RESULTS:** At T0 the patient's face superimposed on the average non-Class III face with shell-to-shell deviations showed a retrognathic midface, prominent lower lip and prognathic mandible. However, at T1 and T2 the patient's face was similar to a non-Class III facial appearance. 3D reconstruction of the tongue showed an incorrect tongue posture on the mouth floor at T0. At T1 a correct tongue posture was obtained that remained on the palate at T2.

**CONCLUSIONS:** Early treatment of a Class III malocclusion with the modified Fränkel III appliance successfully modified the growth and development of the orofacial system, as well as the incorrect tongue posture on the mouth floor. Early treatment of Class III malocclusion in the primary dentition using the modified Fränkel III appliance improves tongue posture and creates more favourable conditions for normal occlusal and craniofacial development.

#### CP88 COMBINED RAPID MAXILLARY EXPANSION AND FACEMASK THERAPY IN A PATIENT WITH A UNILATERAL CLEFT LIP: A CASE REPORT

**Selin Ozbilek**, Ahmet Yalcin Gungor, Department of Orthodontics, Akdeniz University, Antalya, Turkey

**AIM:** To present the treatment of a patient with a skeletal Class III malocclusion due to maxillary retrusion, using combined rapid maxillary expansion (RME) and facemask appliances.

**SUBJECT AND METHOD:** An 11 year-old girl with the main complaint of a retrusive upper lip and crowding of the upper incisors. Intraoral assessment showed an anterior constricted maxilla with a normal intermolar width, a Class I molar relationship and insufficient overjet and overbite. According to the facial midline, there was a maxillary dental midline shift of approximately 2 mm to the left. Cephalometric examination showed that, SNA, SNB, ANB, and GoGN/SN angles were 77.5, 80, -2.5 and 35 degrees, respectively. Extraoral evaluation indicated a concave profile with flattening of the

upper lip. The patient was treated with a fan-type RME appliance and a Petit type facemask. The activation protocol was twice per day and then changed to once per day after the maxillary suture was opened. One month prior to expander placement, conventional 0.022 MBT brackets were placed in the lower arch to decompensate the lingual tipping. The expansion appliance was fixed and kept in the mouth for three weeks after the activation period. It was then removed and a removable appliance was applied in the same session for the upper arch to avoid relapse. Following retention, fixed appliances were inserted in the upper arch. The total treatment time was 22 months.

**RESULTS:** The post-treatment lateral cephalometric results indicated that SNA SNB, ANB and GoGn/SN angles were; 79.5, 79, 0.5 and 37 degrees, respectively. A normal overjet and overbite were achieved. The patient's profile and smile were highly improved. Upper anterior crowding was resolved.

**CONCLUSIONS:** Arch length discrepancy was eliminated by expansion and slight incisor protrusion. Satisfactory functional and aesthetic outcomes can be obtained in a patient with a unilateral cleft lip and maxillary deficiency using combined RME and facemask therapy and non-extraction orthodontic treatment.

#### CP89 ARE THERE ANY LIMITS OF DENTOALVEOLAR DECOMPENSATION IN SURGICAL CLASS III PATIENTS? A CASE REPORT

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**AIM:** The main goal is to achieve dental decompensation with pre-operative orthodontic treatment in Class III surgical cases. However, when the symphysis is not sufficiently thick for mandibular dentoalveolar decompensation, anterior segmental osteotomy can be an option. This case report, presents the correction of a skeletal Class III malocclusion with an anterior segmental osteotomy followed by maxillary advancement.

**SUBJECT AND METHOD:** A 24 year-old female who had a skeletal and dental Class III malocclusion (Wits: -9 mm). The patient's main complaint was mandibular protrusion and aesthetic disorder. Pre-treatment cephalometric analysis revealed that SNA was 73°, SNB 78°, ANB -5° and GoGn/SN 30°, IMPA 62°. The overjet and overbite were 1.3 and -0.4 mm, respectively. A positive overjet was seen because of abnormal compensation. Pre-surgical orthodontic treatment included extraction of the lower right and left canines followed by fixed appliance treatment. The surgical protocol was planned as an anterior mandibular segmental osteotomy first, and then maxillary advancement. The maxillary surgery included advancement of 4 mm with a Le Fort I osteotomy. After debonding, Hawley appliances were used for retention.

**RESULTS:** After anterior mandibular segmental osteotomy, IMPA was improved from 62 to 91 degrees. At the end of orthodontic treatment; the Class III malocclusion was eliminated and a Class I molar relationship with an ideal overjet and overbite was obtained. Clinical and cephalometric evaluation revealed that pleasing aesthetic results and good functional occlusion was preserved in the retention period.

**CONCLUSIONS:** Treatment of a Class III malocclusion can be achieved by combination of orthodontic and surgical procedures. Orthognathic surgical treatment offers one of the best approaches for patients with dental and skeletal disharmony and contributes to functional development.

#### CP90 UNEXPECTED UNILATERAL CONDYLAR HYPERPLASIA DESPITE SUCCESSFUL COMPLETION OF ORTHODONTIC TREATMENT

Dietmar Paddenberg, **Alexander Sawaljanow**, Bettina Paddenberg, Tobias Schuette, Orthodontic office, Paderborn, Germany

**AIM:** According to current literature, a secure occlusion prevents the appearance of unilateral condylar hyperplasia. However, several cases observed did not confirm this thesis. The analysis screens condylar hyperplasia after successful occlusal Class I adjustment.

**SUBJECTS AND METHOD:** Unilateral condylar hyperplasia is a rare disorder. In a short period of time four subjects with unilateral condylar hyperplasia could be identified after successful occlusal Class I

adjustment. Radiographs and plaster models were analyzed as a time series and compared with a control group.

**RESULTS:** In all subjects a moderate trend towards one-sided hyperplasia existed at the beginning of treatment. In defiance of a secure occlusion an unexpected late/post-treatment growth spurt in one condyle appeared. Additional treatment to some extent up to surgical intervention was needed. A gender-specific as well as a temporomandibular joint disorder (TMJ) accumulation were detected.

**CONCLUSIONS:** A functional and definite occlusion is not able to prevent a one-sided post-orthodontic growth spurt. Females are more often affected. Orthognathic surgery cannot always be avoided and seems to provide stable results and an improvement of TMJ disorder symptoms.

#### CP91 TREATMENT OF A CLASS I MALOCCLUSION PATIENT WITH UNILATERAL HYPODONTIA OF THE MAXILLARY LATERAL INCISOR: A CASE REPORT

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**AIM:** Congenital absence of an upper lateral incisor is frequently associated with malocclusions and usually requires a multidisciplinary treatment approach. There are two basic treatment options: orthodontic space closure, with the canine reshaped to substitute the missing lateral incisor, or space opening for prosthetic restoration (implants or bridges). The aim of this case report is to present the orthodontic management of a patient with unilateral hypodontia.

**SUBJECT AND METHOD:** In 26 year old female clinical and radiographic examination showed a Class I malocclusion with a deep overbite and hypodontia of the right maxillary lateral incisor with a conical and microdont incisor as its counterpart. In the lower arch severe crowding was present with an ectopic lower right canine. Based on the space, canine shape and size, smile line and soft tissue analysis, it was decided to extract the conoid left lateral incisor and close the space in the left upper quadrant. In the mandible, teeth 35 and 44 were extracted to resolve the crowding.

**RESULTS:** After 30 months of active orthodontic treatment, space in the upper arch was closed with canine substitution of the left lateral incisor. In the mandible, the right canine was placed in the arch. The overbite was decreased and Class I molar relationship was obtained.

**CONCLUSIONS:** Patients with a Class I malocclusion and unilateral hypodontia of a maxillary lateral incisor could be successfully treated with orthodontic space closure with the canine replacing the missing tooth. The treatment decision and plan depends on several factors (canine shape, size, gingival margin, total arch space, smile line and soft tissues) and should be individually analysed for each patient.

#### CP92 SKELETAL CLASS III OPEN BITE CORRECTION BETWEEN SURGICAL-ORTHODONTIC TREATMENT WITH MANDIBULAR SECOND MOLAR EXTRACTION AND NON-SURGERY WITH MINISCREW

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**AIM:** To estimate the vertical changes in patients with a skeletal Class III open bite following surgical-orthodontic treatment with mandibular second molar extraction and non-surgery with miniscrew anchorage.

**SUBJECTS AND METHOD:** The first case was a Thai female, aged 16 years, who presented with the chief complaints of chewing difficulty and a protruded chin. She was diagnosed as having an asymmetric chin, dolichofacial type with straight profile, severe open bite with two divergent occlusal planes from the second molars anteriorly, and a skeletal Class III open bite. Surgical-orthodontic treatment was planned to correct both the skeletal and dental malocclusions: mandibular second molar extraction, followed by the orthodontic phase. Mandibular set-back and upward rotation by bilateral sagittal-split ramus osteotomy were performed at the orthognathic surgical phase. The second case was a Thai female, aged 22 years. She had the chief complaint of mandibular tooth protrusion and difficulty in chewing. She was diagnosed as having an asymmetric dolichofacial type, a skeletal Class III and skeletal open bite with an anterior open bite (AOB). Non-

surgery and orthodontic treatment were planned; group maxillary tooth intrusion and mandibular whole-arch dentalization were performed using miniscrew anchorage.

**RESULTS:** After treatment, a Class I canine and molar relationship and a symmetrical chin were achieved in the first patient. Her anterior and posterior open bites were corrected and her profile became normal. In the second patient, the AOB, the Class III malocclusion and the mandibular midline deviation were corrected. Cephalometric analysis showed vertical profile changes in the first but not in the second patient.

**CONCLUSIONS:** The overall treatment results in both patients were satisfactory. Improved facial appearances and occlusions were obtained as a result of treatment. However, surgical-orthodontic treatment with mandibular second molar extraction therapy may be more efficient in establishing vertical changes in patients with skeletal Class III open bites than non-surgery with miniscrew anchorage.

#### CP93 ORTHODONTIC-SURGICAL CORRECTION OF A SEVERE CLASS III MALOCCLUSION: CASE REPORT###

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**AIM:** To present a patient with a severe Class III malocclusion.

**SUBJECT AND METHOD:** A 24 year old patient orthodontically treated after clinical assessment, with straightwire appliances in both jaws, in order to align and upright the teeth. Afterwards surgical correction of the mandibular bite was carried out.

**RESULTS:** Correction of the intermaxillary relationship and a change of the occlusion was confirmed by the changes seen on the teleroentgenogram. There was also significant aesthetic improvement of the profile.

**CONCLUSIONS:** The greatest correction was seen in the patient's smile.

#### CP94 DIGITAL IMAGE PROCESSING FOR BONE DENSITY EVALUATION AFTER ORTHOGNATHIC SURGERY

**Livia Pompéia**, Roberta Ilinsky, Kurt Faltin Junior, Cristina Lucia Feijo Ortolani, University Paulista, Sao Paulo, Brazil

**AIM:** To evaluate upper jaw bone density recovery 12 months after orthognathic surgery for anterior open bite (AOB) correction, using a digital image processing technique.

**MATERIALS AND METHOD:** ix digital lateral cephalometric radiographs were analysed in this pilot project. The radiographic material was obtained from three adult patients at two different moments: one month before and 12 months ( $\pm 1$  month) after undergoing a Le Fort I osteotomy for AOB correction. The images were processed with ImageJ software and its image aligning plugins, through which five different regions of interest (ROI) around the plates and a control region (CR) in the sphenoid bone could be selected and analysed for each image, further comparing pixel intensity in the same regions in their pairs. The ratio between all ROI and CR were analysed for all images.

**RESULTS:** There was a significant difference between the initial and final images, with a lower image density in the 12-month after surgery radiographs for the whole sample. In addition, some regions were shown to be more likely to have fully recovered than others, possibly due to the different structures involved in the surgical fracture.

**CONCLUSIONS:** The use of a simple and affordable technology for diagnosis enhancement makes it possible to identify small changes in bone density, which cannot always be seen with the naked eye. Digital image processing is a useful tool for orthodontists who are in doubt as to whether retention after surgery should be removed from patients, preventing relapse.

#### CP95 CREATING SPACE IN THE DENTITION FOR THE PERMANENT MAXILLARY CANINE IN PATIENTS WITH SHORTENED DENTOALVEOLAR SEGMENTS\*\*\*

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**AIM:** To improve the efficiency of orthodontic treatment of a Class III malocclusion in patients with a vestibular position of the permanent maxillary canines.

**SUBJECTS AND METHOD:** Fifteen patients, 18-37 years old, with a Class III malocclusion complicated by a vestibular position of the permanent maxillary canines. The deficit of space for the canines ranged from 3.5 to 8.0 mm. In two cases there was no space for the maxillary canines and dislocation of the anterior teeth was diagnosed. Anthropometric measurements on plaster models of the jaws and photometric and radiographic (dental pantomography, teleroentgenography) methods were used for diagnosis and treatment planning. Computer tomography was carried out according to indicators. A device allowing movement of the distal maxillary premolars to create space for optimal location of maxillary canine in the dentition (patent RU № 131599, 27.08.2013) was used for orthodontic treatment. The device consisted of springs, wire elements for distal movement of the teeth and locks to secure the wire elements, consisting of vestibular and palatal parts.

**RESULTS:** The device for distal movement of the maxillary premolar, which consisted of a wire with bends at an angle of 90 degrees, allowed improvement of the stabilization of the abutment. The elastic rod, representing the chain, the length of which is determined by the clinical indicators, allows movement of the premolars to create space for the maxillary canine. One end of the chain is worn on the bracket, fixed to the vestibular surface of the tooth to be moved distally and the other end to a hook on the locking device.

**CONCLUSIONS:** In complex treatment of patients with a Class III malocclusion, complicated by a vestibular position of the permanent maxillary canines, the proposed device for distal movement of maxillary premolar allows the creation of comfortable conditions for patients as there are no bulky palatal elements or extraoral devices. A reduction of orthodontic treatment duration and stable positive results were achieved.

#### CP96 OSTEOGENIC DISTRACTION IN A CASE OF BILATERAL CLEFT LIP AND PALATE ASSOCIATED WITH VAN DER WOUDE SYNDROME

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**AIM:** There is a growing interest in the use of the osteogenesis distraction technique applied to the craniofacial skeleton due to its enormous potential in the treatment of dentofacial deformities. Van der Woude syndrome is a rare syndrome, transmitted by an autosomal dominant mode, associated with cleft lip and/or cleft palate (CP) and lower lip pits.

**SUBJECT AND METHOD:** A 6-year-old boy with congenital malformation of the face, with a bilateral cleft lip and palate (CLP) associated with Van der Woude syndrome. The multiplicity of clinical features that follow a CLP requires a multidisciplinary approach. Therefore, orthopaedic, orthodontic and surgical procedures should be performed in a specific order and chronologically coordinated. Orthodontic treatment of maxillary expansion was performed before the surgical procedure of osteogenic distraction for closure of the CP using bone transport distractors. Prior to surgery, a cone beam computerized tomograph was used to select the distractor. Surgically, an inverted L osteotomy was performed bilaterally medial to the maxillary first molars.

**RESULTS:** After 5 days of latency, the process was initiated, with a distraction rate of 1 mm/day for 14 days on the right side and 20 days on the left. After the distraction period, the device was locked, followed by a period of consolidation. There was a significant decrease in the size of the CP.

**CONCLUSIONS:** Osteogenic distraction presents itself as a successful technique to adopt in the treatment protocol of these patients.

#### CP97 INTERDISCIPLINARY ORTHODONTIC, ORTHOPAEDIC AND ORTHOGNATHIC TREATMENT

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**AIM:** Increasing the quality of treatment by full oral-maxillofacial interdisciplinary interaction.

**SUBJECTS AND METHOD:** Patients with facial dentomaxillary disorders with multiple extractions on the lateral side, negative space redistribution that could not have correct prosthetic treatment and achieve the proper function and aesthetic smile, sleep disordered breathing also with upper airway space compression due to a retrognathic mandible such as obstructive sleep apnoea (OSA). After comprehensive analysis of dental casts, panoramic radiographs, cephalometrics and an overnight cardiorespiratory polygraphy test, a full fixed appliance system and modified functional appliance was used to successfully complete the desired goals.

**RESULTS:** Achievement of long-term results, removed the factors of trauma, orthodontic, orthopaedic and orthognathic correction and aesthetic improvement and correction of jaw position in adults and children's cases with satisfying results.

**CONCLUSIONS:** Interdisciplinary treatment is the only way to achieve long-term results. More than ever is there a need for multidisciplinary interaction, not only between general practitioners and specialist, but also between specialists themselves.

#### CP98 EFFECT OF THE RBJ STIMULATOR ON MAXILLARY ARCH DIMENSIONS IN A NEWBORN WITH GOLDENHAR SYNDROME AND UNILATERAL CLEFT LIP AND PALATE

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**AIM:** The oculoauriculovertebral spectrum or Goldenhar syndrome, is characterized by varying degrees of unilateral underdevelopment of the craniofacial structures (orbit, ear, and mandible) in association with vertebral, cardiac, renal, and central nervous system defects. Goldenhar syndrome, oculoauriculovertebral spectrum, hemifacial microsomia, facio-auriculo-vertebral syndrome, and first and second branchial arch syndrome represent similar errors in morphogenesis with gradation of severity). The syndrome is characterized by a variable degree of problems in the morphogenesis of the first and second branchial arches, sometimes accompanied by vertebral anomalies and/or ocular anomalies (microphthalmia/anophthalmia). Associated anomalies include cardiac, urinary, and nervous system defects. Unilaterality of these anomalies is present in 70 per cent of cases. A cleft lip and palate (CLP) has been reported in 16 per cent of affected individuals. Newborns with Goldenhar syndrome and CLP have many problems; feeding is one of them. The aim is to present the procedure of RBJ palatal stimulator production and its effects in a newborn male with Goldenhar syndrome and unilateral CLP.

**MATERIALS AND METHOD:** The first RBJ stimulator is produced 24 hours after birth and then weekly in succession. Cast taking is an important phase in stimulator production and is carried out without any anaesthesia. The effects of the RBJ stimulator were evaluated on serially obtained maxillary casts. Measurement of intraoral casts was performed, and statistical analyses were used to compare the differences between measurements pre- and post-therapy.

**RESULTS:** There was a significant reduction in the width of the cleft.

**CONCLUSIONS:** The RBJ stimulator has significant advantages in the treatment of a newborn with Goldenhar syndrome. The stimulator helps decrease the complexity of subsequent surgery.

#### CP99 ORTHODONTIC EFFECTS OF AN RBJ STIMULATOR ON CLEFT SIZE IN A NEWBORN WITH A UNILATERAL CLEFT LIP AND PALATE

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**AIM:** To present the effects of orthodontic activity of the RBJ stimulator used in the early orthodontic treatment of a female newborn with a unilateral cleft lip and palate (UCLP). The effect that occurred during therapy was studied by monitoring changes in the three-dimensional structure of the damaged upper jaw.

**SUBJECT AND METHOD:** Consecutive palatal impressions were taken of the female immediately after birth and 1, 3 and 6 months before and 6 months after cheiloplasty. Using the Cerec 3D in the Lab Stack System (Sirona Dental System, Germany) the palatal casts were measured and compared three-dimensionally.

**RESULTS:** The cleft width decreased significantly during therapy.

**CONCLUSIONS:** Positive effects of orthodontic RBJ stimulator on the size of the cleft in a newborn with UCLP occurred as a result of the screw activation included in the RBJ stimulator and selective grinding of the acrylic stimulator. Certainly, highly accurate impressions of the upper damaged jaw are a prerequisite of orthodontic action of RBJ stimulator.

#### CP100 DENTAL CARE APPROACH IN PATIENTS WITH DELETION ON 14q22.1

**Margot Raes, Greet Hens, Koenraad Devriendt, Anna Verdonck, KU Leuven, Belgium**

**AIM:** To describe the dental and craniofacial characteristics observed in four patients diagnosed with an autosomal dominant deletion on chromosome 14q22.1 and to advise on the dental care approach in these patients. A summary of the disease characteristics is given.

**MATERIALS AND METHOD:** Medical files, clinical research, radiographs, clinical photographs and dental casts of four relatives with a confirmed diagnosis of 14q22.1 deletion were prospectively collected. All patients differed in age (age range: 7.5-66 years). They presented with highly similar facial phenotypes. The patients were clinically diagnosed with a short stature, retrognathism and hypoplasia of the mandible, poly- or syndactyly, eye disorders and cleft associated diseases. There was a difference in severity of the anomalies. Cephalometric radiographs were digitally traced and measurements were compared to normal values. Dental casts and panoramic radiographs were used to study the occlusal and dental features. At present no general syndrome identification has been found.

**RESULTS:** All patients showed similar facial characteristics but the severity and extent of the symptoms differed. A general delay in development and growth was seen. Tracing of the cephalometric radiographs showed a distal relationship between the upper and the lower arch. Analysis of the dental casts and panoramic radiographs showed a distal molar occlusion, lack of space in the dental arches, a delay in tooth eruption and a likelihood of agenesis.

**CONCLUSIONS:** Craniofacial characteristics such as convexity of the face and retrognathism of the mandible were all seen in the patients diagnosed with 14q22.1 deletion, although the symptoms of the disorder differed in severity and extent. Treatment management: frequent dental follow-ups are advised for guiding the eruption and professional dental cleaning to maintain oral hygiene. Correction of the distal relationship and distal occlusion by guiding growth with functional appliances is recommended. Rare syndromic cases with specific craniofacial problems need an individual approach and a careful follow-up of craniofacial growth.

#### CP101 MONITORING AND CONNECTED ORTHODONTICS FOR A BETTER FOLLOW-UP\*\*\*

**Louis-Charles Roisin, Private Practice, Paris, France**

**AIM:** Advances in technology and the evolution of orthodontics tend to increase the time between appointments, but perfect appliances and perfect predictability of clinical evolution of our technical protocols do not exist. For the same protocol, as all patients do not react in the same way there is a need to enlarge control of therapeutics, more continuously during the time between appointments.

**MATERIALS AND METHOD:** This problem of remote continuous control of treatment is not new in medicine. There are models of self-measurement, patient monitoring, connected tools and telemedicine that are now incontestable standards, for instance, in high blood pressure or diabetes treatment follow-up. No equivalent exists in orthodontics. Dental monitoring is the first solution to transform the smartphone of the patient into a remote control tool for orthodontic treatment. The patient is driven by a dedicated application on his smartphone, to remind him/her every two weeks to take an intraoral photograph, with a specific cheek retractor. All these photographs are controlled on a platform service. If an incident is detected, the practitioner receives an email notification. For advanced follow-up, if the practitioner provides the initial models, it is possible to quantify tooth movement. Due to sophisticated three-dimensional (3D) algorithms of matching between patient

photograph and initial model, tooth movement measurements achieve an accuracy far less than 1 mm.

**RESULTS:** The dashboard of this toolbox, to remotely control treatment, will be shown: including a gallery for basic photographic monitoring, and graphs of global appliance activity or detailed graphs of movement per tooth for the advanced 3D monitoring. Clinical examples will be presented: notifications or alerts, on clinical review of the photographs or evaluation of the tooth movement graphs; interactions of practitioner avoiding many aggravations and improving results.

**CONCLUSIONS:** A service of monitoring, using frequent and regular photographs taken by the patient, and systematically controlled by both technical algorithms and the clinical team, can provide efficient and in-time notifications for the practitioner, improving compliance and communication with the patient, and globally the quality of the treatment.

#### CP102 A CUSTOMIZED FIXED RETENTION DEVICE IN ADULTS: AN INDIVIDUAL DESIGN PROPOSAL

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**AIM:** Retention devices are an integral part of orthodontic treatment. The increase in orthodontic treatment requests by adult patients has resulted in many who require multidisciplinary treatment. The aim of this study is to introduce clinicians to the possibility of applying a steel mesh retention device for maintaining the results obtained by orthodontic treatment. This type of retention allows access to the interproximal spaces and prevents the rotation of dental elements in the apicocoronal vector.

**SUBJECTS AND METHOD:** Ten adult patients who required different types of orthodontic treatment. The retention device is made of a 0.2 mm thick and 5 mm high preformed steel mesh built in point by the dental technician. The height of the mesh must be at least 2 mm at the level of the dental contact point. Application of this device is carried out by etching the lingual surface of the teeth, positioning the bonding on the device and teeth, followed by polymerization of the bonding only on the teeth; at this point a fluid composite is applied on both the device and the teeth by exerting slight pressure. The excess composite can escape through holes in the mesh, and is removed. At this point it is cured and the device is applied.

**RESULTS:** This is a multipurpose device. It has been thought to permit access to interdental zones in periodontal therapy, but has also been used as a retention device and as a space maintainer in implant treatment, directly reconstructing the temporary tooth on the mesh.

**CONCLUSIONS:** This customized device provides several solutions for treatment and has various fields of use. It may be very useful in interdisciplinary treatment in patients requiring periodontal support therapies. The positive results, using this device, born from the need to stabilise the results obtained with orthodontic therapy and finalise periodontal therapy, has led to an increase its use in multidisciplinary treatment.

#### CP103 THREE-DIMENSIONAL VIRTUAL PLANNING APPLIED TO ORTHOGNATHIC SURGERY – A CASE OF CRANIOFACIAL MICROSOMIA

**Jessica Scherzberg**, Adriana Guimarães, António Bettencourt Lucas, Luísa Maló, Francisco do Vale, University of Coimbra, Portugal

**AIM:** In this clinical case, the feasibility and precision of three-dimensional (3D) virtual planning was tested in one patient with craniofacial microsomia using Nemoceph 3D-OS software (Software Nemotec SL, Madrid, Spain) to predict post-operative outcome on hard tissue and produce computer aided design/computer aided manufacturing (CAD/CAM) surgical splints.

**MATERIALS AND METHOD:** The clinical protocol consisted of 3D data acquisition of the craniofacial complex by cone-beam computed tomography (CBCT) and surface scanning of the plaster dental casts. The 'virtual patient' created underwent virtual surgery and a simulation of post-operative results on hard tissues was produced. Surgical splints were manufactured using CAD/CAM technology in order to transfer the virtual surgical plan to the operating room. Intraoperatively, both CAD/CAM and conventional surgical splints were compared. A second set of 3D images was obtained after surgery to acquire linear measurements and compare them with measurements obtained when predicting post-operative results virtually.

**RESULTS:** A high similarity was found between both types of surgical splints with equal fitting on the dental arches. The linear measurements presented some discrepancies between the actual surgical outcomes and the predicted results from the 3D virtual simulation, but caution must be taken in the analysis of these results due to several variables.

**CONCLUSIONS:** The reported case confirms the clinical feasibility of the described computer-assisted orthognathic surgical protocol. Further progress in the development of technologies for 3D image acquisition and improvements in software programs to simulate post-operative changes on soft tissue are required.

**CP104 A CASE REPORT ON TREATMENT OF MAXILLARY PROTRUSION THROUGH ORTHODONTIC ANCHOR SCREWS WITH IMPROVED SCISSOR BITE AND TOOTH ANCHORAGE**

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**AIM:** Orthodontic anchor screws are known to be effective in strengthening tooth anchorage. The subject presented a severe brachyfacial pattern and a deep overbite. It is said to be very difficult to improve a scissor bite. The anchor screws were used as anchorage support.

**SUBJECT AND METHOD:** A 21-year-old female with the chief complaint concerning a median diastema and upper protrusion. Based on intraoral findings, the right premolar portion had a scissor bite. Radiographic findings confirmed a congenitally missing maxillary left second premolar. Based on the above results, it was diagnosed as maxillary protrusion with congenital absence of the maxillary left second premolar with a deep overbite. As a treatment plan, it was decided to perform orthodontic treatment with a multibracket system by extracting the maxillary left second primary molar (prolonged retention of the primary tooth) and maxillary right second premolar. In addition, orthodontic anchor screws were implanted in the maxillary median palate and the left maxillary tuberosity in order to strengthen anchorage of the teeth and to improve the scissor bite on the right premolar.

**RESULTS:** This case was FMA 6 degrees with a severe brachyfacial pattern, but by using orthodontic anchor screws in combination with a palatal bar, multibracket system, it was possible to efficiently improve the scissor bite. At the end of the treatment a good occlusion and appropriate anterior tooth cover were obtained.

**CONCLUSIONS:** Orthodontic anchor screws are very effective for improving a scissor bite with severe brachyfacial pattern.

**CP105 EARLY INTERCEPTION OF ORTHODONTIC PROBLEMS**

**Terry Sellke**, Dr. Sellke & Reily LTD, Grayslake, USA

**AIM:** Every practice is faced with daily problems that affect treatment quality. The aim of this study was to investigate if remote monitoring can enhance patient care and provide the metrics that every practice needs to self-improve.

**MATERIALS AND METHOD:** The research was undertaken on over 500 patients. Description and quantification of detected expected and unexpected orthodontic problems and statistical analysis of the effect of remote monitoring solutions on early interception orthodontic problems.

**RESULTS:** Remote monitoring of patients allows a practice to reduce unexpected results and improve patient care.

**CONCLUSIONS:** Remote monitoring solutions should be considered an adjunct to routine patient care.

**CP106 THE BIOLOGICAL EFFECTS OF CONE BEAM COMPUTED TOMOGRAPHY IRRADIATION WITH RAMAN SPECTROSCOPY**

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AIM: The identification of cellular and molecular biomarkers after cone beam computed tomographic (CBCT) irradiation of the orofacial region in paediatric patients.

MATERIALS AND METHOD: Label-free Raman Spectroscopy (RS) of human dental follicle stem cells (DFSC) after cumulative doses of CBCT irradiation were studied. DFSC, collected and grown after a specific protocol from the dental follicle of a 9 year old boy, were irradiated with 30 mGy and fixed after 30 minutes with paraformaldehyde. Five control cells and five irradiated DFSC were analysed using RS. Raman micro-spectrometer measurements included: 785 nm diode laser (300 mW power), optical microscope with an x,y translational stage, ×60 times water immersion objective, 1200 lines/mm diffraction grating, 5 second integration time, one acquisition at each 2 µm from the cells, obtaining thus Raman images of entire cells. The collected spectra were pre-processed and analysed with multivariate statistical analysis including principal component analysis.

RESULTS: Exposure to CBCT irradiation induced modifications in DFSC. The control stem cells biomarkers included Raman bands specific to 784 (nucleic acids), 815 (O-P-O in RNA), 918 (proline, glycogen), 1005 (phenylalanine), 1318 (guanine, C-H deformations in proteins). The irradiated stem cells biomarkers included Raman bands specific to 1434 (CH<sub>2</sub> deformations in lipids), 1661 (amide I), 1733 (C=O stretching lipids). The Raman biomarkers specific to the CBCT irradiation identified corresponded to an increase in the lipid content and a decrease in the nucleic acids content.

CONCLUSIONS: Although doses of single CBCT procedures are typically low, the paediatric population may require repeated examinations over time and could receive a relatively high cumulative dose. The biochemical changes induced by CBCT irradiation can be important in understanding the effects of ionizing radiation used in the orthodontic diagnosis of paediatric patients.

#### CP107 AN INTERESTING CASE OF A GEMINATED PREMOLAR AND HYPODONTIA

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AIM: Geminatio n is rare morphological dental anomaly. The aim of this case report is to increase the awareness of the clinician in the appropriate diagnosis, management and treatment of a geminated tooth complicated by hypodontia. This case demonstrates the use of cone beam computed tomography (CBCT) in diagnosis and treatment planning.

SUBJECT AND METHOD: A non-syndromic 14 year old boy diagnosed with a geminated second premolar using clinical examination and radiological investigation of CBCT. Treatment of the unilateral geminated premolar, taking the occlusion into account, included extraction of the geminated second premolar and lower second primary molars and application of fixed appliances to achieve a Class I occlusion.

RESULTS: CBCT is often necessary to distinguish between the variable dental anomalies. When gemination occurs, there is a high risk of hypodontia in the dentition as illustrated in this case. This dental anomaly can cause malocclusions manifesting as crowding or spacing.

CONCLUSIONS: Geminatio n is a morphological alteration that is sometimes confused with fusion but confirmed by thorough clinical and radiographic interventions especially with recent advances in radiography using CBCT when indicated. Geminatio n of a maxillary premolar is not a common phenomenon. Geminatio n of maxillary central incisors and molars with supernumerary teeth has been reported by many authors, whereas geminations of maxillary second premolars are rarely reported. Multidisciplinary management is often required in order to diagnose and treat these cases appropriately.

#### CP108 ERUPTION AND ORTHODONTIC TREATMENT OF IMPACTED TEETH FACILITATED BY MARSUPIALIZATION IN YOUNG PATIENTS

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AIM: Dentigerous cysts often occur with impacted teeth in the maxilla and mandible. Because of the cyst and malpositioned teeth, malocclusions usually develop in various forms. Correction of such

situations may require a clinical decision between surgical removal of the impacted permanent teeth with cystic lesion and post-operative orthodontic treatment. In relation to this topic, two cases of patients with dentigerous cyst are reported.

**SUBJECTS AND METHOD:** The first patient was a 25 year-old male who had dentigerous cyst with impacted supernumerary teeth in the anterior maxillary region. The cyst was positioned from the maxillary anterior area up to the left maxillary sinus inferior wall. The second patient was a 9 year-old male who had an extensive dentigerous cyst covering #75 to #44 regions with impacted #33, 34, and #35 teeth. Both patients underwent surgery for marsupialization followed by orthodontic treatment. The impacted supernumerary teeth were extracted when marsupialization was performed in first patient, and the impacted permanent teeth were not removed in second patient.

**RESULTS:** The first patient has been followed-up for a total of 24 months post-operatively. Eleven months post-operatively, fixed orthodontic appliances were bonded in the maxillary arch and levelling initiated. The second patient has been followed-up for a total of 46 months post-operatively. At post-operative 17 months, the previously impacted #33, 34, and 35 teeth erupted intraorally and orthodontic treatment began. In both cases complete reduction of the diffuse radiolucent cystic lesion and tooth alignment were achieved.

**CONCLUSIONS:** Two patients with dentigerous cysts were successfully treated. In one case, the impacted permanent teeth with cysts were not surgically removed but erupted spontaneously after marsupialization. Orthodontic treatment began 11 and 17 months post-operatively and the malocclusions were resolved.

#### CP109 CASE REPORT: A PATIENT WITH FACIAL ASYMMETRY AND A UNILATERAL POSTERIOR CROSSBITE TREATED WITH THE SURGERY-FIRST APPROACH

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**AIM:** In conventional pre-surgical orthodontics, the orthodontist tries to achieve a pre-operative occlusion which is against what the soft tissue and skeletal components dictate. This has been thought of as one of the challenges in decompensating the arches prior to surgery. Especially, in orthognathic surgery for correcting facial asymmetry, it is difficult to decompensate teeth because of surrounding structures such as the tongue and cheeks. Although dental decompensation is done, this structural imbalance could evoke trauma from the occlusion or temporomandibular disorders. In surgery-first orthodontic treatment, structural balance and transient muscle atrophy induced from orthognathic surgery make it easier to decompensate teeth against occlusal forces or structural limitations. Compared with the conventional surgical-orthodontic approach, having surgery first eliminates the unsightly pre-surgical appearance and allows the chief complaint of the patient to be addressed at the beginning of treatment. In addition, immediate resolution of the soft tissue and skeletal imbalance is an added advantage with the surgery first approach. In this respect, a treatment procedure using the surgery-first approach of a patient with facial asymmetry and unilateral posterior crossbite will be shown.

**SUBJECT AND METHOD:** A 29 year-old female with severe facial asymmetry and a unilateral posterior crossbite. To resolve her facial asymmetry, a differential mandibular set-back was planned. After a bilateral sagittal split ramus osteotomy was performed first, post-operative orthodontic treatment was carried over. Transverse dental decompensation was undertaken by posterior intrusion via mini-implants unilaterally.

**RESULTS:** The total period of active treatment was 18 months. Both the patient's occlusion and facial appearance were significantly improved by the surgery-first approach.

**CONCLUSIONS:** Treatment outcomes balanced with facial aesthetics, function, and stability can be achieved with surgery-first orthodontic treatment once correct case selection, diagnosis, and treatment planning are established.

#### CP110 NON-EXTRACTION TREATMENT OF CROWDING BY FIXED APPLIANCES – CASE REPORT

**Zorana Stamenkovic**, Vanja Stojic, Jelena Stambolija, Nenad Nedeljkovic, Natasa Randjelovic, Department of Orthodontics, School of Dentistry, University of Belgrade, Serbia

AIM: To show that a patient with crowding can be successfully treated with fixed appliances without extractions.

SUBJECT AND METHOD: A 12 year old male with crowding treated with upper and lower fixed appliances. Clinical examination, study cast analysis, dental pantomogram and lateral cephalogram were undertaken before treatment. Clinical examination and study cast analysis showed a Class I occlusion with crowding of 10 mm in the upper and 8.5 mm in the lower arch, and ectopic tooth 25. The lateral cephalogram showed bimaxillary retrognathism (SNA: 81°, SNB 79°), skeletal Class I (ANB: 2°), forward facial rotation (Björk: 393°) and retroclination of the upper and lower incisors (I/SpP 76°, i/MP: 101°). Treatment lasted for 36 months, during which archwires for expansion of the upper dental arch were used to correct the crossbite and active coil springs were used to attain space for tooth 25. In the final stage of the treatment vertical intermaxillary elastics were used, as well as elastics for the correction of the midline deviation.

RESULTS: At the end of the treatment a stable Class I occlusion was achieved, the overjet was 2 mm and the overbite 3 mm. The patient is now in period of retention, without signs of relapse and wears the splints every third night.

CONCLUSIONS: A Class I malocclusion with crowding can be successfully treated by upper and lower fixed appliances, without extraction of permanent teeth. The results of treatment were stable with a good occlusion, correct orofacial functions and acceptable facial aesthetics.

#### CP111 TREATMENT OF DISTAL DEEP BITE BY FIXED APPLIANCES – CASE REPORT

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AIM: To show that a patient with distal deep bite can be successfully treated with fixed appliances.

SUBJECT AND METHOD: A 16 year old female with a distal deep bite treated with upper and lower fixed appliances. A clinical examination and study cast, dental pantomogram and lateral cephalogram analysis were carried out before treatment. Study cast analysis showed a half-unit Class II occlusion with a narrow upper and lower dental arch, and crowding of 5 mm in the upper and 8 mm in the lower jaw. The lateral cephalogram showed a skeletal distal and deep bite (ANB: 4°, B: 17°), forward facial rotation (Björk: 391°) and retroclination of the upper and lower incisors (I/SpP: 91°, i/MP: 92°). Treatment lasted 24 months and in the final stage intermaxillary Class II elastics were used.

RESULTS: At the end of treatment a stable Class I occlusion was achieved, the overjet was 3 mm and the overbite 3 mm. The patient is now in retention, without signs of relapse and wears the splints every night.

CONCLUSIONS: Successful treatment of a distal deep bite can be achieved with upper and lower fixed appliances and intermaxillary Class II elastics. Treatment was stable with a good occlusion, correct orofacial functions and acceptable facial aesthetics.

#### CP112 ORTHODONTIC TREATMENT OF A UNILATERAL CROSSBITE IN AN ADOLESCENT

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AIM: Elimination of a unilateral crossbite in order to obtain harmonized and symmetrical arches, to achieve a nice smile design and facial aesthetics, and to remove the barrier to good pronunciation of velar consonants and improve masticatory function.

SUBJECT AND METHOD: A 13.5 year old patient presented with the following problem: unilateral left-side crossbite, where the second premolar is in a palatal position and in the reverse a mismatched relationship with its antagonists; migration of neighbouring teeth towards the empty space created by the palatally positioned second premolar, with a worsening tendency; crowding in the dental arches; midline deviations in the upper and lower jaws; difficulty in pronunciation of velar consonants; difficulty in mastication and slight facial asymmetry. The patient was treated with a fixed orthodontic appliance. After disarticulation and levelling of the dental arches, the next step was to create space for the second premolar by pulling it from the palatal position into its natural

place resolving at the same time crowding and aligning the arches. Therapy was conducted with different diameter arches, springs and the combination of elastic and metallic traction.

**RESULTS:** A normal occlusion was achieved that resulted in a nice smile, facial harmony, and better pronunciation of velar consonants.

**CONCLUSIONS:** It is necessary for the accurate identification of teeth prior to developing a treatment strategy.

#### CP113 THE ROLE OF THE OCCLUSAL SPLINT IN DIAGNOSING AND REDUCING TEMPOROMANDIBULAR DYSFUNCTION SYMPTOMS BEFORE ORTHODONTIC TREATMENT – A CASE REPORT

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**AIM:** To evaluate the role of an occlusal splint in the orthodontic treatment of temporomandibular dysfunction (TMD) patients.

**SUBJECT AND METHOD:** A 23-year-old patient with a diastema presented for orthodontic treatment. Clinical evaluation revealed left temporomandibular joint pain and pathological sounds. Complete records were taken, including cephalometric and occlusal registration. After registration of centric relation and mounting the models in an Artex articulator, a propulsion interference due to a migrated molar was identified. An acrylic occlusal splint was constructed in centric relation. Regular appointments for adjustment of the splint followed, and the status of TMD was re-evaluated after two months. Radiographic investigation with and without the splint revealed a more stable condylar position after splint therapy.

**RESULTS:** After two months, the pain disappeared and the sounds lowered their intensity. Orthodontic treatment could start in order to close the diastema and obtain a functional and aesthetic result.

**CONCLUSIONS:** Correct occlusal evaluation and model mounting can help the orthodontist in obtaining a correct diagnosis and reducing the risk of unrecognised TMD problems.

#### CP114 A CASE STUDY OF TREATMENT OF A SKELETAL CLASS III MALOCCLUSION WITH A UNILATERAL CROSSBITE THROUGH ADJUSTING THE OCCLUSAL PLANE CANT

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**AIM:** A skeletal Class III malocclusion with a midline shift and mandibular deviation is often referred for orthodontic treatment combined with orthognathic surgery. However, patients sometimes refuse to undergo orthognathic surgery because of their personal life or desire to avoid general anaesthesia. This case reports, as an alternative to surgery, camouflage treatment that successfully improved a skeletal Class III malocclusion with a lateral crossbite by adjusting the cant of the occlusal plane.

**SUBJECT AND METHOD:** A 28 year 6 month old female who was concerned about the crossbite and crowding of her anterior teeth. She had an Angle Class III malocclusion on the right and an Angle Class I on the left, and a deficient posterior buccal overjet with a crossbite in the left premolar area. The frontal image showed a deviation of the mandible to the left. The maxillary and mandibular dental midline was deviated 3.5 mm to the right and 2.0 mm to the left. Cephalometric analysis revealed a skeletal Class III (ANB =  $-0.5^\circ$ ) malocclusion, maxillary incisor proclination and uprighted mandibular incisors. She was diagnosed with a skeletal Class III malocclusion with a unilateral crossbite. She refused to undergo orthognathic surgery. Therefore, orthodontic camouflage treatment was proposed using a maxillary hyrax expansion appliance for slow expansion along with extraction of both maxillary and mandibular first premolars. Changing the cant of the occlusal plane and attaining a Class I molar relationship with a consequent coincidence of the maxillary and mandibular dental midlines would depend on patient compliance in using intermaxillary elastics (Class III on right side, Class II on left side) as well as anterior diagonal elastics.

**RESULTS:** The molar relationships in terms of left-right asymmetry due to mandibular deviation were improved through tooth movement and the occlusal plane cant which was adjusted by

increasing the amount of leaning on the left. An acceptable overbite and overjet with tight interdigitation was also achieved.

**CONCLUSIONS:** Not only tooth movement, but also occlusal plane cant change using intermaxillary elastics was effective in the treatment of a skeletal Class III malocclusion with a midline shift.

#### CP115 MOLAR DISTALIZATION WITH PALATAL MINISCREWS

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**AIM:** The use of miniscrews has resulted in a major change in orthodontic treatment mechanics. They have replaced conventional unaesthetic and compliance dependent extraoral appliances with well accepted intraoral mechanics. Miniscrews can be used in molar distalization with intraoral distalization appliances in Angle Class II malocclusions instead of headgear appliances.

**SUBJECT AND METHOD:** A 16-year-old boy with the complaint of anterior crowding and smiling problems. In clinical examination, there was minimal anterior crowding with an Angle Class II canine and molar relationship and a deep bite. Cephalometric analysis showed a skeletal Class I malocclusion (SNA: 81°, SNB: 76°, ANB: 5°) and a balanced growth pattern (GoMe/SN: 33°, Jarabak: 64%). Upper and lower incisor inclinations were in the ideal positions (U1/NA: 24°, L1/NB: 23°, IMPA: 92°). The benefit system was applied with two palatal miniscrews to treat the Class II molar and canine relationships. After distalization conventional orthodontic treatment was planned.

**RESULTS:** After 8 months of distalization an ideal Angle Class I molar and canine relationship was achieved. Distalization of 8 mm was obtained. The canines teeth reached an ideal Angle Class I relationship by themselves with their interseptal ligaments. After distalization a 3 degree increase was observed in GoMe/SN angle.

**CONCLUSIONS:** With support from the palatal region, the maxillary first molars were distalized without anchorage loss. An Angle Class I occlusion was successfully achieved.

#### CP116 TREATMENT EFFECTS OF HERBST APPLIANCES IN A CLASS II DIVISION 1 MANDIBULAR RETROGNATHIC PATIENT: A CASE REPORT

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**AIM:** The dentoskeletal effects of Herbst appliances have been reported in several studies. The purpose of this research was to evaluate, using cephalometry, the skeletal and dental effects of treatment using the Herbst appliance in Class II division 1 malocclusion subject with mandibular retrognathism.

**SUBJECT AND METHOD:** A 14 year 10 month old male treated with the Herbst appliance. Before treatment study cast analysis was undertaken and a dental pantomograph, lateral cephalogram and intra-and extraoral photographs obtained. The overjet was 7.13 mm, the overbite 7 mm and the patient had a Class II occlusion. ANB angle was 7.9°, U1-SN 98.3° and IMPA 95.7°. Post-treatment study casts, intra- and extraoral photographs and a lateral cephalogram were obtained.

**RESULTS:** After 10 months an Angle Class I relationship and normal overjet and overbite were achieved.

**CONCLUSIONS:** The treatment effects of the Herbst appliance were skeletal and dental changes which contributed to the Class II correction.

#### CP117 ORTHODONTIC TREATMENT OF A CLASS I MALOCCLUSION WITH AN ANTERIOR CROSSBITE OF FOUR MAXILLARY INCISORS – A CASE REPORT

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**AIM:** To demonstrate the orthodontic correction, without orthognathic surgery, of a malocclusion case with complete anterior crossbite.

**SUBJECT AND METHOD:** A 20-year-old female with a skeletal Class I jaw relationship, orthodivergent facial pattern, Class I malocclusion with space deficiency, anterior crossbite of maxillary four incisors, a 4.5 mm deep overbite, a high canine position, and concave profile. A decision was taken to treat

the patient without surgery by extraction of the maxillary second premolars and mandibular first premolars for relief of crowding and anterior crossbite correction.

**RESULTS:** The total treatment time was approximately 24 months. After treatment, an ideal overjet and overbite was established, without any anterior crossbite or high canine, with a stable and functional occlusion. The facial profile was also improved.

**CONCLUSIONS:** Many modalities have been suggested for treatment of an anterior crossbite of four maxillary incisors. All factors should be taken into consideration to provide the best possible results regarding function, aesthetics and stability.

#### CP118 A MODIFIED ROSID GYRO AN INNOVATIVE DIGITAL DEVICE TO ESTIMATE PITCH, ROLL AND YAW

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**AIM:** To estimate the pitch roll and yaw by placing a three- axis MEMS gyroscope on the fox plane and to orientate the head in the natural head position with the help of spirit levels.

**MATERIALS AND METHOD:** The patient is made to sit in a balanced head position with the help of two spirit levels struck to the face. The head is orientated by centralising the two spirit levels to attain a balanced head position. The device is placed in the mouth in the occlusal plane of the maxilla and is checked for centralisation again. The reading for pitch and roll is recorded. Yaw is measured by moving the slider from midline marked on the device to the midline of patient's maxilla.

**RESULTS:** The result is shown in digital output in terms of x, y and z. X roll is measured in degrees and Z = yaw in millimetres.

**CONCLUSIONS:** The Rosid-gyro is a device for measuring pitch, roll and yaw and maintaining orientation, based on the principles of angular momentum. Its key advantages are instant readings, minimized error in readings, and economy.

#### CP119 ORTHODONTIC TREATMENT OF A CLASS II SUBDIVISION VERTICAL GROWTH PATTERN WITH AN OPEN BITE: A CASE REPORT

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**AIM:** To present the orthodontic treatment of a patient with a vertical growth pattern and a severe open bite who did not want surgical treatment.

**SUBJECT AND METHOD:** A 13 year-old male with a vertical growth pattern, open bite and increased upper and lower incisor inclinations. Clinical examination showed a 1 mm overjet, 4 mm negative overbite and an Angle Class II subdivision relationship. Cephalometric analysis showed a Class I skeletal relationship and a skeletal vertical growth pattern (FMA: 35.3°, Mx-MD: 35.5°, SN-PP: 10.2°, SN-GoMe: 45.7°), the upper (U1-SN: 109.6°, U1-PP: 119.8°) and lower (IMPA: 96.8°, L1/NB: 38.3°) incisors were proclined. Non-surgical treatment started with the modified Kim technique (Enacar *et al.*). With this technique, 0.016 × 0.022 inch upper accentuated-curve and lower reverse-curve nickel titanium archwires were used in place of multiloop wires with intermaxillary elastics applied in the canine areas. Because of poor cooperation with intermaxillary elastics, four miniscrews were placed to achieve extrusion of the upper and lower incisors. They were applied between the central and lateral incisors in the upper arch and bilaterally between the lateral incisor and canine in the lower arch. Extrusion springs (0.016 × 0.022 inch titanium molybdenum alloy) were bent and inserted in the slots of the screws.

**RESULTS:** After extrusion was achieved, clinical examination showed a 3 mm overjet and a 2 mm overbite. FMA, SN-PP, SN-GoMe were decreased (1.4°, 1.6° and 0.8°, respectively) but Mx-Md angle was increased. Upper and lower incisor inclinations (U1-SN: 1.6°, U1-PP: 3.2°, IMPA: 15.3°, L1/NB: 14.7°) were decreased at the end of treatment.

**CONCLUSIONS:** After 20 months, the occlusion was improved and a normal overjet and overbite were achieved. Satisfactory aesthetic and functional results were provided. The patient was successfully treated by non-extraction and non-surgical treatment.

#### CP120 THE USE OF MICRO-IMPLANTS FOR ANCHORAGE REINFORCEMENT. PRESENTATION OF THREE CASES

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**AIM:** To present clinical cases in which there was need for mesialization of the posterior segments due to agenesis of the upper and lower premolars as well as to the absence of the upper lateral incisors. Micro-implants were inserted in order to facilitate mesial movement of the molars and reinforce anchorage of the anterior teeth.

**SUBJECTS AND METHOD:** Three cases with agenesis of the permanent teeth, either second premolars or upper lateral incisors, in which mesial movement of the posterior segments was planned. The anterior teeth were stabilized by indirect skeletal anchorage in the upper arch and direct skeletal anchorage in the lower arch.

**RESULTS:** Micro-implants in the paramedian region of the palate were used in two cases with a very good result in the reinforcement of minimum anchorage. In the second case, the insertion site was in the lower arch between the canines and the first premolars. Mesialization of the molars was also very successful.

**CONCLUSIONS:** The use of micro-implants is helpful for reinforcement of minimum anchorage and mesialization of the molars.

#### CP121 ANKYLOSIS OF THE TEMPOROMANDIBULAR JOINT AFTER INFECTION: REPORT OF FOUR CASES

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**AIM:** To describe the craniofacial and dentoalveolar characteristics observed in four patients diagnosed with ankylosis of the temporomandibular joint (TMJ) as a complication of otomastoiditis and to describe the orthodontic aspects of the multidisciplinary treatment of these patients.

**SUBJECTS AND METHOD:** Four patients (age range 9-18 years) diagnosed with ankylosis of the TMJ caused by a septic arthritis as a complication of otomastoiditis. Clinical examination showed a decrease of mouth opening, mandibular growth impairment and increased facial asymmetry. The initial panoramic radiograph revealed a bone mass on the affected mandibular condylar process. On the computed tomographic scan of the affected TMJ before surgery, deformity of the condylar process was observed with bony fusion between the condylar head and the base of the skull. The medical history showed that patients had an ear infection with swelling behind the ear at an early age and prior to the onset of the symptoms of ankylosis.

**RESULTS:** All four patients were treated surgically with a costochondral graft shortly after diagnosis of ankylosis. The surgical treatment was combined with intensive physiotherapy and functional appliance therapy. Functional appliances prevent further eruption of the molars to preserve mouth opening. One patient showed early recurrence of ankylosis and was treated with a gap arthroplasty using an interpositional silicone block. Another patient was treated with a total joint replacement to restore mouth opening function and a symmetrical facial appearance. All four patients showed acceptable mouth opening (range 10-31 mm) and symmetrical growth of the mandible.

**CONCLUSIONS:** Ankylosis of the TMJ interferes with facial skeletal and dentoalveolar development in the growing child. Therefore, treatment should be initiated as soon as the ankylosis is diagnosed. Although there is no consensus on the treatment of TMJ ankylosis, the results of this case series suggest early mobilization, intensive physiotherapy and functional appliance therapy as a successful approach.

CP122 AN ORTHODONTIC SOLUTION FOR AN IMPACTED UPPER SECOND PRIMARY MOLAR WITH PRESERVATION OF THE PREMOLARS IN MIXED DENTITION###

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**AIM:** To describe the treatment solution for an impacted upper right second primary molar in the mixed dentition. The treatment goal was to achieve bite correction without extracting the permanent teeth and to extract the impacted primary molar under optimal conditions.

**SUBJECT AND METHOD:** An 8-year-old male diagnosed with an overbite and an anteinclined and mesialized upper first permanent molar. Radiographic examination showed an impacted second primary molar situated apically to the upper first premolar germ. A low pull asymmetric headgear was first applied for permanent molar distalization and to correct the anteinclination. The upper right first primary molar was extracted. After eruption of the first premolar a partial fixed orthodontic appliance was the treatment of choice following the usual arch sequence. Asymmetric coil springs were used to gain more space for creating optimal conditions for surgical extraction of the impacted upper right second primary molar, followed by surgical exposure and orthodontic alignment of the right upper second premolar.

**RESULTS:** The surgical elimination of the impacted primary molar and orthodontic alignment of the surgically exposed premolar resulted in acceptable premolar-primary molar relationship in the late mixed dentition. Distal molar movement improved the molar relationship, but further treatment was needed to complete the Class II correction. Improvement of alveolar bone volume and gingiva was perceptible.

**CONCLUSIONS:** The presented case shows the advantages of space gain as a first step in solving tooth impaction. The applied therapy is an alternative in similar cases to achieve an equilibrated occlusion with smaller surgical interventions and preservation of permanent teeth.

CP123 USE OF MINI-IMPLANTS FOR AN ADULT WITH CROWDED CLASS II DIVISION 1 AND AN ANKYLOSED UPPER LATER INCISOR

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**AIM:** The top jet appliance is a feasible device for routine bodily molar distalization. This case report presents the orthodontic treatment of an adult with a crowded Class II division 1 malocclusion with an ankylosed upper left lateral incisor.

**SUBJECT AND METHOD:** A 30-year old female concerned about the unaesthetic appearance of her crowded dentition localized in both the upper and lower arches while smiling. She presented with a moderate Class II division 1 incisor relationship with ankylosed UL2 and edge-edge upper left first premolar on a mild Skeletal II base with an average maxillary-mandibular planes angle and average lower face height. Crowding was moderate in the upper and lower arches. Treatment was commenced using the top jet appliance, followed by retraction in all four quadrants with fixed appliances.

**RESULTS:** Distalization of the maxillary molars into a Class I molar relationship was achieved as well as a canine Class I relationship. In order to achieve an ideal overbite and overjet a prosthetic aid was required for the ankylosed UL2.

**CONCLUSIONS:** This case illustrates the minimalistic approach and versatility of the top jet appliance in an adult with a challenging crowded Class I malocclusion.

CP124 MULTIDISCIPLINARY MANAGEMENT OF AN IMPACTED AND SEVERELY ROTATED CENTRAL INCISOR: A CASE REPORT

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**AIM:** Maxillary central incisors have a crucial role in facial aesthetics and phonetics. Maxillary central incisor impaction is relatively uncommon, at a ratio of 0.06-2 per cent. Supernumerary teeth are the

main cause of upper canine impaction. The aim of this case report is to present the multidisciplinary treatment of an impacted and severely rotated maxillary central incisor.

**SUBJECT AND METHOD:** A 14 year-old female referred with the complaint of an unerupted maxillary central incisor. Besides the impacted the maxillary central incisor, a supernumerary tooth had been diagnosed radiographically. Primarily the impacted supernumerary tooth was surgically removed. Fixed orthodontic appliances were used to align the upper arch and gain adequate space for the impacted central incisor. The impacted tooth was surgically exposed and a nickel titanium closed coil spring with an orthodontic attachment was bonded to the impacted tooth. After forced eruption was performed, the palatal surface of maxillary central incisor was facing towards the vestibular side. According to periodontal consultation, it was decided not to correct the rotation of central incisor due to the risks of gingival recession.

**RESULTS:** Orthodontic treatment was completed with a Class I molar relationship with an ideal overjet and overbite. The 180 degree rotated maxillary central incisor was restored with the zirconia all-ceramic system. After restorative treatment of the maxillary central incisor, a considerable aesthetic result was obtained.

**CONCLUSIONS:** A favourable aesthetic and functional outcome can be achieved in cases with impacted and severely rotated teeth using a multidisciplinary approach including surgical, orthodontic and restorative procedures.