

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

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#### CP 01 CUSTOMIZED LINGUAL APPLIANCE TREATMENT OF AN ANGLE CLASS III MALOCCLUSION WITH AN OPEN BITE AND CROWDING: A CASE REPORT

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**AIMS:** Recently, adult patients seeking orthodontic treatment have indicated a preference for aesthetic treatment options, which include lingual orthodontics and thermoformed appliances or removable polyurethane aligners. The key to successful treatment in lingual orthodontics is the fabrication of customized lingual appliances to meet the wide-range of requirements of each patient due to highly variable lingual morphology. The aim of this poster is to present the treatment of a patient with an open bite and crowding, which were treated with a customized lingual appliance.

**SUBJECT AND METHOD:** A 24-year-old Japanese female presented with the chief complaint of not exhibiting contact between upper and lower anterior teeth and mild crowding. Clinical examination revealed an open bite with an Angle Class III molar relationship, facial asymmetry with mandibular deviation to the left side and a lower midline shifted 2.0 mm towards the left. The overjet was 3.9 mm and the overbite was -2.9 mm. There was a maxillary arch length discrepancy of -0.5 mm and -1.5 mm in the mandibular arch. Two treatment options were considered. The first was bimaxillary orthognathic surgery with extraction of third molars, correcting facial asymmetry and the second was labial aesthetic fixed appliance or lingual fixed appliance with extraction of third molars, correcting the open bite and crowding. The patient chose the second option with a lingual fixed appliance. The treatment objective was to relieve the open bite and crowding by extraction of third molars and to correct the malocclusion with the use of customized lingual appliances.

**RESULTS:** Treatment was initiated by extracting the maxillary and the mandibular third molars. A fully customized lingual appliance was placed using indirect bonding with a customized bonding tray on both arches. After 2 years 2 months of therapy, a successful treatment outcome was achieved by correcting the open bite and crowding resulting in a Class I molar relationship. Stability of the occlusion during the retention stage was also exhibited.

**CONCLUSION:** The presented case indicates that the customized lingual appliance can be a useful approach to correct a dental malocclusion involving an open bite.

#### CP 02 MIGRATION OF SECOND MOLARS TO THE SUB-CORONOID REGION: A CASE REPORT

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**AIMS:** To understand normal dental development and tooth positioning, aetiology and the phenomena of tooth migration. Furthermore, this case report highlights the significance of clinical and radiographic observation of unerupted teeth during orthodontic treatment.

**SUBJECT AND METHOD:** A 12 year old boy referred in November 2008 for an orthodontic opinion regarding his malocclusion. A dental pantomogram (DPT), taken at the initial assessment, showed the presence of all teeth except the third molars. The lower second molars were unerupted with incomplete root formation and with a distal angulation. These teeth failed to erupt during the course of treatment. A new DPT was taken at the end of orthodontic treatment, which showed that the mandibular second molars had now ascended up the mandibular ramus, with no pathological changes observed around the crowns of the teeth.

**RESULTS:** The aetiology of tooth migration is not fully understood, however it is suggested the crowns leads the migration following the long axis. Moreover it is believed that intraosseous tooth migration may be a result of the force directed toward the crown as a result of the reversal of blood flow direction during its passage through the pulpal vessels. In recent cases with canines, a

link between genetics has also been made with tooth migration, however the migration process itself is still poorly understood.

**CONCLUSION:** This case highlights the importance of ensuring that second molars have erupted in a favourable position at the end of active orthodontic treatment. The unique aspect of this case shows that movement of the second molars was due to pure migration as there was no pathological lesion associated with their movement to the coronoid.

#### CP 03 INTERDISCIPLINARY TREATMENT OF A PATIENT WITH A SEVERE SKELETAL OPEN BITE AND AMELOGENESIS IMPERFECTA

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**AIMS:** Amelogenesis imperfecta is a dental anomaly characterized by enamel hypocalcification and its treatment becomes complicated when it is associated with a skeletal open bite. The aim of this case report is to present the orthodontic, surgical and restorative treatment of a patient with amelogenesis imperfecta who had a severe vertical growth pattern.

**SUBJECT AND METHOD:** An 11-year old female with the chief complaint of the inability to bite food and anomaly of her teeth. The overbite and overjet were -13 mm and 4 mm, respectively. The maxilla was narrow and the molar relationship was Class I on the right and Class III on the left. Based on lateral cephalometric analysis, the following values were obtained: SNA: 75°, SNB: 73.5°, ANB: 1.5°, GoGnSN: 51°, UI/PP: 117°, IMPA: 69°. The initial treatment plan consisted of controlling the vertical maxillary growth with occipital headgear and rapid maxillary expansion with a bonded acrylic expansion appliance. A fixed tongue crib was applied after the expansion period. However, the excessive maxillary vertical growth continued and the open bite increased, so it was decided that the ideal treatment would be orthognathic surgery in adulthood. At 17 years 5 months, pre-surgical orthodontic treatment was started and bimaxillary orthognathic surgery was performed (maxillary impaction and advancement, mandibular setback). After the debonding phase, full mouth zirconium restorations were placed.

**RESULTS:** The open bite malocclusion was successfully corrected with a combined orthodontic-surgical approach and an ideal interincisal relationship was achieved. A functional and stable occlusion with a satisfactory aesthetic outcome was obtained.

**CONCLUSION:** Although early treatment is essential in the treatment of malocclusions, growth modification and compensation may be inadequate in the presence of severe skeletal anomalies and orthognathic surgery may be the only option. When amelogenesis imperfecta cases are severe, fixed orthodontic treatment mechanics are limited and can create a challenge for physicians during the treatment period.

#### CP 04 A STUDY ON DIFFERENTIALLY EXPRESSED SALIVARY PROTEINS OF POST-ORTHODONTIC TREATMENT PATIENTS VIA THE PROTEOMIC APPROACH

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**AIMS:** The biological reactions involved in post-orthodontic treatment relapse have been the topic of research interest for many years but knowledge in this field is limited. This study aimed to detect the differentially expressed salivary proteins of post-orthodontic treatment patients using a proteomic approach.

**MATERIALS AND METHOD:** Following ethical approval, a total of 5 ml of unstimulated whole saliva was collected based on a convenience sampling from 15 post-orthodontic patients at debond, 6 months post-debond and from 10 non-orthodontic patients as a control. Samples were then subjected to liquid chromatography mass spectrometry. Differentially expressed proteins were

identified. A Venn diagram was used to detect the co-expressed proteins between groups whilst Panther software was used for further identification of the related biological process involved.

**RESULTS:** One hundred and forty six proteins were expressed in the control group, whilst 128 proteins and 135 proteins were expressed in the debond and 6 months post-debond group, respectively. Two types of proteins were co-expressed in all groups. The proteins involved in locomotion were detected in the debond group only whilst immune system proteins were detected in both the debond and 6 months post-debond group.

**CONCLUSION:** In summary, the proteins involved in immune response and locomotion process could be used as biomarkers in monitoring outcomes and stability of post-orthodontic treatment.

#### CP 05 LONGITUDINAL MANAGEMENT OF RECURRENT TEMPOROMANDIBULAR JOINT ANKYLOSIS FROM INFANCY TO ADULTHOOD INVOLVING SURGICAL AND ORTHODONTIC TREATMENT

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**AIMS:** To present the longitudinal management of recurrent temporomandibular joint (TMJ) ankylosis from infancy to adulthood involving surgical and orthodontic treatment.

**SUBJECT AND METHOD:** A 2-year-old girl referred with the chief complaints of restricted mouth opening and micrognathia due to bilateral TMJ ankylosis. For stage I treatment during early childhood (6 years-old), a high condylectomy and interpositional arthroplasty were performed. Although the amount of mouth opening increased, TMJ ankylosis recurred. Obstructive sleep apnoea (OSA) symptoms appeared. For stage II treatment during early adolescence (12 years-old), gap arthroplasty, coronoidectomy, bilateral mandibular distraction osteogenesis, and orthodontic treatment with extraction of the four first premolars was performed. Although the treatment results were satisfactory, TMJ ankylosis recurred. Since the OSA symptoms reappeared, she used a continuous positive airway pressure device. For stage III treatment after completion of growth (20 years-old), a low condylectomy, coronoidectomy, reconstruction of the bilateral TMJs with artificial prostheses accompanying counterclockwise rotational advancement of the mandible, genioglossus advancement, and orthodontic treatment were performed.

**RESULTS:** After stage III treatment, the amount of mouth opening significantly increased. With mandibular advancement and ramus lengthening, there was a significant improvement of facial profile, a Class I canine and molar relationship, and a normal overbite/overjet. The OSA symptoms were also relieved. Treatment results were well maintained at the one-year follow-up. Treatment modalities for TMJ ankylosis can differ according to the duration of ankylosis, age, and degree of deformity.

**CONCLUSION:** A treatment flowchart suggested in this case report might be used as a guideline for selecting the appropriate treatment time and methods for managing TMJ ankylosis.

#### CP 06 CASE REPORT: TREATMENT OF A PATIENT WITH A SKELETAL OPEN BITE BY SURGERY FIRST APPROACH IN ORTHOGNATHIC SURGERY

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**AIMS:** To present the orthodontic and surgical treatment of an adult patient with a high angle growth pattern and a skeletal open bite malocclusion.

**SUBJECT AND METHOD:** A 22 year old male with the chief complaints of a prognathic mandible and ineffective chewing of food. In clinical examination, a -0.5 mm overjet and a 2.5 mm open bite was observed but no facial asymmetry. From the above clinical and skeletal findings, the patient was diagnosed with a skeletal Class III malocclusion with a long lower anterior face height. Surgical correction was advised to achieve aesthetic and functional results in both the soft tissue and dental aspects. After discussion between the orthodontists and surgeons, a surgical treatment plan was drawn up as follows: 1. Orthognathic surgery before orthodontic treatment. 2. A Le Fort I posterior impaction by 2 mm with, at the same time, 6 mm protraction.

**RESULTS:** The total duration of treatment was 11 months. The skeletal open bite was corrected with the surgery first approach and aesthetic and functional dentofacial changes were obtained with treatment. The initial chewing complaints disappeared due to the ideal occlusion.

**CONCLUSION:** Although the conventional surgical-orthodontic approach can reliably treat dentofacial anomalies, the prolonged period of orthodontic treatment required, especially in the pre-operative period, is cumbersome and time consuming. The shortened total treatment time might be an extra benefit in these cases.

#### CP 07 ORTHODONTIC PERSPECTIVES OF INTERDISCIPLINARY TEAM WORK AT SEMMELWEIS UNIVERSITY

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**AIMS:** To provide orthodontic screening, analysis and treatment for patients with diabetes as the part of the diabetes-dental working group at Semmelweis University. A further aim was to participate in the Budapest Diabetes Day event with the diabetes-dental working group to provide free oral screening and dental consultation.

**MATERIALS AND METHOD:** To fulfil this aim, the first author joined the diabetes-dental working group. During regular office hours, which is provided on a weekly basis, patients complete a questionnaire and are provided with orthodontic care and analysis. Before every examination the patient completed a questionnaire, in order to comply with ethical approval (SE RKEB:204/2018). Participation in this screening was voluntary. All the patients under the age of 18 years were referred to the diabetes-dental working group where a dental pantogram, lateral cephalogram, impressions and photographic documentation were performed.

**RESULTS:** Registration of the data commenced in September, 2018. In 12 cases (patients aged 12-18 years) orthodontic treatment had already been started. Four patients had removable functional appliances and eight multibonded appliance. Six of the 12 patients (50%) needed skeletal transverse expansion. All patients in the study group had type 1 diabetes. One hundred and sixteen oral examinations were performed at the Budapest Diabetes Day event in 2018. There were 47 patients (22 female, 25 male), under the age of 18 years. For further treatment they were guided to Semmelweis University.

**CONCLUSION:** There is a need for interdisciplinary cooperation with the help of an orthodontist. Diabetic patients have a higher risk of oral health problems (caries, infections) especially in cases of crowded teeth or different types of malocclusion. Orthodontic treatment may help them to have better metabolic results.

#### CP 08 CO-DEVELOPMENT OF A WEBSITE FOR YOUNG PEOPLE AND PARENTS ABOUT HYPODONTIA AND ITS TREATMENT

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**AIMS:** Hypodontia has a significant quality of life impact for those affected and often requires complex treatment. High quality, evidence-based, unbiased information is required to help people prepare for choosing treatment. This study aimed to work with young people and parents to co-develop an innovative and interactive website about hypodontia, its treatment and choosing care.

**MATERIALS AND METHOD:** Funding was secured from National Institute of Health Research. An interdisciplinary collaboration of authors was formed with representation across all dental specialties involved in hypodontia care. Young people with hypodontia and their parents contributed to the website development at all stages; from inception, throughout design and development, piloting, and devising the dissemination and promotion strategy. In addition, young people from 'seldom heard' communities were invited to comment on content and language to ensure information was clear, accessible and engaging. Best practice guidance for developing

patient information was followed and experts in health communication were consulted during content development.

**RESULTS:** The website [www.MyMissingTeeth.co.uk](http://www.MyMissingTeeth.co.uk) has successfully been co-developed. The website contains five sections: 1) Information about the website - purpose, target audience, sources of evidence; 2) Information about hypodontia - background information, commonly missing teeth, impact of hypodontia; 3) Information about treatment options; 4) Introduction to making decisions; 5) Further information - contributors, funding, references, support. Illustrations and animations were created by a professional illustrator to support text information and provide interactive elements to engage the audience. Photographs with annotated diagram overlays provide examples of how treatment works and possible outcomes. There is a section to help young people and families think about issues caused by missing teeth and their preferences for treatment. Piloting showed the website was informative, engaging and functional. Evaluation tools have been incorporated into the website to map use across the different sections of the website. In depth evaluation using qualitative and quantitative methods is planned for the 1-year post-launch.

**CONCLUSION:** Co-development promoted a design that is engaging and content that is age-appropriate and relevant. It is hoped that the website will improve understanding of hypodontia and its treatment to support young people and their families to prepare for decision-making.

**CP 09 A CLINICAL CASE OF DISTRACTION OSTEOGENESIS IN CLEFT PALATE PATIENT: STEP-BY-STEP**  
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**AIMS:** Distraction osteogenesis (DO) is an alternative when a bone defect is very large making it difficult and unpredictable to use a conventional graft to solve it. The purpose of this presentation is to describe a patient with cleft palate (CP) who underwent this therapeutic approach.

**SUBJECT AND METHOD:** A 21 year old female seeking orthodontic treatment for correction of her malocclusion and reduction of a bilateral CP. The treatment plan consisted of placement of fixed appliances with Roth 0.018 prescription and an intraoral bone anchored distractor ('Liou' KLS Martin Group®). The distraction period was two weeks.

**RESULTS:** The use of DO is an efficient method when the bone and tissue defect is very extensive, and the predictability of a conventional bone graft is lower. The results presented in this clinical case show a significant increase of gingival tissue volume and cleft reduction.

**CONCLUSION:** DO allows reduction or elimination of the need for a secondary bone graft, by bringing the alveolar bone and soft tissue closer and helping orthodontic treatment with a better aesthetic outcome.

**CP 10 EXTRACTION OF UPPER LATERALS VERSUS UPPER PREMOLARS IN CLASS III SKELETAL PATIENTS**

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**AIMS:** To present the aesthetic evaluation, after extractions, in two skeletal Class III patients who underwent orthognathic surgery. Usually Class III patients present proclination of the upper incisors. To allow for correct incisor position before orthognathic surgery, upper extractions are often required. The usual extraction pattern is of upper first premolars. However, aesthetics and the general condition of the patient's teeth should also be considered. This presentation will show two similar cases solved with two different extraction approaches.

**MATERIALS AND METHOD:** Two cases showing patients who underwent orthognathic surgery, one where the upper laterals were extracted and the other where the upper first premolars were extracted.

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

**CONCLUSION:** Often in preparation for orthognathic surgery, upper extractions are the best option to achieve a better aesthetic, stable and functional occlusion. Either option has advantages and disadvantages which need to be evaluated by the clinician and determined case by case.

**CP 11 ORTHODONTIC TREATMENT OF A SKELETAL CLASS II PATIENT USING A HYBRID EXPANDER AND MONOBLOC APPLIANCE: A CASE REPORT**

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**AIMS:** To describe the treatment of a skeletal Class II patient with transverse maxillary deficiency using a hybrid expander and monobloc appliance.

**SUBJECT AND METHOD:** An 11 year 4-month-old female with the chief complaint of a midline diastema and mandibular retrusion. The patient had a convex profile, an Angle Class II molar and canine relationship, a midline diastema, a deep labiomental sulcus, a 6.5 mm overjet and 4.5 mm overbite according to the clinical examination. Initial cephalometric analysis showed SNA: 83°, SNB: 77°, ANB: 6°, Mx-SN: 126.5°, IMPA: 93.6°. Treatment started with a monobloc appliance to correct the skeletal Class II relationship in the MP3 cap phase. She used the appliance for one year. Treatment was then continued with a hybrid expander, which is a newly designed bone-anchored expander consisting of two miniscrews and palatal acrylic plates for the transverse maxillary deficiency. The expansion protocol was twice a day for one week and once a day for three weeks. The hybrid expander, which was applied simultaneously with fixed orthodontic treatment, was left in place for retention. Finally, a labial frenectomy was performed. The total treatment duration was 2 years 6 months.

**RESULTS:** After treatment skeletal compatibility was obtained. Sufficient maxillary expansion was achieved without buccal tipping of the posterior teeth. Preferable dental aesthetics and Angle Class I skeletal and dental relationships were obtained.

**CONCLUSION:** The hybrid expander and monobloc appliance are very effective in the correction of a skeletal Class II malocclusion with transverse maxillary deficiency. The hybrid expander has many advantages such as being hygienic, comfortable and giving an opportunity to be applied simultaneously with fixed orthodontic treatment. Also, it is a minimally invasive expansion appliance that protects teeth by including bone support.

**CP 12 TREATMENT OF A CLASS II PATIENT USING A SELF-LIGATING SYSTEM: A CASE REPORT**

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**AIMS:** To present the non-extraction fixed orthodontic treatment of a patient with a Class II subdivision malocclusion treated with the Damon self-ligating system

**SUBJECT AND METHOD:** A 13-year 1-month-old male with the chief complaint of crowded maxillary anterior teeth and the position of the upper left canine. Clinical examination revealed a convex profile, a Class II molar and canine relationship on the right side, a Class I molar relationship on the left side, a high vestibular position of the upper left canine, impacted lower right second premolar, 4 mm overjet, 3.7 mm overbite, retroclined maxillary and mandibular incisors and buccal corridors. Initial cephalometric measurements were SNA: 80.4°, SNB: 76.4°, ANB: 4.0°, Mx1-SN: 94.4°, IMPA: 77.2°, SN-GoGn: 44.3°. According to Hayes-Nance analysis, 4 and 5.2 mm crowding were determined in the maxilla and mandible, respectively. As a treatment plan, it was decided to perform fixed treatment with the Damon 3MX passive self-ligating system without extractions. Damon copper nitinol wire, 0.014, 0.014 × 0.025, 0.018 × 0.025 inch and 0.019 × 0.025 inch stainless steel archwires were used, respectively. The treatment duration was 22 months.

**RESULTS:** A Class I canine and molar relationship was obtained. The upper canine, which was in a high vestibular position, was included in the arch. An ideal overjet and overbite relationship were achieved. The lower and upper anterior teeth were protruded and proclined. Final cephalometric measurements showed: SNA: 82.9°, SNB: 79.1°, ANB: 3.8°, Mx1-SN: 109.9°, IMPA: 91.2°, SN-GoGn: 43.5°.

**CONCLUSION:** The Damon self-ligating system corrects moderate crowding, increases transversal width of the dental arch and improves facial appearance. The Damon system can be an effective method for aesthetic and functional satisfactory results.

**CP 13 MOLAR DISTALIZATION WITH A MODIFIED NANCE APPLIANCE AND PALATAL MINISCREW: A CASE REPORT**

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**AIMS:** Distalization of maxillary molar teeth using temporary anchorage devices (TADs) is frequently preferred in the treatment of Class II malocclusions due to the side effects of other intraoral methods such as mesialization of premolar teeth and protrusion of anterior teeth. This case report describes the treatment outcomes of a patient with a Class II malocclusion using a modified Nance appliance and palatal miniscrew.

**SUBJECT AND METHOD:** A 16-year 3-month old female with the chief complaint of the upper teeth being forward and crowding. Clinical examination determined a convex profile, a 6.4 mm overjet, a 3.8 mm overbite and an Angle Class II malocclusion. Cephalometric analysis showed a normal growth pattern (SNA: 78.3°, SNB: 74.7°, ANB: 3.6°, SNGoGn: 35.7°, Mx1-SN: 105.8°, IMPA: 95.0°, interincisor angle: 123.4°). For bodily distalization of both molars, extraction of the third molars had previously been carried out. After banding the first maxillary molars, a modified Nance appliance with a miniscrew in the palatal region and nickel titanium coil springs on the palatal bars (between the palatal tubes and adjustable screws) was applied. The coil springs were activated with a force of 300 g per molar. Distalization continued until overcorrection was obtained. The active distalization period was 8 months. After distalization was complete, the incisors and premolars were retracted with anchorage of the appliance and the overjet was corrected. Following debonding of orthodontic brackets, fixed retainers were bonded in the upper and lower arches.

**RESULTS:** An Angle Class I relationship was obtained by distalization, which was performed on the bilateral maxillary molar teeth. No anchorage loss, distopalatal rotation of molar teeth or mandibular incisor protrusion were noted during distalization (SNA: 78.3°, SNB: 74.5°, ANB: 3.8°, SNGoGn: 37.5°, Mx1-SN: 102.5°, IMPA: 98.1°, interincisor angle: 121.9°).

**CONCLUSION:** A Class I molar relationship was obtained before fixed orthodontic treatment without the need for patient cooperation with the modified Nance appliance and miniscrew supported molar distalization method. This approach is an effective option for patients with a Class II malocclusion.

**CP 14 VALIDATION OF A PATIENT RELATED OUTCOME MEASURE FOR ORTHOGNATHIC SURGERY**  
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**AIMS:** To validate a patient related outcome measures (PROM) which was designed to assess patient satisfaction following orthognathic surgery in a multitude of areas covering their entire treatment journey.

**MATERIALS AND METHOD:** Patient satisfaction questionnaires were handed out in person to consecutive patients attending the joint orthodontic maxillofacial surgery-orthodontic Multidisciplinary clinics. The PROM was handed out on two separate occasions as well as three other questionnaires which had already previously been validated; the Leiden questionnaire, Oral Health Impact Profile and inpatient questionnaire in order to assess reliability and validity of the PROM.

**RESULTS:** Extensive data analyses supported the validity, reliability and responsiveness of this orthognathic PROM.

**CONCLUSION:** Due to the reliability and validity of the questionnaire it should continue to be used in future cases. The data has provided a valuable insight into the thoughts of patients who had

completed orthognathic treatment and can therefore give us an insight into the overall satisfaction of care and highlight areas that can be improved.

#### CP 15 IMPROVED SUPERELASTIC WIRE FOR TREATMENT OF A PATIENT WITH SINGLE MAXILLARY CANINE EXTRACTION

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**AIMS:** To show a patient with a single maxillary canine extraction treated with improved superelastic nickel titanium archwire.

**SUBJECT AND METHOD:** Dental transposition of maxillary canines and lateral incisors can sometimes be seen which results in malocclusion. Therefore, selection of extraction or non-extraction may become important during the establishment of the treatment plan. In this case, the treatment plan was extraction of the maxillary canine to relieve dental crowding. Improved superelastic nickel titanium wire (ISW) was used as the main archwire, in order to obtain the best aesthetic result and attention was always paid to tooth axis of the maxillary incisors. A 19 year-old male with dental crowding in both the maxillary and mandibular dentitions. Transposition of maxillary right canine and lateral incisor was noted. Extraction of his right maxillary canine was carried out, and ISW was selected as the main archwire for orthodontic treatment. After 2 years, orthodontic active treatment finished and the patient wore a retainer.

**RESULTS:** Tooth alignment and occlusion, the aesthetics of the maxillary anterior teeth and the patient's facial profile improved.

**CONCLUSION:** In a single maxillary canine extraction case, ISW could be an effective material for avoiding occlusal plane canting, and in helping to obtain better aesthetics of the maxillary anterior teeth. However, long-term follow-up still needed.

#### CP 16 CONE BEAM COMPUTED TOMOGRAPHIC ANALYSIS OF A SKELETAL CLASS III MALOCCLUSION PATIENT WITH FACIAL ASYMMETRY TREATED WITH ORTHOGNATHIC SURGERY

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**AIMS:** The face is determined by the hard and soft tissues of the craniofacial surface, and facial balance refers to the state in which the size and shape are balanced with respect to the midline. The midsagittal plane (MSP) is an important symmetrical plane in the craniofacial structure and serves as the basis for the analysis of the skull direction and three-dimensional (3D) head measurement. However, when facial asymmetry analysis is performed on the basis of the plane, it is often the case that the degree of hard and soft tissue asymmetry is inconsistent. The aim of this study is to present the treatment of a patient with a skeletal Class III malocclusion with facial asymmetry successfully treated by orthognathic surgery, considering hard and soft tissue asymmetry based on a CBCT analysis.

**SUBJECT AND METHOD:** A 23-year-old male with the complaint of facial asymmetry. Cone-beam computed tomographic (CBCT) 3D images were taken for diagnosis. The 3D CBCT images were used to reconstruct the craniofacial region; hard and soft tissues were evaluated simultaneously by adjusting the rotation and axis.

**RESULTS:** When comparing the deviation of soft and corresponding hard tissue deviation to the hard tissue MSP (hMSP), distances from soft tissue nasion, soft tissue pogonion and soft tissue menton to the hMSP were significantly smaller than those from nasion, pogonion and menton ( $P < 0.001$ ). However, there were no significant differences between the asymmetry of soft tissue and corresponding hard tissue on subnasale, soft tissue gonion and soft tissue ramal inclination.

**CONCLUSION:** This skeletal Class III patient with facial asymmetry showed differences between soft and hard tissue asymmetries to the hard tissue MSP. To compensate the differences a new soft tissue MSP based on the anterior landmarks of craniofacial structures using CBCT images was established.

## CP 17 BUTTON AND BEAD CLASS II CORRECTOR – AN ALTERNATIVE FUNCTIONAL APPLIANCE? A CASE SERIES

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**AIMS:** The button and bead Class II corrector, originally developed by Spary and Little, is a type of removable functional orthodontic appliance. It can be used to assist in the correction of a Class II malocclusion and improve a Class II skeletal discrepancy during active growth. The aim of this appliance is to reduce the overjet and correct the incisors and buccal segment relationship to Class I. This case series highlights four patients who were successfully treated with this novel type of functional appliance, as part of their overall treatment plan.

**SUBJECTS AND METHOD:** Three adolescent females (aged 14, 13 and 12 years) and a male (aged 11 years) all with Class II division 1 incisors with a Class II skeletal discrepancy and an increased overjet. Data collected included the overjet (and reverse overjet) measurements; pre-treatment and after 6 months of wearing the appliance. Unlike the modified Clark's twin block appliance, the button and bead Class II corrector uses aesthetic clear tray aligners. There is a bead incorporated into the upper tray that encourages posturing of the mandible. Bilateral Class II elastics are attached to a button on the upper lateral incisors run to the lower first permanent molars from attached tubes. The appliance is worn full time.

**RESULTS:** All patients had a reduction in their overjet; two patients went from 11 mm pre-treatment to 2 mm post-treatment. In all cases the buccal segment relationship improved with most patients completing functional appliance therapy with Class I buccal segments. Photographic records and, where required, lateral cephalometric radiographs were obtained pre- and post-treatment.

**CONCLUSION:** The button and bead Class II corrector can be used as an alternative option to the bulkier and less aesthetic commonly used functional appliances. This case series demonstrates four patients who successfully completed functional appliance therapy using this alternative treatment option.

## CP 18 STRESS DISTRIBUTION ON THE TEMPOROMANDIBULAR JOINT USING A MANDIBULAR ADVANCEMENT DEVICE FOR OBSTRUCTIVE SLEEP APNOEA: A FINITE ELEMENT STUDY

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**AIMS:** To evaluate temporomandibular joint (TMJ) stress distribution during use of a mandibular advancement device (MAD).

**MATERIALS AND METHOD:** This study was undertaken using the finite element method (FEM). A 27-year-old female without temporomandibular disorders was used as model. Dental casts and an advancement bite allowed the fulfilment of a Somnodent oral device. The device was scanned and associated with the three-dimensional cranium model obtained by cone beam computed tomography (CBCT) to evaluate jaw movement forced by the appliance. Magnetic resonance imaging was used to evaluate the articular disc of the TMJ and to associate this structure to the cranium model. FEM analysis was made using ANSYS software with 1 and 2 mm of advancement.

**RESULTS:** FEM analysis simulated the mandibular advancement and showed the strength distribution on the TMJ. The articular disc showed values ranging between 0.099-6.39 and 0.5-2.02 MPa for an advancement of 1 and 2 mm, respectively. The condyle load distribution showed values ranging between 0.0037-7.50 and 0.0020-10.0 MPa for an advancement of 1 and 2 mm, respectively.

**CONCLUSION:** Mandibular advancement causes a load distribution mainly on the central area of the condyle and articular disc. The central part of the anterior area of the condyle shows a higher stress for the contact with the articular eminence during mandibular protrusion movement. The articular disc shows a high load distribution in the central area too, but during the advancement movement the load distribution moves posteriorly. Deformation and load values induced by MAD are lower than physiological limits of the anatomical part evaluated. Since the load distribution

values increase with mandibular advancement, slight mandibular advancement can be considered a safe procedure even for a long period and should not cause permanent side effects.

#### CP 19 IMPACT OF A SMARTPHONE APPLICATION ON ORAL HYGIENE DURING ORTHODONTIC TREATMENT: A CONTROLLED STUDY\*\*\*

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**AIMS:** To evaluate, in a prospective controlled study, the effects of a dental monitoring (DM) app on oral hygiene outcomes compared with those of the usual standards of care.

**SUBJECTS AND METHOD:** Two groups of 30 adolescents with fixed appliances: an experimental group that received the DM app in addition to the usual care, and a control group that only received the usual care. Data was collected during three orthodontic check-ups: baseline (T0), and 6 (T1) and 12 (T2) weeks of follow-up. At each appointment, the presence of dental plaque was checked using the modified Silness and Loe plaque index and gingival bleeding measured with the Bleeding on Marginal Probing Index. The DM app was able to analyse intraoral photographs of the mouth of the patient, taken with their smartphone every week. Short messages were sent to them in this 'hygiene' protocol, that is to say, advice to enhance tooth brushing if it is worsening, and congratulations if hygiene seems satisfactory or progress is made. The Wilcoxon test with the R software was used for statistical analysis.

**RESULTS** Definitive results will be available in April 2019. They will inform us about the possibility of using remote monitoring with a special app to enhance oral hygiene.

#### CP 20 ORTHODONTIC MANAGEMENT OF IMPACTED MANDIBULAR SECOND MOLARS: A CASE SERIES

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**AIMS:** To show different treatment modalities that can be employed in the management of impacted mandibular second molars, and to highlight the difficulties and challenges in the management of these patients, as well as the importance of early diagnosis and treatment.

**MATERIALS AND METHOD:** This case series describes five subjects treated in a hospital orthodontic department, using a variety of methods with various degrees of success.

**RESULTS:** Eighty per cent of the patients had successful treatment outcomes, with 20 per cent (one patient) declining further orthodontic treatment.

**CONCLUSION:** Successful management of mandibular second molars is dependent on early detection, diagnosis and treatment. Often late diagnosis results in a patient being referred following a course of orthodontic treatment, resulting in re-treatment being necessary to achieve a satisfactory outcome. No single method of treatment has been shown to be consistently successful in managing impacted mandibular second molars and each case should be treated on its merits. Good lines of communication with maxillofacial colleagues are paramount in these challenging cases.

#### CP 21 TREATMENT APPROACH WITH ORTHOGNATHIC SURGERY IN A SKELETAL CLASS III MALOCCLUSION: CASE REPORT

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**AIMS:** Orthodontic treatment with surgery in patients who have completed growth and development and have severe skeletal disorders is usually the first choice of treatment. For success, the orthodontic treatment performed before and after surgery and the planning of treatment is important. In the orthodontic treatment of skeletal Class III malocclusion patients before orthognathic surgery, the aim is to remove the dental compensations such as the lower incisors being lingual and the upper incisors being bent to the palatal. The surgical approach in Class III malocclusion patients is maxillary advancement, mandibular reduction, or a combination of

both. This case was treated with a combination of maxillary advancement and fixed orthodontic treatment. The aim of this case report is to show the orthognathic surgery changes in a patient with a skeletal Class III malocclusion.

**SUBJECT AND METHOD:** A patient with the chronological age of 15 years 7 months with complications of his teeth and the fact that his lower jaw was in front. Clinical examination revealed a concave profile and that the appearance of the incisors during smiling was inadequate. Intraoral examination showed a right and left Angle Class II molar relationship, a Class III canine relationship, a bilateral posterior crossbite, maxillary space requirements were 17 mm and mandibular requirements were 7 mm. The patient, who had a skeletal Class III relationship, was prepared for orthognathic surgery by extraction of 14 and 24 after surgically-assisted rapid maxillary expansion and maxillary advancement

**RESULTS:** At the end of the treatment, a Class II molar and Class I canine relationship were obtained and improvement in the profile was achieved.

#### CP 22 ORTHODONTIC TREATMENT OF AN IMPACTED MAXILLARY CANINE: CASE REPORT

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**AIMS:** The maxillary canines are the teeth most frequently impacted after the mandibular third molars. Impacted maxillary canines occur in approximately 3 per cent of the population. Many studies have found that the majority of impacted maxillary canines are located in the palatal region (80-90%) and less (10-20%) in the buccal region. Impacted canines can be detected by careful clinical and radiographic examination. Cone beam computed tomography (CBCT) is an important diagnostic tool. The aim of this case report is to show the maintenance of an impacted canine tooth.

**SUBJECT AND METHOD:** A male with the chronological age of 15 years 5 months. Clinical examination revealed that he had a concave profile and that the appearance of the incisors during smiling was inadequate. Intraoral examination showed a right and left Angle Class III molar and canine relationship, maxillary space requirements were 6 mm and mandibular were 1.5 mm. The position of canine was determined by CBCT.

**RESULTS:** The patient's impacted canine was maintained. A Class I molar and canine relationship was obtained at the end of the treatment.

#### CP 23 WILLIAMS-BEUREN SYNDROME: A CASE REPORT

Florence Danneels, Guy Willems, Maria Cadenas De Llano Pérula, Dominique Declerck, Ann Verdonck, Department of Orthodontics, KU Leuven, Belgium

**AIMS:** Williams-Beuren syndrome is a rare genetic disease with many medical problems and phenotypical features. Cardiovascular abnormalities, urogenital and endocrine disorders and neurological problems are common. The average IQ is 55, they often have poor coordination and hyperflexia. Craniofacial characteristics are a wide mouth with full lips and cheeks, small jaw, long philtrum, low positioned nasal root and wide nose wings. The lips remain normally open at rest and patients with this condition often breath through their mouth. The mandibular angle is increased and they have small teeth with spacing. Agenesis and malocclusions are common. The aim of this research is to describe the clinical features of Williams-Beuren syndrome and its orthodontic intervention.

**SUBJECT AND METHOD:** A Williams-Beuren patient was diagnosed at the age of 1 year. At 13 years of age, he was referred to the orthodontic department. He was very anxious and had poor oral health. He presented a convex profile, an obtuse naso-labial angle, an open lip relationship and a gummy smile. He had a symmetrical distal occlusion, disto-vestibular rotation of teeth 11 and 21 and spacing in the lower anterior segment. He also presented an overjet of 9 mm. There was a deep bite with palatal infringement, a skeletal Class II and retroclination of the maxillary incisors. The panoramic radiograph showed asymmetric condyles, with the left condyle being narrower but

no agenesis. Treatment protocol first included oral health instruction following which a half open functional appliance with a protrusion spring was placed.

**RESULTS:** After a period of 1 year 9 months a neutro-occlusion was achieved. The patient was instructed to continue wearing the appliance until the end of growth. Fixed appliances were no option because of the high anxiety level and poor oral health.

**CONCLUSION:** Orthodontic treatment is possible in Williams-Beuren patients, although an individual approach is required. Treatment possibilities depend on the abilities of the patient. Some patients can handle full orthodontic treatment, while others already have difficulties with small interventions. Good communication and clear explanations are strongly advised.

#### CP 24 ORTHODONTIC TREATMENT OF LINGUAL GINGIVAL RECESSIONS: A CASE REPORT

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**AIMS:** To describe the orthodontic treatment of gingival recession induced by an active orthodontic retainer.

**SUBJECT AND METHOD:** The patient was orthodontically treated during adolescence and was referred at the age of 36 years by her general dentist because of lingual recession on tooth 42. This tooth showed significant proclination and torque. First, the retainer was removed for spontaneous improvement, but this was not achieved. Digital models, cephalometric and panoramic radiographs were then taken to study occlusal and dental features and the patient agreed to start treatment with fixed appliances in the lower jaw.

**RESULTS:** One month after removal of the lower retainer there was no improvement. Treatment with a removable appliance was not indicated because of the type of tooth displacement. To improve torque, fixed orthodontic appliances were placed in the lower jaw, excluding the second molars. The position of the tooth quickly improved. The patient accumulated a lot of calculus that had to be removed at almost every appointment, a situation that improved near the end of treatment. Tooth 42 was mobile in the beginning, possibly because of premature contact. A periapical radiograph showed a healthy periodontal status. After debonding (8 months) a stainless steel wire retainer was placed. Tooth 35 was not completely rotated because it fitted better in the occlusion this way. The lingual recession on tooth 42 decreased significantly, but minor recession was still observed. The retainer loosened on tooth 42 after 1 month. There was minimal displacement which did not disturb the patient. An additional vacuum-formed retainer was placed.

**CONCLUSION:** Unexpected tooth movement caused by active orthodontic retainers is a common issue that can be severe enough to require orthodontic re-treatment, in some cases combined with periodontal treatment. A good follow-up is necessary, initially by the orthodontist and later by the general dentist. The patient should be informed to contact the orthodontist in case of changes.

#### CP 25 IDENTIFICATION OF A NOVEL NONSENSE MUTATION OF PARATHYROID HORMONE 1 RECEPTOR GENE IN A PATIENT WITH PRIMARY FAILURE OF ERUPTION: CASE REPORT

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**AIMS:** Primary failure of eruption (PFE) is characterized by non-syndromic eruption failure of permanent and not ankylosed teeth. They fail partially or completely during the eruptive process, without any systemic disease or identifiable mechanical interference. Recent studies support that this dental phenotype is inherited and that mutations in PTH1R gene explain several familial cases of PFE. However, some of them are de novo and/or novel familiar cases have not yet been identified. The objective of this study was to show the importance of a clinical diagnosis of PFE in patients without a clinical family history.

**SUBJECT AND METHOD:** A 26-year-old male. Clinically, a bilateral posterior open bite was observed. The panoramic radiograph showed inclusion of several permanent teeth. A saliva sample was collected by buccal swabs for molecular analysis of the PTH1R gene. Genetic analysis was also performed in family members: mother, father, maternal aunt and grandfather, although no one

had clinical signs of PFE. Extraction and purification of DNA was carried using the automatic machine MagCore Nucleic Acid Extractor. All coding sequences were amplified and sequenced. Primer sets were designed to delineate splice junctions. The genetic defect was characterized by sequencing analysis of PTH1R gene using the Sanger method with automatic sequencer AB 3500 and 3130 genetic analyzer.

**RESULTS:** Sequencing analysis of PTH1R genes revealed a novel heterozygous nonsense mutation in exon 7 that introduced a premature stop codon (c.708 G>T, p.169E/\*) causing truncated and non-functional protein. This novel variant was found in the patient and his mother although she did not show a typical PFE phenotype.

**CONCLUSION:** The phenomenon of incomplete penetrance is poorly understood. The results show that incomplete penetrance observed in two family members may indicate that the premature stop codon (c.708 G>T, p.169E/\*) leads to a partially inactive protein product and/or variability in the PTH1R gene expression. The findings confirm that genetic analysis of the PTH1R gene plays a key role in clinical management of PFE patients who are unresponsive to traditional orthodontic treatment.

#### CP 26 EVALUATION OF THE EFFECTS OF THE BENEFIT MOLAR SLIDER IN CLASS II DIVISION 1 MALOCCLUSIONS

Ayhan Doğan, Murat Aksoy, Filiz Uslu, Inonu University, Malatya, Turkey

**AIMS:** In the treatment of a dental Class II malocclusion, molar distalization is one of the treatment methods which is frequently preferred. The aim of this research was to evaluate the results of the distalization with benefit slider.

**SUBJECT AND METHOD:** A 15 year-old female with the chief complaint of proclined upper incisors. Intraoral examination showed that she had Class II division 1 malocclusion with an overjet of 9.97 mm and an overbite of 4.45 mm. Arch length discrepancies were -1.36 mm in the maxilla and -2.9 mm in the mandible. Extraoral examination showed a convex profile and no asymmetry. The treatment plan was bilateral maxillary molar distalization with the benefit slider. After achievement of a super Class I molar relationship, the appliance was debonded and a Nance appliance was bonded at the same appointment. The treatment continued with a levelling and aligning period after placement of brackets.

**RESULTS:** After 10 months distalization the right and left upper first molar teeth were distalized. A decrease in overjet and overbite were found.

**CONCLUSION:** In the treatment of the Class II division 1 malocclusion with the benefit slider the results were successful.

#### CP 27 SKULL PARAMETERS AND THEIR STUDY IN PATIENTS WITH A CLASS II DIVISION 2 MALOCCLUSION

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**AIMS:** To improve the diagnosis of dental diseases in patients with a Class II division 2 malocclusion differing from the normal growth rate.

**MATERIALS AND METHOD:** Fifty-three lateral cephalograms were taken. Thirteen longitudinal and 14 vertical parameters of the face and cerebral parts of the skull of 28 subjects aged 6 to 12 years in the mixed dentition and 25 children (12-15 years of age) in the permanent dentition were measured.

**RESULTS:** The intensity of age-related changes of many longitudinal and vertical skull parameters differed significantly from normal. This intensified abnormality of the facial skull section resulting in occlusion and facial configuration abnormality.

**CONCLUSION:** Data obtained showed that children with a Class II division 2 should be treated as early as possible.

## CP 28 THE NECESSITY FOR EARLY TREATMENT OF CHILDREN WITH A CLASS II DIVISION 2 MALOCCLUSION

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**AIMS:** 1) To study the intensity and direction of age-related changes in linear and angular parameters of individual morphological structures of the face and cerebral skull sections of children with a Class II division 2 malocclusion; 2) to conduct a comparison of the intensity of age-related of linear and angular parameters of the children with physiological occlusion and Class 2 division 2; 3) identify the features of the intensity of age-related changes in individual morphological structures.

**MATERIALS AND METHOD:** Fifty three teleroentgenograms of the head in lateral projection were made of children with an Angle Class II division 2 malocclusion. Twenty eight (6-12 years) of them were made during the mixed dentition period and of 25 children (12-15 years) after this period. Some values of 19 linear and 16 angular parameters of the cerebral and facial skull sections were found.

**RESULTS:** The data obtained of the intensity of age-related changes in the skull linear and angular parameters indicated that orthodontic treatment for children with distal occlusion and retrusion of the upper anterior teeth is necessary at an early age. During diagnosis attention should be paid to the linear and angular parameters of the intensity of age-related changes which differ considerably from normal.

**CONCLUSION:** In children with Class II division 2 malocclusion in the mixed dentition, there is a significant deviation from the normal intensity and direction of age-related changes in many linear and angular parameters of the skull, which indicates a disruption in the dynamics of the formation of the individual morphological structures of cerebral and facial skull sections.

## CP 29 NEW APPLICATION OF DYNAMIC MAGNETIC RESONANCE IMAGING FOR THE ASSESSMENT OF DEGLUTITIVE TONGUE MOVEMENT

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**AIMS:** Deglutitive motion of the tongue may function to maintain tooth position. However, the causation between abnormal patterns of orofacial muscle function and dental malocclusion remains unclear. To clarify the pathogenic mechanism of malocclusion, it is important to determine the relative positional relationship between the tongue tip and incisor edge or the dorsal tongue and palate during deglutition. The aim of this study was to assess the utility of 3-T segmented cine-magnetic resonance (MR) imaging, combined with static magnetic resonance (MR) images for hard tissue visualization, to determine the relationship between the tongue and surrounding tissues during deglutitive tongue movement.

**MATERIALS AND METHOD:** Cine-MR images were acquired from three healthy female volunteers during deglutition who had no history of swallowing disorder or other chronic illness, normal alignment and occlusion, and a skeletal Class I relationship. Three cine-MR images were taken during deglutition in accordance with an auditory cue for each volunteer. During static imaging, custom-made, contrast-medium-filled clear retainers were positioned in the mouth to allow visualization of the upper and lower incisors and hard palate boundaries. Static images were superimposed onto images of the three stages in deglutitive tongue movement, which were selected from a series of cine-MR images. These superimpositions were assessed five times by tracing cephalometric parameters to examine the reproducibility of the method.

**RESULTS:** Traces varied little across repeated measurements, and all subjects had a similar pattern of dorsal tongue movement. Tongue-to-palate contact increased slightly during the first to second stage of swallowing and abruptly increased during the second to third stage, while the tongue tip position remained constant.

**CONCLUSION:** Segmented cine-MR imaging combined with static MR images is useful for assessing soft tissue motion during deglutition. This method is particularly useful to evaluate the relationship between tongue function and maxillofacial morphology in orthodontic treatment and orofacial myofunctional therapy, and for improving tongue movement during speech therapy.

**Acknowledgement:** Professors Ei-Ichi Honda and Tohru Kurabayashi. Without their guidance and support, the research could not have been successfully conducted.

#### CP 30 TREATMENT OF A CLASS III OPEN BITE WITH ZYGOMA ANCHORAGE: A CASE REPORT

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**AIMS:** An anterior open bite (AOB) is a lack of vertical contact of incisor teeth when posterior teeth are in intercuspation. The aetiology of the problem and the age and growth potential of the patient determine the treatment options. Skeletal anchorage, for the intrusion of posterior teeth, is widely used to treat an AOB especially in adults. The aim of this case report is to represent the treatment of an Angle Class III, AOB patient with the aid of zygomatic anchorage.

**SUBJECT AND METHOD:** A female patient with the chronological age of 15 years 2 months referred with the complaint of crowding and spaces between the upper and lower anterior teeth. Clinical and radiographic examination revealed a skeletal Class I, Angle Class III relationship, 4 mm crowding in the lower jaw and a 4 mm AOB. The treatment plan included molar intrusion to treat the AOB and fixed orthodontic mechanics with the aid of intermaxillary elastics to treat the Class III molar relationship. Zygomatic miniplates were planned to be used as anchorage in both treatment stages. The intermaxillary elastics were applied from the miniplates to prevent unwanted tipping of the anterior teeth.

**RESULTS:** An Angle Class I molar relationship, normal overjet and overbite and sufficient function and aesthetics were obtained at the end of a total treatment period of 28 months. The angular changes in the anterior teeth were kept to a minimum.

**CONCLUSION:** Zygomatic anchorage is a reliable option in the treatment of an AOB with molar intrusion as well as in the correction of a Class III molar relationship with minimal effects to incisor angulations.

#### CP 31 COMPARISON OF THERMOFORMED AND ADDITIVELY MANUFACTURED CLEAR ALIGNERS

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**AIMS:** Additive manufacturing (AM) is a common name for technologies that build three-dimensional (3D) objects by adding material in a layer-by-layer form. The principle of layered production makes them very suitable for low volume manufacture of parts with very complex shapes. In recent years, digitization and AM have opened new perspectives in the field of personalized complex dental prostheses production and could be very useful also in orthodontics.

**MATERIALS AND METHOD:** Treatment began with a 3D scan of the patient's study cast and occlusion, followed by a treatment simulation using the software for orthodontic planning and design of teeth models in normal occlusion. Aligners were made by AM or from a thermoplastic polyurethane (TPU) foil thermoforming it over the model made by laser sintering. According to production, two groups of patients were evaluated. In the first group clear aligners for treating orthodontic malocclusions were made by AM and in the second group from TPU. Both aligners were tested and evaluated.

**RESULTS:** Important information about maximum tooth movements and methods of manufacture were provided. The results of clinical use of conventional aligners made from TPU foil and 3D printed transparent aligners will be shown and analysed.

**CONCLUSION:** The results show great potential and future perspectives of AM in orthodontic treatment.

#### CP 32 MULTIDISCIPLINARY TREATMENT OF A CLASS III MALOCCLUSION

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**AIMS:** In orthodontic treatment of adults, a multidisciplinary approach is often needed to achieve an optimal treatment outcome. In this case, therapy with a fixed appliance was contraindicated because of inadequate ceramic crowns. The aim of this presentation is to show the treatment of a severe skeletal Class III malocclusion with inappropriate restorations using aligner-technology and surgery.

**SUBJECT AND METHOD:** A 27 year old male with a bilateral skeletal and dentoalveolar Class III, an overjet of -3 mm, an overbite of 0 mm, a circular tongue-interposition; crossbite from 1.4 to 2.7 and inadequate prosthetics on 1.2, 2.1 and 2.2. The treatment plan consisted of the substitution of the inadequate crowns with temporary-crowns with adequate anatomical shape, dentoalveolar expansion of the upper arch from 1.5 to 2.7 as well as the lower arch from 3.4 to 4.4 with Invisalign® clear aligners, orthognathic surgery: (a Le Fort I osteotomy and bilateral sagittal segment-osteotomy) and final adjustment and coordination of the arches post-surgery.

**RESULTS:** Both arches were coordinated and both sides were dentoalveolar Class I. The overjet was 2 mm, the overbite 3 mm with no crossbites and sufficient functional movements. The total treatment time was 22 months; The Aligners were changed every two weeks.

**CONCLUSION:** As a result of goal-orientated planning and the cooperation of prosthetics, orthodontics and maxillofacial-surgery, an optimal result was achieved, with more comfortable and efficient treatment in a shorter time.

#### CP 33 ORTHOPAEDIC TREATMENT A OF CLASS III MALOCCLUSION WITH RAPID MAXILLARY EXPANSION AND REVERSE HEADGEAR: A CASE REPORT

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**AIMS:** To present the orthopaedic treatment of a skeletal Class III patient with midface deficiency using rapid maxillary expansion (RME) and reverse headgear (RHG).

**SUBJECT AND METHOD:** A female with a chronological age of 12 years 10 months. Clinical examination showed that she had midface and maxillary deficiency with a concave profile, an Angle Class III malocclusion with an overjet and overbite of 0 mm. Cephalometric analysis showed a skeletal Class III malocclusion and vertical growth pattern (SNA: 73.4°, SNB: 81°, ANB: -7.5°, Sn-GoGn: 36.3°, Mx1-SN: 115.3°, IMPA: 84,6°, interincisal angle: 123.7°). The skeletal Class III malocclusion was treated without surgical intervention using RME and RHG. The Hyrax screws were activated one quarter turn every 12 hours for one week. After confirming that the radiographic midpalatal suture had opened, RHG was used. The maxilla was protracted with a force of 450-550 cN with RHG, in a forward and downward direction at an angle of 25-30 degrees to the occlusal plane. RHG was used for 6 months, 12-15 hours a day until a 2 mm positive overjet and overcorrection were gained. Fixed orthodontic treatment was then undertaken.

**RESULTS:** The skeletal deficiency was corrected with orthopaedic treatment. The total treatment duration was 2 years with RME, RHG and fixed orthodontic treatment. Post-treatment cephalometric analysis results showed a Class I skeletal relationship (SNA: 81.2°, SNB: 80.3°, ANB: 0.9°, Sn-GoGn: 39.3°, Mx1-SN: 114.1°, IMPA: 90.2°, interincisal angle: 116.3°). However clockwise rotation of the mandible appeared during treatment due to the use of RHG. An ideal overjet and overbite was obtained with a Class I dental relationship. An improved profile appearance was acquired after treatment.

**CONCLUSION:** RME and RHG are effective treatment options for patients with a mild to moderate Class III malocclusion due to maxillary retrusion. The pronounced anterior movement of point A

demonstrates that using RME and RHG positively affects correction of the midface and maxillary deficiency and achieves satisfying aesthetic results.

#### CP 34 ORTHOGNATHIC SURGICAL TREATMENT OF A SKELETAL CLASS III PATIENT WITH FAILED CAMOUFLAGE TREATMENT: A CASE REPORT

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**AIMS:** In orthodontics, a Class III malocclusion is considered to be one of the most difficult and complex problems to treat and also to maintain stability. This case report presents the orthognathic and orthodontic treatment of a skeletal Class III patient, who had received compensation treatment previously, caused by maxillary retrusion.

**SUBJECT AND METHOD:** A 17 year 2 month old female re-referred with the chief complaint of developing an unaesthetic facial and dental appearance, 5 years post-treatment. Clinical examination revealed a concave profile, chin prominence and a Class III molar and canine relationship. Due to previous compensation treatment, there was no negative overjet or crowding. Upper and lower dental and facial midlines were compatible. The overbite was 0 mm. In cephalometric analysis, a skeletal Class III (SNA: 75.5°, SNB: 79.3°, ANB: -3.8°) and vertical growth pattern (GOGN-SN: 42.8° FMA: 31.4°) were determined. The dentoalveolar measurements were Mx 1-SN: 105.1°, IMPA: 73.2°. The treatment plan was orthognathic surgery following decompensation by fixed orthodontic treatment. Maxillary advancement surgery with a Le Fort I osteotomy was performed. The day after surgery, the patient used intermaxillary elastics for a month and post-surgical orthodontic treatment lasted 6 months.

**RESULTS:** At the end of treatment, the skeletal Class III malocclusion was corrected and an ideal overjet and overbite were obtained; the profile was improved.

**CONCLUSION:** Satisfactory results were obtained with orthognathic surgical treatment in this skeletal Class III patient.

#### CP 35 FUNCTIONAL STUDY OF THE TEMPOROMANDIBULAR JOINT BY DATA FUSION AND CLINICAL CONSIDERATIONS: PRESENTATION OF A NEW SCIENTIFIC PROCEDURE

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**AIMS:** The temporomandibular joint (TMJ) is one of the most complex joints in the human body. The movements of the TMJ are determined by the dental occlusion. Because of the complexity of the TMJ, only a few functional studies have been realized at this point. The following study aimed to explore the mandibular movement in healthy volunteers trying a new scientific procedure. The procedure could be used later to study mandibular movements in orthodontic patients presenting different types of malocclusion.

**MATERIALS AND METHOD:** The study was based on a multimodal analysis using two types of examinations [magnetic resonance imaging (MRI) and movement analysis] which provided different types of data (anatomical and kinematic) that were complementary. The study included four healthy volunteers with no TMJ disorder. Each subject was underwent an MRI of the TMJ, jaw and skull and a functional movement analysis using the stereophotogrammetry technique. For each participant a static three-dimensional (3D) model including bones, muscles and ligaments was constructed using the anatomical data of the MRI (segmentation technique). This static 3D model was later fused with the kinematic data of the functional movement analysis. The model designed after fusion of the two types of data was a 3D biomechanical model of the skull and jaws which allowed the study of the mandibular movements of each participant. The movement was studied using different referentials located on the condyles, mandible and skull.

**RESULTS:** The condyle movement, different muscle and ligament behaviour was studied during mouth opening and closure and lateral movement. During mouth opening, the condyle translation was immediately combined with a rotation and no pure rotation of the condyle at the beginning of

mouth opening. Left and right condylar behaviour was symmetric. The length variation of the stylo-mandibular ligament and lateral pterygoid muscle during mouth opening and closing was cyclical and synchronous with condylar translations and rotations. The Bennett movement during lateral translation was observed in the biomechanical model.

CONCLUSION: The tested procedure allowed the study of a number of parameters during mandibular movement and could be used to study condylar, muscle and ligament behaviour in different types of orthodontic malocclusion.

#### CP 36 ANTERIOR OPEN BITE TREATMENT WITH THE A MODIFIED FRÄNKEL IV REGULATOR – A THREE-DIMENSIONAL FOLLOW-UP EVALUATION

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AIMS: To objectively evaluate changes of jaw morphology characteristics and tongue posture in a young patient with an anterior open bite (AOB) using three-dimensional (3D) diagnostics.

SUBJECT AND METHOD: A girl with an AOB in the prepubertal growth phase is presented. Functional diagnosis revealed mouth breathing, a visceral type of swallowing pattern and incorrect tongue posture on the mouth floor. The girl was treated with the modified Fränkel IV (FR IV) removable functional regulator appliance (Farčnik *et al.*, 2014). Dental impressions for study casts were made before (T0), after one year of treatment (T1) and after one year follow-up (T2). Study casts were digitalized using a 3D scanner (3Shape R700™ Orthodontic Scanner, 3Shape, Copenhagen, Denmark) and their morphological traits, such as jaw surface, volume and gingival projection plane surface were analysed using the 3D analysis program (RapidForm™ 2006, INUS Technology Inc., Seoul, Korea) according to the method of Richmond *et al.* (2007). The findings of the morphological traits were compared to an untreated subject of the same age and gender. 3D ultrasound images of the mouth floor and the tongue were obtained at T0 and T1. An ultrasound system with a 3D convex probe (Voluson 730 Expert, General Electric's Healthcare, Kretztechnik, Austria) was used to evaluate tongue posture according to the method of Volk *et al.* (2010).

RESULTS: After treatment with the modified FR IV regulator the AOB was no longer present and an overbite was achieved. The surface and volume of the upper jaw increased while the surface and volume of the lower jaw decreased compared to an untreated control subject. Ultrasonography revealed a tongue posture on the mouth floor at baseline and on the palate after treatment which remained stable during the follow-up period.

CONCLUSION: The modified FR IV regulator possibly changed the dynamic imbalance in the oral cavity due to the improper tongue posture, improved space conditions in the oral cavity as well as the jaw morphology.

#### CP 37 EARLY TREATMENT OF UNILATERAL FUNCTIONAL CROSSBITE WITH AN ACRYLIC PLATE WITH BITE BLOCKS

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AIMS: To evaluate the treatment effects of palatal expansion in an objective way using three-dimensional (3D) jaw morphology and to compare clinically determined orofacial functions before and after treatment.

SUBJECT AND METHOD: A 7 year old boy with a unilateral functional posterior crossbite and facial asymmetry. An upper acrylic plate with bite blocks and a midline screw was designed for rapid palatal expansion (RPE; 1 turn/day) until hypercorrection was achieved. After approximately 1 month of expansion, the plate was used for a further 6 months as a retention appliance. Maxillary and mandibular morphological traits were assessed and compared using a 3D system, Rapidform™ according to the method of Richmond *et al.* (2007). Morphological traits such as jaw surface, jaw volume and gingival projection plane surface were determined before and after treatment and at 1 and 2 year follow-ups and were compared to a healthy untreated subject of same age and gender.

**RESULTS:** At baseline the maxillary morphological characteristics were smaller while the mandibular were larger compared to a control subject. Clinical examination revealed mouth breathing, an irregular chewing pattern, irregular tongue posture and function. After active treatment of 6 months, the crossbite was corrected and facial asymmetry was reduced. Morphological traits of the jaws no longer differed from those of a healthy control subject and remained unchanged and stable during the follow-up period. After treatment clinical examination showed correct orofacial functions with the exception of a low tongue posture.

**CONCLUSION:** A unilateral functional crossbite is a transverse discrepancy due to a narrow maxillary arch leading to a lateral mandibular shift. Early RPE proved successful in achieving correction of the unilateral functional crossbite, improving 3D jaw morphological traits and alleviating facial asymmetry. Despite early orthodontic treatment, a crossbite can often relapse, which could be due to persistent incorrect orofacial functions, which should be considered in long-term treatment planning.

#### CP 38 MULTIDISCIPLINARY TREATMENT OF A PATIENT WITH A GUMMY SMILE: CASE REPORT

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**AIMS:** To present the treatment of a gummy smile with fixed orthodontic appliances and gingivectomy combined with a surgical lip repositioning procedure.

**SUBJECT AND METHOD:** A 26 year old female with the complaint of an anterior diastema and excessive gingival display. Clinical examination revealed an excessive gingival display of 6 mm, hyperactive lip during smiling, a straight profile, normodivergent vertical pattern, normal maxillary height, Angle Class I molar relationship, short clinical crowns of the incisors and mild anterior maxillary diastema with a hypertrophic labial fraenum. After consultation with the periodontology department, the treatment plan included lip repositioning and a gingivectomy procedure. During the period of fixed appliances, 0.022 inch brackets were placed in both arches and levelling was accomplished with light continuous archwires. Closure of the diastema was carried out with an elastic chain using stainless archwires. After 13 months of active treatment, the retention protocol included lingual retainers from 0.175 inch multistrand wire and a removable clear appliance. Before surgery, the periodontal tissue was left to heal for 2 months. Surgical intervention was performed by a periodontologist. The procedures included; gingivectomy, gingivoplasty, lip repositioning and frenectomy.

**RESULTS:** The patient's gingival display reduced from 6 mm to 1.5 mm during smiling.

**CONCLUSION:** The 6 month retention results did not reveal any significant relapse tendency as the gingival display was maintained as it was at the end of surgical intervention.

#### CP 39 CORRECTION OF UNILATERAL CONDYLAR HYPERPLASIA AND A POSTERIOR OPEN BITE WITH PROPORTIONAL CONDYLECTOMY AND FIXED ORTHODONTIC TREATMENT

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**AIMS:** To present a case of unilateral condylar hyperplasia (UCH) and posterior open bite, treated with proportional condylectomy and fixed orthodontic treatment.

**SUBJECT AND METHOD:** A 29 year-old female with UCH of the left side presented with facial asymmetry, a maxillary transverse occlusal plane (MXTOP) cant, a posterior open bite and a Class III relationship.

**RESULTS:** Treatment consisted of proportional condylectomy of the left condyle for management of UCH, and fixed orthodontic treatment with intrusion of the left maxillary molars for correction of the MXTOP cant and remaining chin point deviation (CPD). Proportional condylectomy with 14 mm resection of the left condylar head improved the CPD from 11.5 mm to 7.8 mm and resolved the posterior open bite on the left side. However, it produced a Class II relationship on the right and left sides, a posterior open bite on the right side, and an anterior open bite (AOB). Fixed orthodontic treatment with 1.8 mm intrusion of the left maxillary molars using miniscrews

corrected the MXTOP cant from 3.5 mm to 1.7 mm, reduced the remaining CPD from 7.8 mm to 3.7 mm, produced counterclockwise rotation of the mandible, and resolved the posterior open bite on the right side and the AOB. After 16 months of total treatment, a normal overbite/overjet and Class I relationship were obtained. Treatment results were well maintained after 5 years of retention.

CONCLUSION: For the correction of UCH, it is important to determine the amount of condylar head resection and accurately simulate the correction of the CPD and MXTOP cant through intrusion of the maxillary molars.

#### CP 40 RAPID MAXILLARY EXPANSION AND REVERSE HEADGEAR TREATMENT OF A CLASS III PATIENT WITH DENTAL TRAUMA: A CASE REPORT

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AIMS: To present the fixed orthodontic treatment following orthopaedic treatment of a skeletal Class III patient with rapid maxillary expansion (RME) and reverse headgear (RHG).

SUBJECT AND METHOD: A male patient with a chronological age of 13 years 6 months with the complaint of an aesthetic problem. The patient had a history of dental trauma at the age of 11 years, which led to avulsion of both maxillary central incisors. Clinical examination revealed a concave profile, skeletal and dental Class III malocclusion, 0 mm overjet and overbite, hyperdivergent growth pattern (SNA: 79°, SNB: 80°, ANB: -1°, SNGoGn: 39.4°, IMPA: 79.8°) The treatment plan was space closure following the application of RME and RHG. Firstly, RME was applied. The activation protocol was defined as two-quarter turns per day for the first week, followed by one-quarter turn per day for a week. RHG was started after the median palatal suture was opened. The maxilla was protracted with a force of 800-1000 cN with RHG, in a forward and downward direction at an angle of 25-30 degrees to the occlusal plane. RHG was used for 7 months, 14-16 hours a day until a 4 mm positive overjet and overcorrection were obtained. At the end of fixed orthodontic treatment reshaping the premolars as canines, restoring the canines as lateral and the laterals as centrals with composite build-ups was carried out.

RESULTS: The total treatment duration was 1 year and 9 months. After orthopaedic and fixed orthodontic treatment, the results of the cephalometric analysis were: SNA: 2.1°, SNB: 9.6°, ANB: 2.5°, SNGoGn: 40°, IMPA: 85°. Maxillary advancement with RME and RHG improved the soft tissue profile of the patient.

CONCLUSION: In patients with skeletal a Class III malocclusion, orthopaedic treatment during the growth and development period can provide significant changes in the interrelationships of the jaws. In cases with maxillary central missing, where the space closure is considered the most favourable treatment plan, aesthetic functional and satisfying results can be obtained with contemporary orthodontics.

#### CP 41 ORTHODONTIC TREATMENT OF A SKELETAL CLASS II OPEN BITE BY ROTATING THE OCCLUSAL PLANE USING MINISCREWS

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AIMS: To illustrate the successful orthodontic treatment of a skeletal Class II anterior open bite (AOB) by rotation of the upper and lower occlusal plane using miniscrews.

SUBJECT AND METHOD: A 24 year old female with the chief complaint of an AOB. The patient had an AOB with an overbite of -4.0 mm and Class I molar and Class III canine relationship. The upper arch showed a severe curve of Spee and the incisal showing was insufficient. Cephalometric analysis showed a skeletal Class II relationship with a hyperdivergent facial pattern. To close the AOB while increasing incisal display, the upper occlusal plane was rotated clockwise by applying a retraction force on the anteriors with miniscrews on the posteriors. The lower occlusal plane rotated counterclockwise by intrusion of molars and retraction of the anteriors using miniscrews in the posterior segments.

**RESULTS:** After 20 months of orthodontic treatment, a Class I canine and molar relationship with a correct overjet and overbite were achieved. Incisal exposure during resting increased after rotation of the upper occlusal plane. The mandible rotated counterclockwise by intrusion of the lower molars.

**CONCLUSION:** The findings suggest that miniscrews facilitate correction of an AOB by rotating the occlusal plane.

**CP 42 MAXILLARY PROTRACTION WITH SKELETAL ANCHORAGE FOR 10 YEARS IN A BOY WITH SEVERE MAXILLARY DEFICIENCY: A CASE REPORT**

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**AIMS:** To present the long-term maxillary protraction treatment with skeletal anchorage of a patient with severe maxillary deficiency and a Class III malocclusion.

**SUBJECT AND METHOD:** A 10-year-old boy diagnosed with an Angle Class III malocclusion with a skeletal Class III jaw relationship and an anterior and bilateral posterior crossbite. He was in the mixed dentition. He had a concave facial profile with a retruded and constricted maxilla and a prognathic pogonion. ANB angle was  $-6.8$  degrees, and IMPA was 81 degrees before treatment. Maxillary expansion and protraction treatment was planned, and miniplates were placed on the bilateral infrazygomatic crest area as anchorage for protraction. A bonded type of rapid maxillary expansion appliance was applied to expand the constricted maxilla. Maxillary protraction was started after maxillary expansion and 300 cN of force was applied per side. Full-time wear of the protraction headgear was instructed for 11 months and night-wear was continued until his mandatory military service at the age of 19.7 years.

**RESULTS:** Serial cephalometric superimposition showed considerable forward movement of the maxilla and mandibular catch-up growth for 10 years.

**CONCLUSION:** This case report demonstrates a successful treatment modality for severe maxillary deficiency. This was achieved by placement of skeletal anchorage and the patient's cooperation for the long-term treatment.

**CP 43 EVALUATION OF TREATMENT FOR CHILDREN WITH CLEAR ALIGNERS AND RAPID MAXILLARY EXPANSION**

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**AIMS:** Because of aesthetics and convenience, clear aligners (CA) are a popular option for orthodontic treatment, particularly among adults but not yet for children. The purpose of this poster is to present cases of children treated with CA, and to compare the effectiveness in paediatric orthodontic treatment between CA and fixed orthodontic appliances.

**SUBJECTS AND METHOD:** Ten children (7-9 years old) with an anterior discrepancy of 5 mm or more were randomly divided into rapid maxillary expansion (RME) and CA groups. The RME group consisted of five children treated with hyrax appliances, and the CA group five children treated with CA. The effectiveness was evaluated with three-dimensional digital models made with a Trios scanner (3Shape, Copenhagen, Denmark).

**RESULTS:** Treatment was initiated by expanding intermolar width, which alleviated the anterior discrepancy. In this study, there were changes in maxillary arch depth and intermolar width before and after treatment with CA and RME.

**CONCLUSION:** Treatment with CA can be a useful approach to correct paediatric dental malocclusions.

**CP 44 CASE REPORT: THREE-DIMENSIONAL DISPLACEMENT OF THE ZYGOMATICOMAXILLARY COMPLEX AFTER MINI-IMPLANT ASSISTED RAPID MAXILLARY EXPANSION**

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AIMS: A variety of palatal expansion appliances have been used to correct transverse maxillary deficiency. Recently, mini-implant assisted rapid maxillary expansion (MARME) was suggested to provide more orthopaedic expansion while reducing undesirable side effects such as dentoalveolar tipping. The purpose of this poster is to show three-dimensional (3D) displacement of zygomaticomaxillary complex (ZMC) after MARME using cone beam computed tomography (CBCT).

SUBJECTS AND METHOD: 3D changes of the ZMC were examined in four patients. The main complaints of those patients were anterior crossbite, unilateral posterior crossbite, relapse after orthodontic treatment and multiple tooth loss with transverse dental arch discrepancy. They were all diagnosed as having maxillary transverse deficiency and treated by MARME. CBCT 3D images taken before and after expansion were superimposed to analyze 3D displacement of ZMC.

RESULTS: In the transverse dimension, the expansion of the ZMC was greater in the lower than in the upper portion and palatal expansion was similar in the anteroposterior portion. In the sagittal and vertical dimensions, the ZMC showed forward and downward displacement; the posterior portion of the ZMC was displaced further downward than the anterior portion.

CONCLUSION: In the transverse dimension, MARME could contribute to correcting a transverse discrepancy. In the sagittal dimension, the ZMC showed anterior and inferior displacement. In the vertical dimension, the anterior and inferior displacement of the ZMC might increase the vertical facial pattern with the change of palatal plane angle and mandibular plane angle.

#### CP 45 TREATMENT OF A POLYDIASTEMA AND CONGENITALLY MISSING TEETH: A CASE REPORT

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AIMS: This clinical report describes the treatment of patient with polydiastema and also congenitally missing lower central incisor teeth.

SUBJECT AND METHOD: A 14-year-old patient with congenitally missing lower central incisors. Clinical and radiographic examination showed a mild-concave profile, proclined upper incisors and a horizontal growth pattern (U1 SN: 115.7, SNA: 85.4, SNB: 87.0). There was a Class I molar relationship on the left and a Class II on the right side. After extraction of the persistent primary mandibular central it was decided to change the lateral to the central and the first premolar to the canine. After treatment, implant surgery was considered in the posterior spaces.

RESULTS: At the end of orthodontic treatment, the lower canines were converted to the laterals and the first premolar to the canine. So, the teeth collected to the anterior region. After treatment there was no resorption

CONCLUSION: At the end of orthodontic treatment, the molar and canine relationships were not ideal because there were two congenitally missing teeth. However, a nice smile was obtained.

#### CP 46 A NEW MAXILLARY UNILATERAL DISTALIZATION METHOD WITH NON-COMPLIANCE INTRAMAXILLARY ARCHWIRE IN CLASS II DIVISION 2 MALOCCLUSION

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AIMS: To completely exclude the incisors from the distalization process and control the influence of reciprocal forces on the incisors to prevent protrusion effects.

SUBJECT AND METHOD: A female patient with a subdivision Class II malocclusion treated with a new method of intramaxillary non-compliance distalization. Due to patient's wishes (and socio-economic circumstances), treatment commenced in the upper arch. Asymmetric extraction of right upper premolar was not undertaken as it could result in asymmetry of the smile line. At the time of planning it was also decided not to use miniscrews. There was incisor protrusion (1/NA: 9 mm) and a 3 mm overjet according to the pre-treatment cephalometric analyses and maxillary crowding of 3.5 mm. The patient had a Class I canine-molar relationship on the left side and a Class II canine-molar relationship on the right side. Anterior Bolton discrepancy was 84 per cent with a 2.65 mm excess tooth substance in the anterior part of the lower arch. After extraction of the right upper

second molar, unilateral distalization commenced on the right side of the maxilla. At that stage brackets were placed on the right and left maxillary premolars and molars and 0.014 inch nickel titanium was used for levelling. After one month of levelling, 0.017 × 0.025 inch' and 0.014 inch round steel wires were attached to each other using composite material. The 0.017 × 0.025 inch wire was attached to the bracket slot of the left canine with composite for rigid stability. For distalization a 0.012 inch coil spring was placed between the right canine bracket and composite which connected the 0.014 inch wire with the 0.017 × 00.25 inch wire.

RESULTS: After 7 months a Class I relationship was achieved. Cephalometric superimposition showed distalization of the molars, slight retrusion of the incisors, 1/NA 8.5 mm and a 2 mm overjet. After this stage upper incisor brackets were placed and the lower arch crowding was corrected by stripping of the lower incisors and use of an Essix appliance.

CONCLUSION: Complete exclusion of the incisors from the distalization process was achieved. Total treatment was completed in 11 months.

#### CP 47 THIRD MOLAR UPRIGHTING TO REPLACE AN UNEXPECTEDLY EXTRACTED TOOTH FOR TREATMENT OF A SKELETAL CLASS III PATIENT

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AIMS: To introduce a skeletal Class III patient with an unexpectedly extracted tooth. Orthodontic camouflage treatment with extraction of four first premolar and uprighting of an impacted mandibular second molar was planned. However, the impacted mandibular second molar was unexpectedly extracted, and the treatment plan needed to be modified. An impacted mandibular third molar was planned to replace the mandibular second molar.

SUBJECT AND METHOD: An 18-year-old male with a skeletal Class III malocclusion with a retrognathic maxilla, anterior crowding and partial impaction of the mandibular right second molar. To improve the retrognathic maxilla and facial asymmetry, orthognathic surgery was recommended, but as the skeletal discrepancy was not severe and as the patient did not want the surgery, orthodontic camouflage treatment was decided. The treatment objectives were to improve smile and profile aesthetics, establish a proper occlusion and upright the mandibular right second molar. To relieve anterior crowding and establish a correct molar relationship, extraction of the four first premolars and mandibular right third molar was planned. However, the mandibular right second molar was extracted unexpectedly and the treatment plan had to be modified. It was decided to protract and upright the mandibular right third molar for use as a second molar. It was planned to use a transpalatal arch and temporary anchorage device (TAD) in the maxilla to reinforce anchorage on the upper right side and to prevent a transverse discrepancy when levelling the upper right second molar. The root formation of the mandibular right third molar was checked and a ramus TAD was used for uprighting. Oral hygiene was well controlled and correct occlusal adjustment was performed during molar uprighting. As a result, no bony defect of the mesial alveolar bone on the impacted mandibular third molar was observed.

RESULTS: Through the treatment described, a stable occlusion and aesthetic smile arc were obtained. The right mandibular third molar moved appropriately to the position of the mandibular second molar and no additional prosthetic treatment was needed.

CONCLUSION: Despite the occurrence of unexpected second molar extraction, the ideal treatment outcome could be obtained by modifying the treatment plan and using the correct biomechanics in camouflage treatment for this mild skeletal Class III patient.

#### CP 48 DENTOFACIAL EFFECTS OF MAXILLARY ADVANCEMENT WITH THE SURGERY-FIRST APPROACH – A REPORT OF TWO CASES

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**AIMS:** A conventional orthognathic surgery approach requires pre-operative decompensation of maxillary and mandibular teeth, which takes approximately one year. Following decompensation, surgery is performed and treatment continues with post-operative fixed orthodontic treatment. Deterioration of facial aesthetics is a common problem seen during pre-operative fixed orthodontic treatment. With the surgery-first approach, orthognathic surgery is performed before orthodontic treatment. Thus, worsening of the facial profile and a long treatment duration are eliminated. The aim of this report is to present two cases with surgery-first approach and post-operative orthodontic treatment.

**SUBJECTS AND METHOD:** Subject 1: A 17-year-old male with the chief complaint of his concave profile. Following clinical and radiological examination, a skeletal and dental Class III malocclusion due to maxillary retrognathia, retrusion of the upper lip, 4 mm of negative overjet and anterior and posterior crossbites were observed. Subject 2: A 22-year-old male patient demonstrated a concave profile due to his retrognathic maxilla. The canine and molar relationships were Class III, there was a negative overjet of 8 mm, anterior and posterior crossbites and a low smile line were also evident. Bonding of orthodontic brackets was performed three days before surgery. CuNiTi 0.016 × 0.016 archwires were placed on the day of surgery. The surgical plan included 6 mm of maxillary advancement in both cases, the maxilla was moved downward 2 mm in the first case and 6 mm in the second case. Pre- and post-surgical cephalometric radiographs and three-dimensional stereophotogrametric photographs were analyzed.

**RESULTS:** Following surgery, improvement of the facial profile was immediately observed. After 6 months of post-operative fixed orthodontic treatment, accelerated orthodontic tooth movement was noticed due to the regional accelerated phenomenon, and both arches were levelled and aligned quickly. A positive overjet and Class I canine and molar relationships were obtained. Moreover, the positive changes in smile aesthetics and facial profile improved the psychosocial status of the patients.

**CONCLUSION:** The surgery-first approach can be considered as a new alternative to the orthodontics-first approach, which helps to reduce treatment time, delivers good aesthetic results from the beginning and improves the psychosocial status of the patients.

#### CP 49 ORTHODONTIC TREATMENT OF A CLASS III PATIENT WITH BUCCAL OPEN BITE AND ANOMALIES OF TOOTH NUMBER, SIZE, MORPHOLOGY, POSITION AND ERUPTION

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**AIMS:** The aetiology of dental anomalies, which are found mainly in developmental and acquired form, is not known exactly. Developmental dental anomalies can be examined in five subgroups such as tooth number, size, shape, position and structural anomalies. Supernumerary teeth are the numerical anomaly, macrodontia is a dimensional anomaly, transposition is a positional anomaly and fusion and *dens in dente* are morphological anomalies. Eruption problems are the inability of teeth to be present in the region that should be located on the arc. The teeth may remain buried due to the delay in eruption movements or complete stoppage of eruption. The aim of this study is to present the treatment of an Angle Class III patient with many dental anomalies and buccal non-occlusion.

**SUBJECT AND METHOD:** A 13-year-old male with the complaint of dental crowding. Clinical examination showed an Angle Class III closure, buccal non-occlusion on the right segment, a 1 mm overjet and a 2 mm overbite. In the maxillary right segment, a lateral tooth fusion, high canine, buried right central incisor and a supernumerary tooth which had *dens in dente* were observed. Form and size anomalies were detected at the upper and lower premolars and wide 35-45 pulp canals were seen. There was a supernumerary tooth embedded in the 35 apex region. Firstly 51-52 and the lower supernumerary tooth were extracted. At the same time, a button was bonded on the buried supernumerary tooth then the fused tooth was extracted. Cross elastics were used for correction of the buccal non-occlusion. After alignment of the high canine, a button was bonded on the buried central incisor and after eruption of the *dens in dente* it was extracted. A supernumerary

lateral incisor was also present in the left maxillary segment which was not extracted as it was planned to use this tooth

RESULTS: The patient's aesthetics and function was provided with the eruption and alignment of four incisors.

CONCLUSION: The patient's and clinicians' patience and caution overcame the difficult situations during long lasting and exhaustive orthodontic treatment.

#### CP 50 ORTHODONTIC TREATMENT OF A SKELETAL CLASS III CROSSBITE PATIENT WITH DEVELOPMENTAL DENTAL ANOMALIES

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AIMS: Mineralization of the permanent lower central incisors begins during 3-4 months of postnatal life and lower canine mineralization in 4-5 months of the postnatal life. The lower central incisor root formation is completed at the age of 9-10 years and the lower canines roots are completed at the age of 12-14 years. Due to trauma, endocrine disorders or syndromes, delay in root development and buried teeth can be observed. The aim of this study is to present the treatment of a Class III crossbite patient who had a developmental dental anomaly and also embedded teeth.

SUBJECT AND METHOD: A 12-year-old female with the complaint that she could not chew. Examination showed a straight profile, an Angle Class III closure, maxillary deficiency, lateral crossbite at the right and anterior segment, 2 mm underjet, 8 mm negative overbite and malformation at the left maxillary central incisor. The buried teeth were the upper and lower canines, the upper right central-lateral incisors and the left lateral incisor. The primary teeth were also seen in the mouth. Radiographic evaluation showed a serious retardation of the root growth of all teeth. A malformation of the upper left lateral incisor and a skeletal Class III were observed. Rapid maxillary expansion was applied. Fixed orthodontic devices were bonded. Extraction of the malformed upper left lateral incisor was planned since it was preventing upper left canine eruption. The other impacted teeth were moved with the help of bonded button. Because of the presence of root growth retardation, the patient was seen frequently and mild forces were applied during the sessions. After the teeth were erupted, prosthetic rehabilitation was required for the malformed left upper central and extracted lateral incisors.

RESULTS: Eruption of the buried teeth eruption was achieved. The Class III relationship was corrected.

CONCLUSION: Orthodontics is a puzzle that needs to be solved with patience and attention. Although root growth retardation has a restrictive effect on orthodontic treatment, the patient's functional needs were provided, a balanced occlusion was created and satisfactory smile aesthetics were obtained

#### CP 51 OCCURRENCE OF MALOCCLUSION AND SPEECH DEFECTS IN PATIENTS WITH CONGENITAL MALFORMATIONS OF THE FACIAL PART OF THE SKULL

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AIMS: To interpret the frequency of occurrence of dental anomalies in patients with the congenital defects of the face.

MATERIALS AND METHOD: The analysis included medical documentation on orthodontic and logopaedic treatment, diagnostic models, pan tomographic and cephalometric radiographs and cone beam computed tomograms. The records of 320 subjects (184 boys, 136 girls) aged from 1 month to 16 years were analysed.

RESULTS: Following all the investigated parameters, tobacco associations were found in 96 per cent. The most frequently observed faults were: Class II and III failure at the end of Class I. Irregularities occurred in 78 per cent of patients.

**CONCLUSION:** Patients with congenital facial abnormalities may require orthodontic treatment. Orthodontic treatment of patients with congenital abnormalities should be multidisciplinary and may include logopaedic treatment.

**CP 52 SINGLE TOOTH MACRODONTIA – MULTIDISCIPLINARY MODALITIES OF TREATMENT: A CASE SERIES AND LITERATURE REVIEW**

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**AIMS:** To investigate the presentation of single tooth macrodontia, highlight their clinical and radiological findings, to understand the clinical implications and the outcomes of different treatment modalities. Finally, to highlight the current evidence available on the topic.

**MATERIALS AND METHOD:** A case series of patients diagnosed and treated in the last 3 years. Case 1: An 8-year old Caucasian male, presenting with a macrodont of the upper left central incisor and a supernumerary tooth in the upper right quadrant. Management involved extraction, autotransplantation of the supernumerary tooth, endodontic treatment and fixed orthodontic appliances for arch alignment. Case 2: A 9-year old Caucasian male, presenting with a unilateral macrodont of the upper left lateral incisor and a Class II division 1 malocclusion. Treatment is ongoing with functional and fixed orthodontic appliances and interproximal reduction of the macrodont. Case 3: A 10-year old Caucasian male, presenting with a unilateral macrodont of the upper left lateral incisor. Managed with interproximal reduction to disguise the tooth, restorative build-up of the contralateral incisor and planned for orthodontic treatment. A literature review using PubMed, Medline, Embase and CINAHL databases was performed to show the evidence available. The search terms covered (Autotransplantation)\*, (Gemination)\*, (Transplant)\*, (Autotransplantation)\*, (Mesiodens)\*, (Maxilla)\*, (Mandible)\*, (Supernumerary)\* (Teeth)\*, (Dental Abnormalities)\* (Macrodontia)\*, (Mesiodens)\* (Fusion)\*, (Interproximal reduction) and (Camouflage)\*. All search terms were meshed to incorporate a wide range of alternate phrases surrounding the topic.

**RESULTS:** The case series presents three different treatment modalities for similar presentations of macrodontia. The literature search results produced 5652 papers, of which duplicates were removed and 193 papers of relevance included. The highest level of evidence was a meta-analysis and systematic review (Chung *et al.*, 2014).

**CONCLUSION:** There are many factors that require consideration to provide treatment options for macrodontia and these are investigated in this case series. A 'case specific' approach is essential for successful treatment. This often requires a multidisciplinary effort to dictate holistic care. More objective and validated research of the literature is required in order to provide appropriate guidance in the management and follow-up of these cases.

**CP 53 MAXIMUM BITE FORCE IN PATIENTS WITH SPINAL MUSCULAR ATROPHY DURING THE FIRST YEAR OF NUSINERSEN THERAPY – A PILOT STUDY**

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**AIMS:** Spinal muscular atrophy (SMA), an autosomal recessive disorder, is characterized by progressive spinal and bulbar muscle weakness and atrophy caused by the degeneration of alpha-motoneurons. The recent approval of the antisense oligonucleotide nusinersen for the treatment of SMA highlights the need for reliable clinical tools to evaluate motor function in patients with neuromuscular diseases. An extension to existing motor scores, sensitive to more nuanced changes, could be measurement of the bulbar neuromuscular function (e.g., bite force), especially in symptomatic patients with a chronic course of disease and severely reduced functional abilities. This study's aim was to test if maximum bite force measurement is suitable to quantify changes of altered bulbar function during nusinersen therapy.

**SUBJECTS AND METHOD:** Isometric maximum bite force measurement was used to quantify changes of the bulbar neuromuscular function in two adult monozygotic female twins with SMA type II. Using piezoelectric transducers placed on one side of the dental arch, 550 observations clustered in 55 measurement points were recorded for each patient. Measurements took place before and during the first year of nusinersen therapy. Associations between changes in bite force and the application of nusinersen were analyzed. Inferential statistics relied on patient-specific models using ordinary least squares regression.

**RESULTS:** During the application of four loading doses of nusinersen within the first two months, bite force levels steadily increased and reached a statistically significantly higher level compared to the initial state in both patients. Subsequent maintenance doses, at four monthly intervals, showed smaller or no statistically significant associations with changes in maximum bite force.

**CONCLUSION:** The quantitative measurement of maximum bite force seems to be a useful tool to evaluate the bulbar function among patients with degenerative, neuromuscular diseases. As such, it may supplement other, existing scores set out to identify treatment-related changes in motor function.

#### CP 54 PALATAL MULTIPURPOSE MINI-IMPLANTS WITH SIMPLE AND STRONG ATTACHMENTS – INITIAL EXPERIENCES

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**AIMS:** Palatal miniscrews are widely used as absolute anchorage in orthodontic tooth movement and even palatal expansion. The amount and quality of bone enables stable seating of the screws. The soft tissue relationships are ideal and hygienic problems rarely occur. The aim of this research was to test a screw and its attachment in daily practice.

**MATERIALS AND METHOD:** Mini-implants were used for maxillary expansion with screw and molar anchorage (hybrid hyrax; n = 7). Robust 1.5 mm thick plates were welded on the expansion screw body to improve the effect of expansion and to decrease appliance bending. The appliance was fixed with glass ionomer cement on the molars and with a hexagonal screw on the mini-implant. The mean age of the patients was 14 years (12.6-15.8 years); all were in the pubertal period (CVMS 4-5). The patients were expanded 0.4 mm/day, overexpansion was 2 mm in each case. The mean expansion was 6.8 mm. After expansion of the maxilla, the molar arms with bands were cut off, and the blocked expansion screw left as retention.

**RESULTS:** All the screws remained stable during treatment and there was no breakage of the screws or the appliance. Maxillary expansion was successful in each case, and the expansion screw on the mini-implants was sufficient to retain the amount of expansion.

**CONCLUSION:** The simple and strong attachment of the abutment holding screw makes the use of this system easy and does not require high precision. The robust and rigid plate welded on the expansion screw makes expansion more effective and reduces the risk of appliance bending or deformation.

#### CP 55 EARLY TREATMENT OF AN ANTERIOR OPEN BITE WITH THE BIONATOR – A THREE-DIMENSIONAL SOFT TISSUE AND ULTRASOUND EVALUATION

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**AIMS:** To objectively evaluate the changes of facial morphology characteristics and tongue posture in a young patient with an anterior open bite (AOB) before and after orthodontic treatment with a Bionator.

**SUBJECT AND METHOD:** An 8-year old girl with an AOB. Functional diagnosis revealed incorrect breathing through the mouth, a visceral type of swallowing pattern and incorrect tongue posture. Three-dimensional (3D) ultrasonography was used to evaluate tongue posture at baseline and after 6 months of treatment with the Bionator. An ultrasound system, Voluson 730 Expert, and a 3D

convex transducer, RAB 2-5 MHz, were used to assess tongue posture. 3D scans of the girl's face were taken at baseline and after 6 months of treatment. The facial appearance was assessed using a 3D laser scanner technique in order to evaluate soft tissue changes after early orthopaedic treatment with the Bionator.

**RESULTS:** After 6 months of treatment a Class I molar relationship with a correct overbite was obtained. Nasal breathing, a correct tongue posture and somatic swallowing pattern were established. 3D reconstruction of the tongue before treatment showed an incorrect tongue posture. Ultrasonographic reconstruction of the tongue after 6 months revealed a correct tongue posture on the palate.

**CONCLUSION:** Early treatment of an AOB with the Bionator was able to improve the facial appearance as well as functional and morphological irregularities together with the space conditions of the oral cavity. The facial morphology characteristics were obtained using a 3D laser scanner and the tongue posture was diagnosed using ultrasonography. Both techniques are non-invasive and relatively simple tools which could in future become important diagnostic tools in orthodontic patients with functional appliances.

#### CP 56 MINISCREW-ASSISTED CAMOUFLAGE TREATMENT OF A DENTAL CLASS III MALOCCLUSION WITH FACIAL ASYMMETRY – A CASE REPORT

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**AIMS:** Treating skeletal Class III malocclusions with facial asymmetry usually involves combined surgical and orthodontic treatment in adult patients. But in some cases a balanced occlusion and acceptable profile could also be achieved by non-surgical orthodontic treatment after careful diagnosis and treatment planning. This case report describes a dental Class III patient with facial asymmetry and dental midline deviation corrected with the use of temporary anchorage devices.

**SUBJECT AND METHOD:** An 18-year-old female who had an Angle Class III malocclusion with an anterior edge to edge bite. In addition facial asymmetry and a lower midline shift to the right side were noted. Cephalometric analysis showed a skeletal Class III jaw relationship with a concave profile and orthodivergent facial pattern. The treatment objectives were to improve the profile, obtain bilateral canine and molar relationships, and also obtain efficient occlusal function. She was therefore treated with non-extraction camouflage due to her facial profile. A left buccal shelf miniscrew was inserted and asymmetry interarch elastics were indicated for distalization of lower left posterior teeth to correct the midline deviation. The lower anterior teeth were retracted with original interdental space to obtain acceptable overbite and overjet.

**RESULTS:** After 39 months treatment, ideal overjet and overbite relationships and functional occlusion were achieved, and the dental midline deviation was corrected. The profile became more harmonious.

**CONCLUSION:** Although facial asymmetry could not be fully corrected by camouflage orthodontic treatment, an ideal overjet, overbite and occlusion was achieved with the help of miniscrews.

#### CP 57 EFFECT OF RAPID MAXILLARY EXPANSION ON TONGUE POSTURE AND TONSIL SIZE IN CHILDREN WITH TONSILLAR HYPERTROPHY: A PRELIMINARY STUDY

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**AIMS:** To evaluate the effects of rapid maxillary expansion (RME) treatment on tongue posture and tonsil size in children with tonsillar hypertrophy.

**SUBJECTS AND METHOD:** Eight children with tonsillar hypertrophy (pharyngeal or palatine tonsils) and maxillary constriction, who had undergone RME treatment, were included in this retrospective study. Tongue posture, position of hyoid bone and the size of the tonsils were evaluated on lateral cephalograms taken before (T1) and after (T2) maxillary expansion.

RESULTS: All patients had low tongue posture at T1 except one patient. Tongue posture was displaced upwards in four patients, maintained in two and downward in two. The distance from the hyoid bone to the mandibular plane decreased in five patients, increased in one patient, and no significant changes were found in two patients. On the other hand, the size of tonsils at T1 did not significantly differ from that at T2.

CONCLUSION: Tongue posture might be improved after RME treatment in children with tonsillar hypertrophy. However, tonsil size itself, does not decrease after treatment.

#### CP 58 TWO DIFFERENT SURGICAL MANagements OF SKELETAL CLASS II CASES – MANDIBULAR ADVANCEMENT WITH/WITHOUT MAXILLARY SURGERY

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AIMS: Skeletal Class II surgery requires mandibular advancement by bilateral sagittal split ramus osteotomy (BSSRO). Maxillary surgery can be included when considering the patient's profile, maxillary canting or vertical problems. Two cases of skeletal Class II surgery with and without maxillary surgery are presented.

SUBJECTS AND METHOD: Case 1. A 23 year-old female presented with a skeletal Class II malocclusion, retrognathic mandible, normodivergent profile, maxillary canting and upper lip protrusion. Orthognathic two-jaw surgery was planned to correct her skeletal discrepancy. Four first premolars were extracted and space was closed with moderate anchorage on both arches. A maxillary Le-Fort I osteotomy was performed to correct canting and yawing. BSSRO with advancing genioplasty was carried out according to the surgical plan. Case 2. An 18 year-old female with a skeletal Class II malocclusion, retrognathic mandible, temporomandibular disorder (especially condylar resorption) and hyperdivergent profile. Mandibular advancement without maxillary surgery and extraction in the upper arch was performed because there was no maxillary skeletal or dental discrepancy. Two first premolars were extracted and the space was closed with moderate anchorage on the lower arch. BSSRO with advancing genioplasty was performed and the facial profile was improved after treatment. Intermaxillary traction was undertaken to correct minor relapse during the retention period.

RESULTS: Case 1. The patient's protrusive facial profile was improved and functional occlusion was established after treatment. Two years after orthodontic treatment, the occlusion and skeletal relationship remained stable. Case 2. After intermaxillary traction, minor improvement was observed in occlusion and facial profile.

CONCLUSION: For each patient, skeletal discrepancy was resolved with different orthodontic and surgical treatments and the facial profile was improved. Correct diagnosis and treatment planning is necessary for each case for favourable results.

#### CP 59 ORTHODONTIC TREATMENT COMBINED WITH ORTHOGNATHIC SURGERY FOR A SKELETAL CLASS III MALOCCLUSION WITH ANTERIOR OPEN BITE – CASE REPORT

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AIMS: A skeletal Class III malocclusion may present several aetiologies, including mandibular prognathism, maxillary deficiency or a combination of both. This type of malocclusion may have an unfavourable impact on facial aesthetics such as a concave profile and prominent chin. This reflection in facial soft tissues may cause an effect on a patient's mental development and social situation. It is well known that a skeletal open bite is one of the most difficult dentofacial deformities to treat. The treatment of an open bite is generally considered a challenge due to its multifactorial aetiology. Several factors are thought to be related to this type of malocclusion such as facial growth pattern, tongue-thrusting, mouth breathing and adenoid hypertrophy. For patients with a skeletal Class III malocclusion and anterior open bite (AOB), a combination of orthodontics and orthognathic surgery is usually indicated for better occlusion and facial aesthetic improvement

and long-term stability. This case report represents a patient with a Class III skeletal malocclusion with an AOB treated with orthodontic treatment combined with orthognathic surgery.

**SUBJECT AND METHOD:** A 21-year-old female with the chief complaint of having difficulty in biting food and a concave profile. After clinical examination and cephalometric analysis, she was diagnosed with a skeletal Class III relationship, hyperdivergent facial pattern and an Angle Class III malocclusion with an AOB. The treatment plan included pre-surgical orthodontic treatment for narrowing of the upper arch with two paramedian miniscrews. After dental decompensation, a bilateral intraoral vertical ramus osteotomy was performed for correction of the skeletal Class III malocclusion and AOB.

**RESULTS:** After 2 years of treatment, an acceptable overjet and overbite, good interdigitation and stable occlusion with Class I canine and molar relationship were achieved. The mandibular prognathism and concave profile were eliminated and a harmonious facial profile was achieved.

**CONCLUSION:** A thorough examination and appropriate diagnosis before deciding the most suitable treatment plan are determinant factors for successful treatment and long-term stability.

#### CP 60 MINISCREWS AND A FACEMASK IN AN ECTODERMIC DYSPLASIA PATIENT

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**AIMS:** To present the treatment of a growing skeletal Class III subject with ectodermal dysplasia with temporary anchorage devices and a facemask.

**SUBJECT AND METHOD:** An 8 year old Class III male with a diagnosis of ectodermal dysplasia. Miniscrews (Spider Screw 1.5 × 8 mm) between the upper canines and first temporary molars and a Petit facemask with 8.5 oz ¼ inch crossed-elastics were used. Careful radiographic check-ups were undertaken to avoid damage to the permanent unerupted teeth.

**RESULTS:** Treatment resulted in successful correction of the anterior crossbite and the Class III malocclusion.

**CONCLUSION:** Miniscrews can be successfully be used with a facemask to treat a skeletal Class III in growing ectodermal dysplasia patients.

#### CP 61 ORTHODONTIC MANAGEMENT OF A MANDIBULAR DOUBLE-TOOTH INCISOR: A CASE REPORT

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**AIMS:** To present a rare case of a geminated mandibular lateral incisor tooth, successfully treated with an orthodontic approach.

**SUBJECT AND METHOD:** A 10.9 year-old Caucasian girl presented a lower right double- incisor tooth, with a Class I molar and a Class II canine tendency on both sides. In the lower arch there was a severe crowding of about 14 mm and a buccally ectopic left canine. The double-tooth was identified as a geminated tooth, because it had one root and one pulp canal of increased size, as shown on radiographic examination.

**RESULTS:** The anomalous tooth was managed with an orthodontic approach, including progressive stripping associated with a two phase-treatment including maxillary expansion and a lip bumper followed by fixed appliances.

**CONCLUSION:** This approach allowed a correct occlusion and better aesthetics to be achieved.

#### CP 62 IS ORTHODONTIC OPEN BITE CORRECTION STILL POSSIBLE IN ADULTS?

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**AIMS:** To critically assess the possibility of correcting, with only orthodontic means, an anterior open bite (AOB) in adult patients.

**MATERIALS AND METHOD:** Clinical and para-clinical assessment of patients with an AOB was subjected to critical evaluation of treatment methods and outcome.

**RESULTS:** The outcome of orthodontic treatment will be presented for adult patients with an AOB and the specifics of the cases are discussed.

**CONCLUSION:** AOB treatment only using orthodontic means is possible in very limited conditions and the stability of the outcome is a constant concern for both patient and practitioner.

#### CP 63 PROFILE AND AIRWAY VOLUME CHANGE AFTER COMPLEX TREATMENT OF A SEVERE CLASS III MALOCCLUSION – CASE REPORT

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**AIMS:** To demonstrate the outcome of complex treatment of an adult patient with a severe Class III malocclusion.

**SUBJECT AND METHOD:** A 25 year-old male with a skeletal Class III, maxillary hypoplasia, crossbite, negative overjet and crowding. His main complaints were an unaesthetic profile and sleep apnoea. The treatment plan included bonding an upper fixed appliance, performing transpalatal osteodistraction, bonding a lower fixed appliance, decompensation of the malocclusion, and double jaw orthognathic surgery.

**RESULTS:** Active treatment was finished in 25 months and a Class I occlusion was obtained. The profile and breathing improved significantly.

**CONCLUSION:** As a result of comprehensive orthodontic and orthognathic surgical treatment, it is possible not only to achieve satisfactory results considering function and bite, but also increase airway volume, which is essential for patients with sleep apnoea.

#### CP 64 RESIDUAL GROWTH OF THE MANDIBLE IN A YOUNG ADULT PATIENT WITH A CLASS III MALOCCLUSION AFTER ORTHOGNATHIC SURGERY: A CASE REPORT

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**AIMS:** To present residual growth of the mandible in young adult patients with a Class III malocclusion who underwent relapse after orthognathic surgery.

**SUBJECTS AND METHOD:** Three 17-year-old male patients diagnosed with a moderate to severe Class III malocclusion with anterior crossbite, who underwent orthognathic surgery at 18.7, 19, and 19.8 years of age. Their cervical vertebral maturation (CVM) stages were stage 5 or 6 before treatment. Lateral cephalograms were taken before treatment (T1), before surgery (T2), after treatment (T3), at retention 2 or 5 years (T4), and their mandibular growth was evaluated.

**RESULTS:** Mandibular length increased 3.5, 2.1, and 1.3 mm during pre-operative treatment (T2-T1), and 4.3, 4.2, and 1.5 mm after surgery and the retention period (T4-T2). Change in the mandibular plane angle during retention (T4-T3) were -4.4, +5.9, and -0.3 degrees, respectively. They showed shallow overjets and overbites at T4.

**CONCLUSION:** Residual growth of the mandible could be one of the contributing factors to the relapse after orthognathic surgery even in young adult patients older than 18 years of age. Although chronological ages and skeletal maturation stages indicate no more active growth, mandibular growth should be evaluated on serial cephalometric radiographs before surgery.

#### CP 65 DIFFERENT RESPONSE PROPERTIES OF THE HUMAN PERIODONTAL-MASSETERIC REFLEX BETWEEN THE CANINE AND FIRST PREMOLAR

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AIMS: Orthodontic treatment often requires extraction of premolars. However, the physiological function of the premolar remains unclear. The present study aimed to clarify the mechanism of premolar function during mastication by comparing it with the canine, with reference to the periodontal-masseteric reflex.

SUBJECTS AND METHOD: Five healthy adult volunteers without malocclusion were recruited. The periodontal-masseteric reflex was recorded with surface array electrodes placed on the bilateral masseter muscles. During light clenching (i.e., 10% of maximum voluntary contraction) with visual feedback for 30 seconds, mechanical stimulation (magnitude: 0.5 N, duration: 2 seconds) was applied twice in a ramp-and-hold fashion to the right maxillary canine and the first premolar lingobuccally to evoke the periodontal-masseteric reflex. The firing rate of the single motor units was analyzed and plotted with respect to the background activity and the reflex response, which represented the difference between the firing rate during stimulation and the background activity. The regression line and correlation coefficient were then obtained. The slope of the regression line and the correlation coefficient between the canine and first premolar, and those between the right and left sides were compared. A Student's *t*-test was used to identify significance ( $P < 0.05$ ) of the regression line, while Fisher's Z test was used to determine the significance ( $P < 0.05$ ) of the correlation coefficient.

RESULTS: Twenty-two pairs of motor units were recorded from the right and left masseter muscles. There was a significant correlation between background activity and the reflex response for the right canine in the bilateral masseter muscles, and for the right premolar in the left masseter muscle. The correlation coefficient for the premolar in the right masseter muscle was not significant. The correlation coefficient for laterality was significantly smaller in the right side than on the left side for the canine. However, the regression line was significantly steeper and the negative correlation coefficient was significantly larger for the canine than the premolar.

CONCLUSION: The findings suggest that the canine and premolar periodontal-masseteric reflexes possess similar laterality and different sensitivities.

#### CP 66 IN-HOUSE DIGITAL ORTHOGNATHIC TREATMENT PLANNING: 'THE NOTTINGHAM EXPERIENCE'

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AIMS: To determine the potential advantages of 'The Nottingham experience' to orthognathic treatment planning within the constraints of a publicly funded health system. This embraces advances in digital technology which enables surgical planning in a three-dimensional (3D) environment, making it possible to fabricate surgical stents with pre-bent plates.

MATERIALS AND METHOD: Following pre-surgical orthodontic treatment, impressions of the dental arches are taken to produce dental models which are digitally scanned. Data obtained from a cone beam computer tomograph (CBCT) is married with the dental model scan using the Dolphin imaging system. This creates an accurate 3D model of the patient's pre-operative position. Virtual surgery is carried out within the Dolphin environment to plan the necessary maxillary and mandibular surgical movements. Based on these predetermined post-operative positions, intermediate and final occlusal wafers are 3D printed for use during orthognathic surgery. Finally, the pre- and post-operative model segments, where cuts are planned, are 3D printed. This enables fabrication of a laboratory made vacuum formed surgical splint with predetermined screw holes, via a reverse engineering technique. Stock titanium metal plates can then be bent pre-operatively.

RESULTS: The Nottingham experience produces comparable outcomes to traditional and other conventional orthognathic treatment planning approaches, with many potential advantages. This includes reduced surgical, laboratory and orthodontic chair time, and phases out many traditional procedural stages such as the use of facebow registration and articulation. This approach embraces the direct interactions between patient, surgeon, orthodontist and laboratory to achieve a shared understanding of the desired results, which are, arguably, more accurate compared to the traditional approach. There are cost implications with the use of sophisticated software and 3D

printing, however these costs are much reduced by in-house planning and fabrication as compared to utilising an external company.

**CONCLUSION:** The Nottingham experience simplifies orthognathic treatment planning and surgery, and is economically sustainable within a publicly funded health system. The next phase is to undertake research for its formal comparison to conventional orthognathic treatment planning.

#### CP 67 FOUR PREMOLAR EXTRACTION TREATMENT WITH A UNILATERAL IMPACTED CANINE: A CASE REPORT

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**AIMS:** Tooth extraction is a common approach in orthodontic treatment to resolve dental crowding and achieve an ideal dental relationship. This poster aims to show the results of extraction of all four premolar treatment with a unilateral impacted canine patient and the effect on the profile and intraoral image.

**SUBJECT AND METHOD:** This case report describes four premolar extractions and impacted canine treatment. A 15-year-old male presented with severe. upper and lower crowding and a labially positioned impacted left maxillary canine. Hays Nance analysis was performed and it was found out that there was 12,5 mm lack of space in the upper dental arch and 10.2 mm space deficiency in the lower arch. The overjet was 3.9 mm, the overbite was 3 mm and the patient had Class II canine and Class I molar relationship on the right side; impacted canine and Class I molar relationship in the left side. The ANB angle was 2.3 degrees, angle U1-SN 95.3 degrees and IMPA 87.6 degrees. Taking into account the severe crowding the extraction of the first premolars was suggested with moderate anchorage in the upper and lower arch. Following tooth extraction, the impacted left canine tooth was surgically exposed and a button was inserted.

**RESULTS:** Active orthodontic treatment lasted for 1 year 8 months. As a result of the extraction treatment, the crowding was resolved and a Class I canine and molar relationship was successfully established. According to the post-treatment records, the overjet was 2.56 mm and the overbite 2.8 mm. According to the cephalometric analyses after treatment; the upper incisor angle was (U1SN) was 96.4 degrees and the lower incisor angle was within normal values (IMPA: 91°).

**CONCLUSION:** Four premolar extraction treatment can provide an aesthetic and functional occlusion, without affecting the profile of the patient.

#### CP 68 CASE REPORT: VIRTUAL PLANNING WITH PATIENT SPECIFIC CUTTING GUIDES AND WAFERS FOR LARGE COMPLEX ASYMMETRIC ORTHOGNATHIC MOVEMENTS

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**AIMS:** Facial appearance is an integral part of social interaction and has a fundamental effect on a person's psyche. Complex facial deformity movements in multiple dimensions are difficult for the orthodontist and surgeon to plan with traditional methods, as this can lead to inaccuracies with rotations or complex asymmetric moves. Modern three-dimensional (3D) planning offers visualisation of the relationship between the dental arches and surrounding bony structures in a single virtual model. This case report demonstrates the use of 3D virtual planning for complex asymmetric orthognathic movements in order to produce a reliable outcome for the patient.

**SUBJECT AND METHOD:** An 18 year-old male with severe maxillary hypoplasia with asymmetry in all three planes and a severe Skeletal III malocclusion. His reverse overjet was -13 mm, there was a substantial maxillary cant of 5 mm, a maxillary centreline shift to the right of 6 mm, mandibular centreline shift to the left of 2 mm and an anterior open bite. Conventional planning failed to produce reliable model surgery as the patient required large orthognathic movements (>10 mm) including rotation, advancement and cant correction. 3D virtual surgical planning was performed with the manufacture of patient specific cutting guides and an iliac crest bone graft template.

**RESULTS:** There was significant improvement in the patient's facial profile, harmony, aesthetics and final occlusion, with correction of the dental centrelines. The use of virtual surgical planning, a bone graft template and cutting jig, reduced surgical time and improved the reliability of the

outcome. CAD-CAM wafers allowed the occlusion to be accurately planned prior to surgery to ensure a reliable outcome to correct the deformity.

**CONCLUSION:** Anatomical information on a 3D scan is far superior to plain film thus complex orthognathic movements can be visualised by the orthodontist, surgeon and patient with ease. A reliable aesthetic and functional outcome can be achieved as well as the anticipation of factors that may contribute to relapse. Primary stability of bone grafts is essential along with accurate osteosynthesis to reduce the risk of skeletal relapse after orthognathic surgery.

#### CP 69 HYBRID-HYRAX BASED RAPID MAXILLARY EXPANSION, WORKFLOW AND TREATMENT OUTCOME OF CLINICAL CASES

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**AIMS:** To establish a reliable, effective and minimally invasive method for surgical supported rapid maxillary expansion (RME) as an alternative for conventional transpalatal distractors (TPD) and band based appliances.

**MATERIALS AND METHOD:** A hybrid-Hyrax was incorporated to elaborate surgical assisted RME: description of workflow, monitoring of treatment progress, evaluation of patients' acceptance based on several documented treatment cases.

**RESULTS:** A precise and symmetric insertion of temporary anchorage devices (TADs) is guaranteed using a matching procedure. The primary surgical complexity is minimal, the appliance is smaller and intraoral restrictions are reduced. The surgeon does not face any restrictions when disconnecting the maxilla at the Le Fort I level. No loosening or loss of TADs was found, even if the region of insertion was very close to the palatal suture. The expansion was effective and there was good acceptance among patients. After dismounting of the RME appliance the TADs can easily be used for further transverse stabilization.

**CONCLUSION:** The hybrid-Hyrax is an effective appliance in surgically assisted RME treatment. The well-known disadvantages of band based RME and TPD can partially be eliminated.

#### CP 70 MANAGEMENT OF A GOLDENHAR AND CLEFT PALATE PATIENT WITH A CUSTOM-MADE OSTEOSYNTHESIS PLATE: A CASE REPORT

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**AIMS:** To show the management of a patient affected by Goldenhar syndrome with a cleft lip and palate (CLP). The patient was treated by means of mandibular first bimaxillary orthognathic surgery with the splintless technique and the use of custom-made osteosynthesis plates.

**SUBJECT AND METHOD:** A 17-year old boy with right hemifacial microsomia characterized by a Pruzansky IIa affected mandible associated with a complete monolateral CLP, maxillary retrusion and vertical maxillary excess who underwent bimaxillary orthognathic surgery. Surgical planning and custom-made plates were developed based on a three-dimensional (3D) virtual program (Trumatch® Personalized Solutions). This approach utilized a personalized orthognathic surgical guide system, which comprised a set of cutting guides and 3D printed custom titanium fixation plates for both Le Fort I and bilateral sagittal split osteotomies (BSSOs). The cutting guides were first used to predrill screw holes and guide osteotomies. The custom plates were then used to reposition and stabilize the bony segments as planned, without the use of surgical splints. In this case a custom-made plate was positioned to stabilize the maxilla after the Le fort I osteotomy without using an intermediate splint. The anatomy of the mandible was reconstructed by mean of a custom-made plate that needed extraoral access for the correct positioning.

**RESULTS:** Post-treatment photographs and radiographs show improved facial symmetry and a harmonious profile. Study models displayed a stable and symmetric occlusion with a correct overjet and overbite. A full Class II molar relationship and a Class I canine relationship with correct midlines were achieved in accordance with treatment planning. Clinical examination revealed correct temporomandibular joint function and as the patient was satisfied with his facial aesthetics it was not necessary to perform additional surgery to correct the nose and upper lip.

**CONCLUSION:** Bimaxillary orthognathic surgery using the splintless technique combined with the use of custom-made osteosynthesis plates allowed more precise surgery of a patient with Goldenhar syndrome associated with a CLP and severe asymmetry to achieve correct aesthetics of the face and of the profile associated with a stable occlusion.

**CP 71 FUNCTIONAL ORTHOPAEDIC TREATMENT OF CLASS II IN EARLY ADOLESCENT: A CASE REPORT**

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**AIMS:** Functional orthopaedic treatment in adolescent is usually not the first choice in Class II treatment, since there is not sufficient remaining growth to resolve the skeletal discrepancies. Even if the patient has passed the peak of the pubertal growth spurt, there is still some mandibular growth left that could be used to correct some skeletal Class II problems.

**SUBJECT AND METHOD:** In 15 year old girl, clinical examination and cast analysis showed a half-cusp Class II division 1 malocclusion, increased incisor overjet and lip incompetence. Radiographic analysis revealed a retrognathic maxilla and mandible, an ANB angle of 6 degrees, retroclination of the mandible, protrusion of the lower incisors and a vertical growth type. Although the patient was in CS5 stage, based on the cervical vertebral maturation method, the treatment was initiated with a twin block appliance. The patient was instructed to wear the appliance for 14-16 hours during the day.

**RESULTS:** The patient showed very good compliance and after 12 months of treatment the Class II was corrected. The overjet was decreased and both upper and lower incisors were retruded. On the lateral cephalometric radiograph there was an improvement in SNB and ANB angles. In addition the sum of the posterior angles was decreased.

**CONCLUSION:** Growth modification in adolescents could sometimes be used to correct some skeletal and dentoalveolar Class II malocclusions. Treatment success depends on skeletal age, growth type and compliance.

**CP 72 HEMIMANDIBULAR HYPOPLASIA WITH CONDYLAR-CORONOID COLLAPSE: THERAPEUTIC APPROACH IN GROWING PATIENTS. A CASE SERIES**

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**AIMS:** To describe the management of two dysmorphic patients affected by hemimandibular hypoplasia with condylar-coronoid collapse (HH-CCC) treated with an asymmetric functional appliance. In the literature these cases are frequently misdiagnosed as hemifacial microsomia (HFM) because of a similar phenotype, but, differently from HFM, they present a normal functional matrix and, therefore, tend to grow towards the original symmetry.

**SUBJECTS AND METHOD:** The patients were a 7 year old female and a 6 year old male with a hemimandibular hypoplasia on right and on left side, respectively, asymmetrical face with chin deviation, Class II malocclusion and canting of the occlusal plane. Radiographic evaluation and clinical observation confirmed the monolateral mandibular deficiency and the collapse of the condyle on the coronoid process on the affected side. Treatment consisted of the use of an asymmetrical functional appliance. The appliance was gradually activated on the vertical plane on one side by a screw incorporated on an acrylic plate. It was used for 22 hours/day, including sleep time but not during meals.

**RESULTS:** Follow-up radiographs at 12 and 24 months showed a consistent remodelling of the head of the condyle and an improvement of the patients' facial aesthetics.

**CONCLUSION:** HH-CCC shows a positive response to functional therapy differently from HFM. Differential diagnosis between HFM and HH-CCC is of great importance given the different prognosis and treatment. Further studies including a larger sample size are needed to confirm the efficacy of this treatment approach

#### CP 73 A LITTLE BIT OF EVERYTHING###

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AIMS: To demonstrate finishing results of various malocclusions.

MATERIALS AND METHOD: Case reports of different malocclusions treated with a combination of fixed and myofunctional appliances.

RESULTS: Final occlusal results will be demonstrated.

CONCLUSION: Orthodontic therapy consists of a wide range of procedures. Each case has its own story. One is easy as a 'piece of cake', the other tough as a rock.

#### CP 74 PECULIARITIES OF TREATMENT PATIENTS WITH EDENTULISM

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AIMS: To improve the efficiency of diagnosis and treatment of patients with tooth loss.

SUBJECT AND METHOD: A clinical example of a complete denture in the upper and lower arch in a 4 year old patient with the complete absence of the primary teeth as a result of early removal of the teeth due to tooth decay. A radiographic examination was conducted including a dental pantomogram, which helped to determine the absence of all primary teeth as well as a set of 28 permanent teeth. Teleroentgenography of head in the lateral projection was conducted. Impressions the jaws and wax models with biting rollers were made. Wax templates of complete dentures were fitted and a constructive bite was determined. Cephalometric analysis in the Dolphin imaging program was performed. Linear and angular parameters and interalveolar height were measured. A dental technician positioned artificial teeth. Complete dentures were fitted to the upper and lower jaws.

RESULTS: The proposed method of using complete dentures in children with complete absence of primary teeth can improve the accuracy of measurement of the interalveolar height. The quality of treatment improves due to development of a sequential diagnostic algorithm. Diagnostics in the computer program allow control of the most significant linear and angular parameters of the maxillofacial system.

CONCLUSION: A comprehensive approach to the treatment and diagnosis of patients with complete absence of temporary teeth is necessary for achievement of optimal and stable results of orthodontic treatment.

#### CP 75 CONTEMPORARY NON-INVASIVE DIGITAL APPROACH TO DIAGNOSIS AND TREATMENT PLANNING OF UNILATERAL FUNCTIONAL CROSSBITE

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AIMS: To present a contemporary non-invasive digital approach to diagnosis, treatment planning and outcome evaluation in a child with a unilateral functional crossbite.

SUBJECT AND METHOD: A 6 year-old girl referred for treatment of a unilateral functional crossbite with a mandibular shift to her right side. After clinical examination, three-dimensional (3D) facial scanning was performed using a non-invasive stereophotogrammetric system. Furthermore, intraoral scanning was used to obtain scans of the upper and lower dentition. Facial asymmetry as well as deviations in the sagittal and vertical planes of the girl's facial scan from an average face matched for gender, age and dentition was assessed. A 3D of the girl's back was also obtained for back asymmetry analysis. Based on the diagnosis, treatment with a maxillary expander with a semi-rapid (0.25 mm per day) expansion protocol was planned. The maxillary expander was digitally designed and printed using a laser melting technique. Active expansion was planned for approximately 1 month followed by a 6 months retention phase without activation and a 6 months

post-retention phase with a functional regulator. Moreover, the girl was referred to an orthopaedist for further assessment. After treatment, outcome was assessed using the same non-invasive methods.

**RESULTS:** Upon clinical examination, the girl's face appeared to be slightly asymmetric, which was objectively confirmed by her facial scan analysis. The highest percentage of asymmetry was seen in the lower part of the face, while the percentages of facial asymmetry in the forehead and maxillary areas were lower. Compared to the average face, the girl's face showed bimaxillary protrusion. Intraorally, a posterior crossbite was seen on the right side along with a midline deviation. The ratio between palatal and mouth floor volume measured on intraoral scans was in favour of the latter, therefore, palatal expansion was advocated. The back asymmetry analysis revealed asymmetry in the neck, shoulder, scapula and hip areas. After treatment, re-evaluation of facial asymmetry along with the ratio between the palatal and mouth floor volumes revealed the positive effects of treatment.

**CONCLUSION:** Contemporary early treatment of unilateral functional crossbite could be based on completely non-invasive and child-friendly digital approaches.

**CP 76 MAXILLARY RECONSTRUCTION IN CLEFT LIP AND PALATE PATIENTS: CLINICAL CASE SERIES**  
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**AIMS:** To evaluate the effects of maxillary distraction osteogenesis (DO) in patients with a cleft lip and palate.

**SUBJECTS AND METHOD:** Three patients were submitted to osteogenic distraction. The technique was performed before secondary bone grafting surgery, due to wide clefts, with an internal distractor. Clinical control was done and recorded with intra-oral photographs before and after the procedure.

**RESULTS:** In cases of wide orofacial cleft palates, dehiscence in the bone graft may occur. DO is a safe method that reduces the size of a large cleft palate, which improves the predictability of alveolar secondary bone graft surgery, as it allows transportation of alveolar bone towards the defect. In all cases, bone formation for orthodontic movement was verified, which allowed maxillary reconstruction.

**CONCLUSION:** Wide cleft palates can be successfully treated using internal DO. This protocol improves the predictability of alveolar secondary bone graft surgery.

**CP 77 APPLICATION OF A STIMULATOR IN THE TREATMENT OF SYNDROMIC CLEFT LIP AND PALATE**

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**AIMS:** Orthodontic and surgical treatment of a syndromic cleft is complex and long-term. It is further complicated by various birth defects which can be life-threatening for a newborn or can make the therapy itself more difficult. The induction of a newborn into total anaesthesia with a view to performing the surgery of a cleft is often made difficult or time-limited. The aim of this research was estimation of the efficiency of stimulator application in newborns with syndromic clefts: Goldenhar syndrome, lobar holoprosencephaly with a median cleft lip and trisomy 13 (47XX+13).

**MATERIALS AND METHOD:** This poster presents pre-surgical orthodontic therapy in newborns with three severe types of cleft, unilateral cleft lip and palate, bilateral cleft lip and palate (BCLP) and premaxillary agenesis with a median cleft lip which occurs within three rare syndromes: Goldenhar syndrome, lobar holoprosencephaly with a median cleft lip and trisomy 13 (47XX+13). Pre-surgical orthodontic therapy was conducted by means of RBJ stimulators without extraoral fixation, whose construction was conditioned by the type of cleft.

**RESULTS:** With active treatment with RBJ stimulators, the cleft area in all three types of cleft was significantly reduced, as well as the protrusion of the premaxilla in BCLP. By directing growth of the

cleft segments of newborn's upper jaw, the most approximate shape to a healthy newborn's jaw shape is achieved.

CONCLUSION: All three types of described stimulators used in the therapy of syndromic cleft lip and palate enabled primarily the feeding of newborns, and thus their survival. With their orthopaedic effect they created optimal conditions for successful performance of surgical care of syndromic cleft lip and palate.

#### CP 78 THREE-DIMENSIONAL ANALYSIS OF THE EFFICIENCY OF STIMULATOR APPLICATION IN NEWBORNS WITH PREMAXILLARY AGENESIS AND A MEDIAN CLEFT LIP

Julija Radojicic<sup>1</sup>, Aleksandra Radojicic<sup>1</sup>, Andrija Radojicic<sup>2</sup>, Aleksandar Radojicic<sup>2</sup>, <sup>1</sup>Faculty of Medicine, University of Nis and <sup>2</sup>Ortodent, Nis, Serbia

AIMS: To estimate of the efficiency of stimulator application in newborns with lobar holoprosencephaly, premaxillary agenesis and a median cleft lip.

MATERIALS AND METHOD: This presentation describes the construction of a uniquely designed RBJ stimulator which enables feeding, and the success of its action in the reduction of wide clefts between the palatal shelves of the damaged upper jaw of the newborn, it documents the computerized three-dimensional (3D) analysis of gypsum impressions of the newborn before and after orthodontic therapy with great accuracy.

RESULTS: A reduction of the cleft width was achieved using the RBJ stimulator from day 7 to the end of the 6th month, of the newborn's upper jaw and HCP.

CONCLUSION: Until 3D intraoral scanning as well as the development of the CAD/CAM technique becomes a generally accepted method, the RBJ stimulator is recommended as the method of choice.

#### CP 79 ASYMMETRIC DENTOALVEOLAR PALATAL EXPANSION USING A QUADHELIX APPLIANCE SUPPORTED BY ONE MINISCREW. CASE REPORT

Laura Rodríguez Martínez, Ana Macías Gago, Iván Nieto Sánchez, Laura Aneiros Fernández, San Rafael Hospital, Centro Universitario San Rafael-Antonio de Nebrija University, Madrid, Spain

AIMS: This case report shows the possibility of performing asymmetric dentoalveolar palatal expansion in a patient with a unilateral posterior crossbite without overcorrecting the side with no posterior crossbite.

SUBJECT AND METHOD: An 8-year-old boy referred with unilateral posterior crossbite. Clinical examination showed a functional left shift of the mandible when closing due to an occlusal interference between 63 and 73. In centric relation, the asymmetric compression was revealed on the left side. The treatment proposed was a quadhelix appliance supported by one miniscrew as indirect anchorage to the first right molar to avoid expansion of the right side.

RESULTS: After 5 months of active treatment an acceptable occlusion was achieved on the left side resolving the crossbite. The quadhelix was maintained for a period of a further 5 months as retention. One month after placing the miniscrew it failed and had to be replaced. The patient suffered an infection on the left side of the face at the end of active treatment, but this was not related to the miniscrew, which was placed on the right side.

CONCLUSION: Miniscrews as indirect anchorage are useful when combined with appliances such as the quadhelix for asymmetric cases, avoiding a bilateral expansion and overcorrection of the unaffected side.

#### CP 80 TREATMENT APPROACH IN A RARE CASE OF CONGENITAL CYSTIC HYGROMA

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AIMS: To report a multidisciplinary treatment approach in a 19-year old male born with a cystic hygroma and facial asymmetry.

**SUBJECT AND METHOD:** Prenatally, the patient was diagnosed with a large lateral neck mass. At birth, resection of a cystic lymphangioma colli that extended from the cranial base to the left maxillary sinus and cervical region was performed. During growth, facial asymmetry and hypoplasia of the mandible and its soft tissues became apparent. Radiographic examination at the age of 3 years revealed agenesis of the left temporomandibular joint (TMJ) with syndesmosis. Multiple surgical interventions in combination with extended orthodontic treatment were needed to optimize the facial appearance.

**RESULTS:** At the age of 3, the patient underwent bilateral distraction osteogenesis of the mandible (2 times left side, 1 time right side). During growth, deviation of the mandible to the left arose. Intra-orally, an asymmetric open bite and posterior crossbite were observed. At the age of 6, radiographic imaging showed agenesis of all second premolars. To improve the asymmetry, functional appliance therapy was started at the age of 9. At the age of 16, fixed orthodontic appliances were used for orthodontic pre-surgical decompensation, followed by rapid maxillary expansion to correct the crossbite. During adulthood, the patient underwent multiple orthognathic surgical interventions, including a sagittal split advancement osteotomy, an anterolateral thigh flap to fill the soft tissues on the left side, a Le Fort I and placement of a TMJ prosthesis on the left side. Unfortunately, left facial nerve paralysis occurred. At the age of 19, the fixed appliances were debonded.

**CONCLUSION:** Cystic hygroma, when massive, can create serious facial deformities. These deformities can be treated if surgery and orthodontics are coordinated early in life. Still, the treatment remains very complex and extended.

#### CP 81 ORTHODONTIC ALTERNATIVES MEDIATED BY MINISCREWS IN DAILY CLINICAL PRACTICE

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**AIMS:** To show therapeutic alternatives found in daily clinical practice using orthodontic miniscrews.

**MATERIALS AND METHOD:** Four different clinical situations are illustrated: first one is an extrusion for recovery a third molar, the second is for uprighting of a molar to allow a correct prosthesis, the third is extrusion of the root and the fourth is about implant site development.

**RESULTS:** The clinical results show how orthodontic therapy allows improvement in clinical conditions.

**CONCLUSION:** Miniscrews today represent an indispensable tool in daily clinical practice, which allow a valid alternative to otherwise more complex treatments.

#### CP 82 EVALUATION OF A CASE WITH PROTEUS SYNDROME FROM AN ORTHODONTIC PERSPECTIVE

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**AIMS:** Proteus syndrome is an extremely rare and complex hamartomatous condition characterized by partial gigantism of the hands, feet, or both; plantar hyperplasia; haemangiomas; lipomas; lymphangiomas; varicosities; verrucous epidermal nevi; macrocephaly; cranial exostosis; and asymmetry of the limbs because of long bone overgrowth. The aim of this presentation is to describe a clinical case of an orthodontic patient with Proteus syndrome, with physical, ophthalmic, facial, and oral involvement; orthodontic considerations were emphasized.

**SUBJECT AND METHOD:** A 13-year-old Caucasian female referred for orthodontic treatment. Her medical history revealed a diagnosis of Proteus syndrome. Clinical examination, study cast analysis, dental panoramic radiography, hand and wrist radiography, anteroposterior and lateral cephalometrics were carried out before treatment. Extraoral examination showed facial asymmetry with a chin deviation to the left side and concave profile. Intraoral examination showed a Class III canine and molar relationship on the left side, edge-to-edge canine and Class III molar relationship on the right side and a bilateral open bite. Upper and lower dental midlines were

deviated to the left. Panoramic radiographs showed that root resorption was present and the lower right second premolar was missing. Anteroposterior radiography showed a 17 degree chin deviation to the left side. Hand and wrist radiographic evaluation showed that she was at the peak period with MP3c stage. Lateral radiographic analysis revealed a skeletal Class III malocclusion.

**RESULTS:** After analysis from an orthodontic treatment perspective, it was decided that treatment should not be started because patient had growth potential. Liposuction of the right cheek was planned to reduce soft tissue asymmetry and improve the patient's aesthetics. Orthognathic surgery will be performed after growth has been completed.

**CONCLUSION:** Proteus syndrome was first described by Cohen and Hayden (1979), with an estimated prevalence of <1/1,000,000 live births. It is a rare complex disorder characterized by asymmetrical and disproportionate overgrowth of various tissues of the body. Therefore, orthodontic treatment must be planned carefully with a multidisciplinary treatment approach.

#### CP 83 TRACTION OF AN IMPACTED LOWER RIGHT CANINE USING A REMOVABLE APPLIANCE IN COMBINATION WITH MAGNETIC FORCE. A CASE REPORT

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**AIMS:** Malocclusion patients with impacted teeth are not rare. Impacted tooth traction is mainly performed with ligature wire and elastics in combination with a fixed type appliance, but pain due to the ligature wire and reduction of the traction force due to elasticity are mentioned as problems. The aim of this research is to highlight efforts to efficiently relieve pain and sustain traction of an impacted tooth with a splint type removable appliance and magnetic force. In addition, in this case, in order to minimize the biohazard caused by corrosion of the magnet, a high corrosion resistant stainless steel keeper was applied instead of a magnet on the impacted tooth.

**SUBJECT AND METHOD:** The patient was a 10 year 9 month-old girl. Her chief complaint was that her teeth were not erupting. The molar relationship was Class II, and the overjet was +6.0 mm. Moreover, from the findings of the intraoral and panoramic radiograph, the impacted lower right canine was seen on the lingual side of mandible. The case was diagnosed as maxillary protrusion with impacted lower right canine and midline deviation. The bone near the target tooth was fenestrated, and a stainless steel keeper was attached to the impacted lower right canine. The canine was tractioned by a magnetic force embedded in a splint type removable appliance.

**RESULTS:** At every clinic visit, the distance between the magnet and the keeper was set to 1 mm and care was taken to ensure that a constant traction force was adequately sustained. As a result, the lower right canine was able to erupt without discomfort and pain. After that, skeletal improvement was achieved by a functional appliance. In the second stage treatment, individual normal occlusion could be obtained by extracting the upper and lower first premolars for improvement of maxillary protrusion and crowding, and aligning teeth with multibracket system.

**CONCLUSION:** It is believed that this method of traction of impacted teeth using removable appliance in combination with magnets is very effective because it is possible to efficiently induce the eruption of the impacted teeth and to reduce patient discomfort.

#### CP 84 ANTERIOR OPEN BITE CORRECTION FOR A 17-YEAR-OLD FEMALE USING PALATAL MINI-IMPLANTS: A CASE REPORT

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**AIMS:** To correct the anterior open bite (AOB) of a female using midpalatal mini implants.

**SUBJECT AND METHOD:** A 17-year-old female, with a previous history of a thumb-sucking habit until the age of 16 years, presented with a Class I incisor relationship on a mild Class II skeletal pattern and increased vertical facial proportions complicated by an AOB of 3.5 mm. Comprehensive orthodontic treatment was applied. Two 6 mm length mini implants were inserted in the palate on both sides of the midpalatal suture at the level of first and second permanent molars and a composite bridge was built between the mini implants. Two separate transpalatal arches with

palatal hooks extending between the first and second molars were cemented. Sectional fixed appliances were fitted to ensure premolar intrusion. In addition, a lingual arch was used to stabilize the lower first and second permanent molars in their pre-treatment positions. Intrusion force was applied using a power chain passing through the composite bridge to the hooks incorporated in the transpalatal arches. Finally, upper alignment was obtained with full upper fixed appliance therapy. RESULTS: Treatment of the AOB was successful with palatal mini-implants as a positive overbite was achieved via molar intrusion and autorotation of the mandible. The Class I incisor, canine and molar relationships were maintained.

CONCLUSION: Temporary anchorage devices provide an effective source of skeletal anchorage where conventional orthodontic treatment provides a limited outcome. A plethora of studies report that the success of orthodontic mini-implants ranges between 66 to 100 per cent with a mean value of 83 per cent. Notably, previous studies report an increase in the success rates nearly up to 100 per cent when mini-implants are connected together and used as direct anchorage.

#### CP 85 DEVELOPMENT OF A MEASUREMENT DEVICE FOR THE MECHANICAL LOAD OF FUNCTIONAL APPLIANCES

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AIMS: Functional appliances, especially for treating maxillary protrusion, mechanically force the mandible forward to apply traction force to the mandibular condyle. This promotes cartilaginous growth in the small mandible. However, a method of measuring how much force is being applied to the mandibular condyle in individual patients with the functional appliance attached did not previously exist. Furthermore, as it was unclear as to how anatomical characteristics affect such force, it has been impossible to evaluate how much growth was promoted. Although the effects of functional appliances have been disputed, their mechanism of action underlying the improvement of skeletal malocclusion remains unclear. Hence, the aim of this study was to develop a new measurement device and to examine the mechanical load delivered to the mandible by the functional appliance as well as its relationship to the morphology of the mandibular condyle and articular eminence.

SUBJECTS AND METHOD: Eight patients (4 boys, 4 girls) diagnosed as having a skeletal Class II malocclusion due to mandibular undergrowth and treated using functional appliances. The average age of the subjects was 10 years 11 months. Traction force values were compared with cone-beam computed tomography (CBCT) image data. The force required to displace the mandible from the rest position to the advanced position was defined as the mandibular traction force ( $f$ ). To measure  $f$ , a new measurement device was developed. The measurement device mainly consisted of intraoral plates, a sliding rail, linear sensor, and photo interrupter. The data was collected over time using a strain gauge.

RESULTS: The functional appliance resulted in a traction force of 339 to 1477 gf/mm, with a mean value of 196.5 gf/mm for the elastic modulus of the mandible. A comparison with CBCT image data suggested that  $f$  was affected by the mandibular condyle and shape of the articular eminence. The correlation coefficient between the angle of the centre of the condyle and  $f$  was statistically significant ( $P = 0.007$ ).

CONCLUSION: It was concluded that the morphology of the mandibular condyle and articular eminence affect the amount of traction force needed to advance the mandible. This method can contribute to discovering efficient treatment techniques more suited to individual patients.

#### CP 86 AN INFLAMMATORY DENTIGEROUS CYST CAUSING DISPLACEMENT OF A PREMOLAR INTO THE MAXILLARY ANTRUM TREATED THROUGH NON-SURGICAL MANAGEMENT

Sowmya Simon, Allan Jones, Department of Orthodontics, Kingston Hospital, Kingston-Upon-Thames, U.K.

**AIMS:** Dentigerous cysts are the second most common type of developmental odontogenic cysts, and account for approximately 20 per cent of all jaw cysts. It has been suggested that progressing periapical inflammation of a primary tooth can cause cyst formation around the unerupted permanent successor tooth, and these cysts are consequently known as inflammatory dentigerous cysts. This case highlights the clinical implications of inflammatory dentigerous cysts, and how they can arise.

**SUBJECT AND METHOD:** A 12-year-old boy with a left-sided facial swelling of the maxilla. Intraorally, a left buccal and palatal swelling of the maxilla was noted, and the upper left second deciduous molar (ULE) was retained, carious and non-vital. Radiographs revealed a large well-corticated radiolucency associated with the ULE, causing displacement of the upper left second premolar into the maxillary sinus. A cone beam computed tomography (CBCT) scan revealed a large expansile cystic lesion in the left maxilla.

**RESULTS:** The ULE was extracted non-surgically and the cyst gradually resolved by decompression over a 1-year period, which was confirmed both clinically and radiographically. Consequently, the UL5 has migrated inferiorly from the antrum into a more favourable position for alignment. The patient is currently undergoing orthodontic treatment with fixed appliances, with the potential for exposure and bonding of the UL5 in the near future.

**CONCLUSION:** Dentigerous cysts represent an important oral and maxillofacial entity, and early recognition and diagnosis is crucial for appropriate management of this condition. As they are slow growing and often asymptomatic, they can achieve a large size whilst causing considerable displacement of adjacent teeth and structures. This case is unique in the fact that the cyst was treated in an entirely conservative manner through simple extraction, which led to an extremely positive outcome for the patient without the need for any surgical intervention.

#### CP 87 CARRIERE MOTION APPLIANCE FOR EARLY ORTHODONTIC TREATMENT PHASE

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**AIMS:** To demonstrate application of the sagittal-first concept using the Carriere motion appliance to treat Class II and III patients. The following two cases offer typical examples of the types of difficult sagittal corrections the appliance can address. The Carriere motion appliance is a technology that first focused on the patient's sagittal relationship to establish a Class I platform prior to comprehensive orthodontic treatment. This protocol is called 'sagittal-first'.

**MATERIALS AND METHOD:** Treatment started with the Motion Class II appliance bonded directly to the maxillary canines (or first premolars depending on the case) and first molars with 6 oz, 1/4 inch intraoral elastics for the first month and 8 oz, 3/16 inch elastics for the second and third months, engaged for Class II traction to molar tubes bonded to the mandibular second molars. An aligner vacuum-formed retainer was employed in the lower arch for maximum anchorage. For Class III treatment, the Motion Class III appliance is bonded directly to the mandibular canines and first molars with 6 oz, ¼ inch intraoral elastics, engaged for Class III traction to molar tubes bonded to the maxillary second molars. An aligner vacuum-formed retainer was employed in the upper arch for maximum anchorage. Sagittal-first eliminates competing force vectors inherent in traditional methodologies when traction is employed concurrent with fixed appliance treatment.

**RESULTS:** Utilizing the latest in advanced orthodontic technology, the Motion appliance ensures fast, effective and aesthetic first phase treatment. Plus, by jumpstarting orthodontic care with the Motion appliance, the overall treatment time is reduced, which means less time in braces. Normal treatment time for the appliance is 3 to 5 months, but it can differ depending on the orthodontic case. When the desired movement is reached, the orthodontist will remove the appliance and place the braces or aligners to finish the orthodontic treatment.

**CONCLUSION:** The Carriere motion technology is concerned first with the patient's sagittal dimension to establish a Class I. Orthodontic treatment with the Motion appliance, reduces the overall treatment time.

#### CP 88 THE INTERDISCIPLINARY MANAGEMENT OF HYPODONTIA

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AIMS: To present and analyze the multidisciplinary approach to resolving the hypodontia of lateral incisors and to evaluate treatment efficacy.

SUBJECTS AND METHOD: Case reports of two female patients of the same age. The first case was a 16 year old with hypodontia of both lateral incisor and irregular positions adjacent teeth as a consequence. Clinical and radiographic analyses showed hypodontia and after soft tissue, smile and space analyses orthodontic therapy was commenced to prepare the patient for implant treatment. After orthodontic therapy, implant treatment and definitive prosthetic restoration was undertaken. The second case was a 17 year old female diagnosed with agenesis of the right lateral incisor and microdontia of left lateral incisor. After the complete space analysis and the position of other teeth, space was opened for the missing tooth and definitive prosthetic restoration has been carried out with no-destructive preparation of veneers.

RESULTS: There is no scientific evidence for favouring some of the ways of resolving hypodontia of lateral incisors. Multidisciplinary work, consultations during planning and coordination of treatment allows provision of the best outcome for the patient.

CONCLUSION: Orthodontic treatment of hypodontia depends on the degree of hypodontia, malocclusion, skeletal and soft tissue correlation. The complexity of the problem and the modern standards of beauty require a multidisciplinary approach in achieving both functional and aesthetic requirements.

#### CP 89 BENESLIDER: A DEVICE TO MOVE MOLARS MESIALLY IN PATIENTS WITH DENTAL APLASIA

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AIMS: Mesial movement of the maxillary molars, premolars and canines is a reasonable but often challenging space closing treatment alternative for patients with dental aplasia. The aim of this report was to demonstrate the effectiveness of the skeletally anchored Beneslider in cases of dental aplasia.

MATERIALS AND METHOD: Maxillary molar mesial movement was performed with BENESlider to achieve bodily movement of the teeth and to minimize anchorage loss. The appliance combines the elements of two mini-implants inserted in the anterior region of the palate; a plate with welded wire which is connected to the implants and slider parts (mobilizer, coil springs, tubes) which are placed on the wire. The force is applied by the coil springs and activated with the mobilizer. Two patients are presented one with unilateral aplasia of the upper lateral incisors and a peg-shaped lateral incisor on the other side; and one with bilateral aplasia of the upper lateral incisors and unilateral aplasia of the second premolar. In both cases the therapeutic option of choice was orthodontic space closure with the Beneslider in order to avoid the technique-sensitive and challenging implantation in the anterior area and to reach a stable solution.

RESULTS: In both cases the canines were moved mesially to the place of the missing upper incisors, and were aesthetically modified to the shape of an incisor. In the lateral segments the limit of mesialization was determined by the stable intercuspation with the lower teeth and the requested width for further implantation to replace the missing premolar.

CONCLUSION: The Beneslider is an effective device to bodily move maxillary molars, premolars and canines mesially in cases of aplasia where orthodontic space closure is the chosen treatment option.

#### CP 90 DENTAL TRAUMATOLOGY VERSUS EARLY PHASE OF ORTHODONTIC TREATMENT: A CASE REPORT

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AIMS: A case report of periodontal trauma of an orthodontic patient with fixed appliance.

**SUBJECT AND METHOD:** A 14-year-old male, generally healthy, treated with fixed appliance for crowding and reverse bite of the lateral incisor in the upper jaw. Two weeks after bonding he fainted at school and fell down on the edge of the table. At the time of the accident he was wearing a heat-activated nickel titanium archwire with a round 0.016 inch cross-section. He avulsed the right central upper incisor but it was still attached to the archwire. The patient attended the dental department immediately where the tooth was relocated in the correct position and the archwires changed. The new one was made of 0.016 × 0.022 inch stainless steel. After two weeks as the tooth was firm the orthodontic treatment was continued.

**RESULTS:** After a short term check-up (3 weeks) the tooth was firm and vital.

**CONCLUSION:** Avulsion of a permanent upper central incisor with the extraalveolar time less than 2 hours is usually treated by reimplantation, fixed with a wire and composite resin splint. In this case there was no extraalveolar time. The presence of the fixed appliance modified the extraalveolar time and therefore the process and prognosis of the tooth improved.

#### CP 91 A CASE OF CROWDING WITH A CONGENITALLY MISSING LOWER LEFT SECOND PREMOLAR BY MODIFIED SERIAL EXTRACTION METHOD

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**AIMS:** Serial extraction (SE) has been used to resolve malocclusions with tooth-size, arch-length deficiencies in the mixed dentition. The goal of SE is to create space in the mixed dentition for the eruption of permanent teeth into more favourable positions to prevent or reduce the complexity of future orthodontic treatment in the permanent dentition. This case report describes the successful treatment of a patient with an arch-length discrepancy and midline deviation and a congenitally missing tooth applying modified SE.

**SUBJECT AND METHOD:** A 6-year-old girl concerned about the anterior lower crowding. The terminal plane relationship of the second primary molars was a mesial step type on both sides. There was a posterior discrepancy because the left lower first molar impacted to the second primary molar. The mandibular dental midline deviated 2.5 mm to the left. The lower anterior teeth were crowded, and furthermore, there was no space for the eruption of the permanent left lateral incisor. According to the prediction of the Ono method, the mandibular arch length discrepancy was 2.5 mm. The diameter for the four lower incisors were all large. The lower left second premolar was congenitally missing. Cephalometric analysis revealed a mild skeletal Class II (ANB = 5.0°) malocclusion, as well as a labial inclination and position of the lower incisor (FMIA = 47.5°, L1 to NB = 7.5 mm). She was diagnosed with crowding and a midline deviation with congenitally missing lower left second premolar. Severe crowding was predicted in the future due to the large teeth. The lower right first premolar and upper first premolars were extracted according to a modified SE method with concurrent use of a Bionator.

**RESULTS:** As a result of phase I treatment, the spaces for missing tooth and extracted teeth were closed, an acceptable overbite and overjet were obtained and a Class I molar relationship was achieved. Therefore, a tooth positioner was used instead of full edgewise appliances.

**CONCLUSION:** These results suggest that minimal orthodontic tooth movement was obtained and effective orthodontic treatment may be achieved by appropriate planning of SE and concurrent usage of a Bionator.

#### CP 92 NON-EXTRACTION TREATMENT WITH DAMON SYSTEM: A CASE REPORT

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**AIMS:** To show the non-extraction treatment of a patient with maxillary and mandibular crowding using Damon self-ligating system.

**SUBJECT AND METHOD:** A 14 year old female referred with the main complaint of crowding. Initial cephalometric analysis showed that ANB angle, upper and lower incisor angles were within normal values (ANB: 2.8°, U1-SN: 99.1°, IMPA: 86.5°). Dental crowding was 5.5 mm in the upper arch and 7.8 mm in the lower arch. A Class I molar relationship with an upper midline shift of 1.5 mm to the

left side were observed. As a result of the examinations, it was decided to treat with the high torque Damon self-ligating system.

RESULTS: A Class I molar and canine relationship and normal overjet and overbite were achieved.

CONCLUSION: The Damon self-ligating system is effective for correction of crowding.

#### CP 93 ORTHODONTIC TREATMENT OF SEVERE MAXILLOMANDIBULAR CROWDING IN A PATIENT WITH GENU VALGUM: A CASE REPORT WITH FIVE-YEAR FOLLOW-UP

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AIMS: Genu valgum (GV) is the Latin-derived term for knock-knee deformity. Although it is perceived as a passing trait, some clinical scenarios may manifest with underdeveloped maxilla and alveolar bones, delayed permanent tooth eruption and malformed teeth especially if it is associated with a genetic disorder or a metabolic bone disease. Therefore, the aim of this case report is to present the comprehensive orthodontic treatment of a GV case and demonstrate the stability of the treatment result after 5 years.

SUBJECT AND METHOD: An 11 year 5 month old female with the chief complaints that her lower lip stuck behind her upper incisors and the absence of tooth exposure while speaking. Intraorally, she had full-step Class II molar relationship, increased overbite and overjet, mild maxillary constriction together with considerably strong buccal and labial muscles. Arch length discrepancy was 10.7 mm for maxilla, and 17.1 mm for mandible. Extraorally, she had a symmetrical face and a straight profile. Cephalometric analysis showed that her lower incisors were severely retroclined. Treatment started with full-coverage maxillary expansion appliance in the maxilla and a lip-bumper in the mandible to remove the lower lip from the overjet and procline the lower incisors. Treatment did not involve extractions. The Class II molar relationship was corrected with fixed appliance mechanics. Composite build-ups were performed on the upper lateral teeth. For retention, a canine-to-canine lingual retainer in the mandible and wire reinforced, double-layer upper vacuum-formed retainer in the maxilla was used.

RESULTS: At the end of treatment, Class I molar and canine relationships were achieved. The upper and lower incisors were proclined and an ideal overbite and overjet were obtained. The total treatment time was 32 months. No significant changes were observed after 5-years of follow-up. The lower lingual retainer successfully retained the anterior inclination and alignment, while the upper reinforced vacuum-formed retainer maintained transverse expansion against the strong musculature.

CONCLUSION: Satisfactory and stable results can be achieved in compelling cases with case-based treatment plans.

#### CP 94 MINISCREW-SUPPORTED *EN MASSE* RETRACTION IN ANGLE CLASS II, DEEP BITE CASES: CASE REPORT

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AIMS: *En masse* retraction, the one-step retraction of six anterior teeth, has the advantages of anchorage reinforcement and better anterior vertical control in deep bite cases when combined with miniscrews. Therefore, the aim of this case report is to present the dentoalveolar changes achieved with miniscrew-supported *en masse* retraction in two deep bite cases.

SUBJECT AND METHOD: A 23 year old female (case 1) with the chief complaint of an increased overjet and a 17 year old female (case 2) of her unpleasing smile. Common features were a convex profile, deep mentolabial sulcus, Class II molar relationship and increased overbite. Case 1 presented with protrusive upper and lower incisors, an increased overjet and an acute interincisal angle. Meanwhile, case 2 had retrusive upper and lower incisors, mildly increased overjet, yet severely increased overbite due to the overeruption of both upper and lower incisors, and an obtuse interincisal angle. Both patients were treated with upper first premolar extractions and miniscrew-supported *en masse* retraction. After initial levelling and alignment, miniscrews with a

diameter of 1.5 to 1.4 mm diameter and a length of 7 mm were inserted between the roots of the second premolars and the first molars, bilaterally. *En masse* retraction was achieved on a 0.016 × 0.022 inch stainless steel archwire with 7 mm long power hooks placed distal to the lateral incisors, and with nickel-titanium closed coil springs exerting a force of 250 g per side. Retraction was ended when the canines reached Class I relationship. Upper 2-2 and lower 3-3 lingual retainers were used for retention in both patients.

**RESULTS:** The most dramatic change was observed in the overbite, where the upper incisors were intruded for 2 mm in case 1 and 2.7 mm in case 2, against the extrusion vector generated by retraction process. At the end of treatment, an ideal overjet and overbite were achieved, and incisor inclinations were corrected. The mentolabial angle was increased by 24 degrees in case 1 and 10 degrees in case 2. Retraction time was 8 months for case 1 and 9 months for case 2. Total treatment time, on the other hand, was 26 months for case 1 and 29 months for case 2.

**CONCLUSION:** Miniscrew-supported *en masse* retraction has the advantage of controlling the overbite during retraction and the opportunity to intrude the incisors.

#### CP 95 MULTIDISCIPLINARY TREATMENT APPROACH OF TWO SIBLINGS WITH CLEFT LIP AND PALATE

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**AIMS:** To illustrate the different treatment options for non-syndromic cleft lip and palate (CLP) patients based on a comparison of two siblings.

**SUBJECTS AND METHOD:** Two siblings: a boy born in 1995, diagnosed at birth with a bilateral CLP. His sister, born in 1999, prenatally diagnosed with a unilateral CLP on the right side. Both followed the standard cleft protocol of UZ Leuven implemented at that time.

**RESULTS:** Both siblings had the standard surgical sequence in their early childhood: lip closure around 5 months after birth, soft palate closure around 18 months and hard palate closure at 5 years of age. The timing of the alveolar secondary bone graft depends on the position and development of the definitive upper lateral incisor and the definitive canine at the cleft side. Orthodontic expansion before the graft optimizes the arch and donor sites. When the patients reached the age for definitive orthodontic treatment, re-evaluation was deemed necessary. Both presented a severe Class III relationship due to maxillary hypoplasia and they were open to surgical correction at a later age. When growth was at its end, pre-surgical orthodontic alignment started. The boy was ahead in treatment and received corrective surgery first. He opted for distraction osteogenesis of the maxilla to obtain a large advancement with a smaller risk of velopharyngeal insufficiency. The girl had a more narrow maxilla and needed surgical assisted expansion (Schuchardt technique) in a first stage. After orthodontic decompensation, she had a Le Fort I advancement. At the end, they both had a functionally adequate occlusion and were satisfied with the results.

**CONCLUSION:** Siblings with an surgically repaired CLP and similar dental features, do not necessarily need the same orthodontic/orthognathic treatment. There are different ways to obtain a satisfying functional and aesthetic end result. The treatment plan should be custom made for each patient.

#### CP 96 USE OF MINI-IMPLANTS FOLLOWED BY ALIGNER THERAPY FOR AN ADULT WITH A CROWDED CLASS II DIVISION 2 MALOCCLUSION

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**AIMS:** To evaluate the feasibility of using the CA® Clear Aligner (Aust Dent J 2017; 62(S1):58-62) for anchorage instead of a stop archwire to prevent relapse after molar distalization with TopJets R (Clin Orthod 2013;47:96-107) and its use for retraction of the upper anterior teeth.

**SUBJECT AND METHOD:** A 34 year-old man concerned about his unaesthetic appearance while smiling. He presented with a relapse of all by four extraction therapy, in a moderate Class II division

2 incisor relationship on a skeletal Class II base with an acute SN-mandibular plane angle and retroclination of the upper and lower anterior teeth. Crowding was severe in the upper and lower arch. Two TopJets R and a prefabricated transpalatal bar were inserted at the M4 sites (Eur J Orthod 2014;36:541-9) within 30 minutes and immediately loaded with 250 cN (one session). The premolars and canines initially moved spontaneously and were later on distalized *en masse* with a force of 360 cN. No unwanted effects (tipping, rotation) occurred during the distalization period. After the retraction period, the distalizers were removed and aligners produced through CA R Clear Align were worn and changed every 10 days for a treatment time of 12 months. Square attachments were placed on all teeth for torque control.

RESULTS: At the end of treatment after 18 months, the anchorage was maintained while the other teeth were perfectly aligned in precise CI I occlusion.

CONCLUSION: This case illustrates the successful combination of molar distalization by means of the Top Jet R appliance and the use of Clear Align aligners for molar anchorage and dental retraction in an adult with challenging crowded Class II malocclusion.

#### CP 97 HERBST APPLIANCE TREATMENT IN AN ADULT FEMALE WITH A CLASS II DIVISION 1 MALOCCLUSION

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AIMS: To present Class II malocclusion correction with the Herbst appliance followed by a straightwire appliance (SWA) treatment in a non-growing female patient.

SUBJECT AND METHOD: In a 22 year old female clinical and radiographic examination showed a severe Class II malocclusion, a skeletal open bite, lower and upper incisor protrusion, incompetent lips and missing teeth 26 and 37. The treatment plan included combined surgical and orthodontic treatment. However as the patient refused orthognathic surgery, a Herbst appliance followed by a SWA were used. The Herbst appliance consisted of custom made metal frames, a Hyrax screw for rapid palatal expansion and rigid bite fixation in the Class I position. Class II elastics were used during all stages of SWA therapy.

RESULTS: Sagittal occlusal correction was achieved by the Herbst appliance after 8 months. Tooth levelling, incisor retraction and space closure were achieved by the SWA. At the end of the treatment, a Class I canine and molar relationship, good function and satisfactory aesthetic were present.

CONCLUSION: In an adult female malocclusion patient with an Angle Class II and skeletal open bite it is possible to achieve correct sagittal and vertical relationships using the Herbst appliance followed by a SWA. Long term stability requires retention and follow-up period.

#### CP 98 FUNCTIONALLY GUIDED RAPID PALATAL EXPANSION AND COMPOSITE PROTOCOL IN THE TREATMENT OF TRANSVERSE DISCREPANCIES IN THE EARLY MIXED DENTITION

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AIMS: To evaluate the efficiency of individualized rapid palatal expansion followed by a functional composite protocol in the treatment of transverse discrepancies in the early mixed dentition.

SUBJECTS AND METHOD: Seven children aged 5-6 years, with different transverse discrepancies were examined and treated. The examination included assessment of facial asymmetries using photographic evaluation, the biometric study by Korkhaus on plaster models, the functional guidance analysis using a gamma-reference articulator and anatomical facebow. These procedures were performed before expansion, before the composite protocol and 5 years after treatment. All children were treated with individualized rapid palatal expander (RPE) bonded on acrylic pads, with adapted height, according to articulator settings. The expansion protocol was 1 turn per day for 3-4 weeks followed by a retention period of 3-4 months. After removal, the functional composite protocol or individualized build-ups were performed. The appropriate canine guidance was revealed using the gamma-reference articulator and transferred intraorally by a direct or indirect

composite restorative protocol on the primary canines cuspids and molars. Symmetrical canine guidance was obtained, with an appropriate bite increase and correction of the midline shift, where needed.

**RESULTS:** The active treatment time was almost 7 months. The average amount of maxillary expansion obtained was 4-5 mm for intercanine and 3-4 mm for intermolar distances. After 4-5 years, all the patients registered normal Class I development of the occlusion and a significant improvement of facial aesthetics and symmetry.

**CONCLUSION:** In transverse discrepancies treatment of early mixed dentition patients, the functional guided RPE, designed by individual parameters, obtained with the use of facebow, can establish the correct transverse jaw relationship and guide the mandibular shift in centric relation. The functional guided build-ups of the primary teeth provide a stabilized centric mandibular position, ensuring, also, over time stability control. It is a reliable non-compliance method of rehabilitation of transverse discrepancy patients, improving facial aesthetics and normal occlusal development in growing patients.

CP 99 TREATMENT OF CLEIDOCRANIAL DYSPLASIA: COMBINING EFFICIENCY WITH AESTHETICS  
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**AIMS:** Cleidocranial dysplasia (CCD) is a rare condition that has clinical manifestations in the entire skeletal structure of the patients as well as their dental tissues. The objective of this poster is to comprehensively present a patient with CCD, treated with a novel appliance based on sound biomechanical principles with a satisfactory functional and aesthetic outcome.

**SUBJECT AND METHOD:** A 23-year old male with CCD. He had a Class III malocclusion, with maxillary retrusion and decreased vertical facial height. Regarding his dental status, lack of root resorption of the upper primary teeth, delayed eruption of the respective permanent teeth and the presence of several supernumerary teeth in the maxilla were recorded. The treatment plan included the extraction of primary and supernumerary teeth and exposure and orthodontic traction of the impacted permanent teeth into their normal position. Thus, the use of efficient force application through a sophisticated orthodontic appliance was mandatory. The latter consisted of two components. The first was a fixed rigid frame including bands on the upper first molars on which a transpalatal arch and a horseshoe palatal arch were welded. In addition, light continuous traction forces were applied in order to avoid side-effects on the teeth to be moved, such as root resorption. Moreover, this design permitted the adaptation to the anatomy of the area and the continuously changing environment (tooth positions and dentoalveolar dimensions). The second component was a removable archwire placed in the headgear tubes of the molar bands, extending in the vestibular area in front of the maxillary teeth, with acrylic upper anterior teeth appropriately welded.

**RESULTS:** Following extraction of the primary and supernumerary teeth, efficient traction of the primary impacted teeth was observed, without any side-effects to the anchor teeth or the surrounding soft and hard tissues. Furthermore, the patient was quite satisfied both with his appearance and with the appliance adaptation.

**CONCLUSION:** This novel approach for the dental management of CCD seems to be effective both in the traction of the impacted teeth as well as in providing an aesthetic solution to the patients.