Research and Clinical Presentation

CR-1

KOOA AI Orthodontic System- A Preliminary Study on its Application of Automatic Cephalometric Analysis
Wei Lin[1,3], John Ling[2,3], Daniel Lee[2,3]
[1]Uni-Care Dental CenterMacau
[2]The University of Hong Kong
[3]Hong Kong registered dentist

Purpose : X-ray cephalometric analysis and facial analysis refer to the analyses of the dental and skeletal relationships of the human skull by measuring the landmarks of its cephalometric X-ray and facial picture. Rapid developments in artificial intelligence techniques in medical imaging allow for the automatic interpretation and identification of the landmarks of cephalometric X-rays and facial pictures.

Materials and methods : With the KOOA system, the clinician only needs to upload the patient's cephalometric X-ray and the facial picture directly through the KOOA cloud services. The AI system will automatically recognize the landmarks and immediately compute the common analytical measurements and diagnostic results. The clinician may adjust the landmarks in the event that he/she doesnt agree with the outputs, as well as customize his/her own analytic set.

Results : The KOOA system can quickly and accurately analyze and diagnose dental malocclusion, speeding up the traditional orthodontic diagnosis and treatment planning process. Artificial intelligence technologies are differentiated from static algorithms, as they will continue to improve on the accuracy of measurement analysis with more and more data and use.

Conclusions : With further research, the system will expand into digital dental model analysis using dental scanner, 3D CBCT measurement, and treatment outcome prediction. This artificial intelligent system is becoming a clinically effective and crucial diagnostic tool for orthodontists.

CR-2

The stability of orthodontic treatment (the view from the inside of the body).
Maria Vasilyeva

Introduction : Speech disorders in children are quite common-in 15-43% of children, and in children with organic pathology of the brain - in 83% of cases. The prevalence of malocclusion and cranial deformations tends to progressive growth in recent years. This is due to the lack of dynamics, the increase in the number of users of phones and other electronic gadgets, violation of the processes of natural childbirth and many other reasons. The number of children with TMJ dysfunction is steadily increasing.

Materials and Methods : Use of various methods of examination of the muscles of the head, neck and postures in general. Elimination of myofunctional habits at any stage of treatment. Joint work with speech therapists, otolaryngologists, neurologists and osteopaths.

Conclusions : The dentition and the speech apparatus are only part of the body. When planning treatment, it is necessary to consider the presence of functional disorders: especially changing in the posture, dysfunction of the laryngeal - pharyngeal complex (tongue and hyoid bone), the upper thoracic aperture, the presence of harmful myofunctional habits and much more.

To work in disciplinary approach and use of muscle-manual testing, modification of Romberg, Fukuda and many other tests makes it possible to objectify the results of orthodontic treatment. As a result, the risks of TMJ dysfunction and recurrence of treatment are reduced.

CR-3
Upper and lower body heights may predict craniofacial growth in adolescents with
Class I occlusion
Thikriat Al-Jewair
University of Missouri-Kansas City

Purpose : The objectives of this study were to correlate upper and lower body heights and craniofacial growth in a sample of growing individuals, and to determine the prediction capability for craniofacial growth based on either lower or upper body lengths.

Materials and methods : This cross-sectional study included 447 African black boys and girls between 8-16 years of age. The subjects were randomly selected patients attending the dental clinic at one hospital. Assent was obtained from parents of all children before data collection. The inclusion criteria were healthy and well-nourished boys and girls, Class I skeletal and dental occlusion, and no previous orthodontic treatment received. The records collected included demographics (chronological age and sex), left hand-wrist radiographs, lateral cephalograms, upper and lower body heights in centimeters, and body mass in kilograms. The maxillary length (Ar-ANS), mandibular length (AR-Gn), and lower facial height (ANS-Me) were measured using lateral cephalograms. Stepwise multiple regression analyses with backward reduction were used to determine predictors of maxillary and mandibular lengths.

Results : The study found statistically significant correlations between the craniofacial measurements and both upper and lower body heights. The mandibular length had a stronger correlation with the upper body height than with the lower body height. Multiple regression analyses to predict maxillary and mandibular lengths suggested that upper and lower body heights and sex might predict maxillary length (adjusted r =0.26); while skeletal age, upper and lower body heights might predict mandibular length (adjusted r =0.50).

Conclusions : The mandibular length had a stronger correlation (r=0.58 in females and 0.72 in males) with the upper body length than with the lower body length. Future studies are warranted to determine the utility of upper body height as a predictor for mandibular growth modification timing.

CR-4

Efficacy of color-change adhesive in orthodontic debonding: an in-vitro 3D analysis
Prajak Jariyapongpaiboon[1]

[1]Prajak Jariyapongpaiboon, Dental Section, Rajavithi Hospital, Department of Medical services, Ministry of Public Health, Bangkok, Thailand.
[2]Niramon Leela-adisorn, Head of Dental Section, Roi et Hospital, Roi et, Thailand
[3]Kriskrai Sittheseripratip, Principal Researcher, National Metal and Materials Technology Center, Pathumthani, Thailand.
[4]Jaturong Jitsaard, Engineer, National Metal and Materials Technology Center, Pathumthani, Thailand.
[5]Pongnarin Jiamwatthanachai, PhD Student, Institute of Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

Purpose : To assess and compare the efficacy of removing color-change adhesive with that of conventional light-cured adhesive for different orthodontic debonding protocols.

Materials and methods : Sixty extracted upper premolar were scanned with a 3D optical scanner (initial scan). Out of 60 teeth, 40 were bracket-bonded with color-change adhesive while 20 with conventional light-cured adhesive. One day later, brackets were debonded. All teeth were scanned (after-debonding scan) and divided into 3 groups: 2 groups consisted of 21 and 19 samples having color-change adhesive remnants grinded by carbide burs with low-speed friction-grip handpiece (Group CM), and by carbide burs with airotor (Group CA). 20 samples having conventional light-cured adhesive residues cleaned by carbide burs with airotor (Group LA) made up the remaining group. Grinding time of each teeth was recorded and all teeth were finally scanned (after-cleanup scan). After-debonding and after-cleanup scans were superimposed on the initial scan to quantify surface changes. The results were statistically analyzed with Kruskal-Wallis test (α=0.05).

Results : The area and volume of after-debonding adhesive remnants were significantly lesser for the color-change adhesive groups (Group CM and CA) compared with those of Group LA. Group CM clearly preserved enamel with significant difference in the depth of enamel loss but insignificant difference in the volume of enamel loss compared with those of Group CA and LA. After cleanup, the color-change adhesive groups (Group CM and CA) were less likely to leave adhesive remnants regarding both volume and thickness, even though the differences were insignificant. Debonding procedure for Group CA was least time consuming followed by those for Group LA and CM with significant differences.

Conclusions : The color-change adhesive was found to reduce enamel damage, decrease adhesive remnants and less time consuming. Yet, further studies are necessary to draw more definite conclusions concerning the advantage of using this type of adhesive.

CR-5

The characteristics, bonding ability, and clinical application of CAD/CAM customized bracket systems

HaNa Sha, JungYul Cha, SunYoung Lim, JinYi Park
Department of Orthodontics, College of Dentistry, Yonsei University

Introduction : Base on three-dimensional scanning and computer-aided design and computer-aided manufacturing (CAD/CAM) techniques, the customized bracket systems have been introduced to move orthodontic treatment into the next era. By using 3D digital models, clinicians can generate different virtual setup to decide the treatment plan and predict the treatment outcome, the customized bracket system exhibit the individual prescript for each patient to achieve the treatment objectives. However, so far, the studies related the characteristic and clinical performance of this advanced systems still very limited. This study was to evaluate the design, bonding ability, and present two cases which treatment by customized bracket system for improving the acquaintance of this innovative technique.

Materials and Methods : 4 different customized brackets were undertaken stereo microscope and the SEM imagines for giving an insight into their design and base characteristic. For testing their bonding ability, 30 human extracted upper premolars were separate into 5 groups, 4 customized bracket groups and one preadjusted bracket group, evenly. The debonding force was evaluated by Instron machine. All the customized bracket groups showed higher debonding force compared with preadjusted bracket.

Two patients with class III molar keys and skeletal facial asymmetry, who was treated by camouflage treatment. For preserving their compensated occlusion, the visual model setup and the customized bracket was utilized. Due to the benefits from virtual setup and customized bracket, the compensated occlusion was well maintained until the treatment finished and the tooth movement was similar to the VTO plan. Two patients were satisfied with their treatment result.

Conclusions : The virtual setup model provides more information to predict the result and the customized bracket enabled us to achieve an efficiently treatment. However, due to the divergent deigns and the technique sensitivity, the clinician should fully understand the treatment limitation and pay more attention during the bonding process.

CR-6

evolution, pros, cons, risks, benefits, ways to use and future of the bonded lower
retainer

Amanda Maplethorp
Vice President, WFO

Introduction : A few words of greetings from the WFO and also share her clinical experiece on fixed retainer.
The bonded 3-3 retainer has been used since the early 1970s and the long-term research is now increasing. However, the research findings are clouded by multiple changes in bonding adhesive, multiple wire types and varied bonding protocols. This is a brief talk on the evolution, pros and cons, risks and benefits, ways to use and future of the bonded lower 3-3 retainer.

Materials and Methods : The bonded 3-3 retainer has been used since the early 1970s and the long-term research is now increasing. However, the research findings are clouded by multiple changes in bonding adhesive, multiple wire types and varied bonding protocols. This is a brief talk on the evolution, pros and cons, risks and benefits, ways to use and future of the bonded lower 3-3 retainer.

Conclusions : The bonded 3-3 retainer has been used since the early 1970s and the long-term research is now increasing. However, the research findings are clouded by multiple changes in bonding adhesive, multiple wire types and varied bonding protocols. This is a brief talk on the evolution, pros and cons, risks and benefits, ways to use and future of the bonded lower 3-3 retainer.

CR-7

EFFICACY OF LOW LEVEL LASER THERAPY IN INCREASING THE RATE OF ORTHODONTIC TOOTH MOVEMENT

Chetak Shetty
Orthodontics, Oro care dentistry

Purpose : To assess the effect of low level laser therapy in increasing the rate of orthodontic tooth movement.
To compare and evaluate the effect of low level laser therapy in increasing the rate of orthodontic tooth movement using cast study models.

Materials and methods : The study used a split mouth design with implant supported space closure using Temporary Anchorage device (TADs) of 8mm length, 1.5 mm diameter (S.K.Surgicals) as anchorage units followed by recording spaces by impressions and pouring casts. The space closure was carried out on 0.019x0.025S.S (OPTIMA) wires using closed coil Ni-Ti springs of 0.010inch diameter and 6mm length with a constant force of 150gm.
24 arches in 24 patients above 18 years of age requiring bilateral extractions in the same arch were randomly selected for this study. The orthodontic treatment was carried out by a post graduate student under the guidance of an Orthodontist of Sri Siddhartha Dental College and the laser irradiation was carried out by an experienced professional following the safety guidelines for laser administration. The patients were taken to the laser room which was prepared following the safety

Results : On comparison of the rate of tooth movement among control and laser groups, the tooth movement was greater in laser group than control and it was statistically highly significant at all-time intervals with level of significance set at 0.05 at 95% confidence interval.

Conclusions : LLLT with specified regimen applied once in a month is effective in increasing the rate of orthodontic tooth movement.

Clinical Oral Presentation

O-1
Management of anomalies in tooth form and shape in orthodontic treatment
DongHyuk Im
Department of Orthodontics, Kooalldam Dental Hospital

Introduction : The purpose of orthodontic treatment is to obtain facial esthetics and functional occlusion. Esthetic smile requires harmonious dental profile.
Discussion : Anomalies in tooth form and shape may occur in primary and permanent dentition. They sometimes make orthodontic treatment difficult. Peg lateralis is the most frequent tooth anomaly found in orthodontic practice. We may encounter fusion, germination, twinning and concrescence in mandibular anterior area. Prominent marginal ridge in maxillary anterior tooth, additional cusp found in posterior tooth and abnormal shape of mandibular first molars can make us embarrassed. Location of contact points and contact surfaces between maxillary anterior teeth can be an important factor in dental esthetics. All of these anomalies can make us to form the ideal line of occlusion difficult.
To solve these problems, we have to consider the Bolton tooth ratio and key points to the line of occlusion to form the functional occlusion. Bracket position and reshaping of tooth form and shape are going to be mentioned. Prosthetic or restorative treatment can be a choice of treatment. We have to notify the patient about the decision making process of treatment planning.
Conclusion : This presentation investigates the clinical problems with anomalies in tooth form and shape and also examines the methods to overcome these challenges.

O-2
Alternative treatment method for severe deep bite correction: lingual appliances
Seung-Min Lim
Gajirunee orthodontic clinic

Introduction : An excessively deep overbite may be associated with incisor wear, palatal impingement, and compromised esthetics. Optimal correction of deep overbite requires proper diagnosis, individual treatment planning, and efficient execution of treatment mechanics. A careful combination of treatment planning and mechanics to correct deep overbite can help to achieve a desirable result and to minimize relapse during the postretention phase.

Discussion : The three fundamental orthodontic treatment strategies for deep bite correction (not including the surgical option) are: extrusion of posterior teeth; flaring of anterior teeth; and intrusion of upper and/or lower incisors. These effects are most often achieved biomechanically via bite plates, reverse curve archwires, and intrusion arches

The type of intrusion that the incisor undergoes during the application of a vertically directed intrusive force is defined by the position of the center of rotation, which is determined by the force system applied on the tooth relative to its center of resistance. With a labial continuous archwire, the intrusive force passes at a distance from the center of resistance. Therefore, the tooth will undergo a combination of intrusion and flaring. With a lingual continuous archwire, although analysis of the force system of continuous arch mechanics is essentially impossible, an intrusive force from the lingual archwire passes close to the center of resistance of the incisors. Therefore, the axial inclination of the incisors can not significantly change and the opening of the bite be primarily accomplished by intrusion of the incisors.

Conclusion : In this presentation, through some cases, I propose the lingual appliance with continuous archwire as an alternative treatment strategy for severe deep bite correction

O-3
Treatment of failed extraction case using A-P lingual retractor and palatal mini-screw

SoonYong Kwon[1], YoungGuk Park[2]
[1]Gangnam Central orthodontic clinic
[2]Department of Orthodontics, Kyung Hee University Dental Hospital

Introduction : There has been growing number of failed extraction cases in orthodontic clinics as the market has been more competitive and spoiled by recent abuse of clear-aligner therapy even for extraction cases. The typical complication in extraction case is uprighted incisors, gummy smile, deep bite, and unexpected Class II molar relationship from complex and prolonged delivery of mechanics accompanying root resorption and frail periodontium. Such complications usually worsen in extreme facial pattern. Although distalization of whole maxillary dentition with or without intrusion is the proper remedy, there has not been one simple way to get out of these problems in short term. We have found simultaneous correction of variable problems in failed extraction case by applying A-P lingual retractor combined with palatal mini-screw.

Case Summary : We report several failed extraction cases treated by conventional mechanics and another cases recovered by A-P lingual retractor combined with palatal screws. It's very hard to fix all of the problems at once with conventional approach in this category of patient even with auxiliary appliance including molar distalizer or TPA. But we can find better result in cases treated by A-P lingual retractor combined with palatal mini-screw. Especially, the use of premaxilla mini-screw to control the level of maxillary molars enables the differential control of maxillary occlusal plane.

Conclusion : The distalization of maxillary molar is known as one of the hardest tooth movement so there are many sophisticated ways or auxiliary appliances in order to treat with non-extraction way or recover the failed extraction cases. But no other distalizing way or appliance has been proven to have consistent result and widely indicated for each type of complicated cases. A-P lingual retractor has showed fast recovery in failed extraction case accompanying orthopedic advancement when it is combined with various palatal mini-screws.

O-4

Treatment protocols for orthodontic treatment of patients with Idiopathic condylar resorption

Gyehyeong Lee[1,2]
[1]21st Century Orthodontic Clinic in Yeosu
[2]Roth Orthodontic Society

Introduction : Idiopathic condylar resorption (ICR), is a degenerative disease of the temporomandibular joint (TMJ) which is found mostly in female adolescents and young women. Patients with ICR present pathognomonic features of a loss of condylar mass, thereby decreasing the height of the ramus, and opening rotation of the mandible resulting in a Class II open bite. Patients with condylar resorption show symptoms of the temporomandibular disorder (TMD) and unstable occlusion and are regarded as one of the challenging cases for orthodontists.

Discussion : For patients with condylar resorption and the symptom of TMD, evaluation of the condylar position should precede orthodontic treatment. Stabilization of the TMJ is a therapeutic process that allows orthodontists to identify the true mandibular position and make an accurate orthodontic diagnosis. Additionally, improvement of TMD symptoms can be expected after stabilization of the TMJ. After stabilization of the condylar position, skeletal and inter-arch relation of the patient should be re-evaluated to establish final orthodontic treatment plan. During orthodontic treatment, orthodontists should be aware of the stable position of the condyles during the tooth movement and final occlusion must be seated to this position.

Conclusion : As establishment of healthy occlusion which minimizes risk factors associated with TMD is one of the most important treatment targets for orthodontists, they should carefully evaluate the temporomandibular joint of the patients from the stage of diagnosis, and have appropriate protocols in orthodontic treatment of a patient with TMD.

O-5

<div align="center">

Transverse control for Airway, When Why and How
Choon bong Lee
Buchoen gounmiso orthodontic clinic

</div>

Introduction : In orthodontic treatment, the orthodontist needs to transverse control through the maxillary skeletal expansion for the buccal uprighting of the mandibular molar and the root movement of the maxillary molar. Therefore the patients are established proper posterior occlusion. Expansion of the nasal cavity occurs when the maxillary is skeletally extended. There are many studies that analyze the difference by comparing the length or the area.

Discussion : However, in this study, we measured changes in the nasal cavity width by CBCT, and changes in the nasal inspiratory flow. Thus we confirmed the increase in the nasal inspiratory flow due to skeletal expansion(42 patients: 11 males, 31 females. 13-39 years).

In addition, patients with severe obstructive sleep apnea(Case 1 : AHI 13->1, Case 2 AHI 15->3 Case 3 : AHI 39->1. Case 4 : AHI 42 -> 8, Case 5 : 42.5-> 0.3) who are above normal were improved by orthodontic treatment through maxillary skeletal extension and intraoral device(Monobloc by designed Buchoen Gounmiso Orthodontic Clinic).(AHI : Apnea Hypoapnea Index)

Through these results, I would like to discuss considerations for transverse control to improve airway. I will also present the most appropriate timing and method of transverse control in consideration of respiration.

Conclusion : MSE increases nasal cavity and decreases resistance in nasal cavity; therefore, it can increase nasal inspiratory airway. It may be an effective and an early treatment modality for growing patients who have airway problem caused by nasal obstruction.

O-6
Factors to predict alveolar bone response during upper incisors intrusion and retraction

Hwa Sung Chae
Division of Orthodontics, Department of Dentistry, Ajou University Medical Center

Objectives : While moving upper incisors upward and backward, even though upper incisors moved as planned, it is often noticed that alveolar bone surrounding the teeth was not remodeled as expected. Such alveolar bone irregularity undermines the esthetics of treatment outcome, diminishing the effect of lip retraction. The objective of this study is to identify prediction factors related to alveolar bone response responsive to upper incisors evaluated in lateral cephalomatrix to enhance diagnosis and prognosis.
ss

Material and Methods : 34 patients who underwent orthodontic treatment including upper incisors intrusion and retraction were investigated. Extraction accompanied with intrusion and retraction treatment was performed. To identify factors related to insufficient remodeling, correlation analysis was conducted. The follow up CT was taken in some patient to evaluate the three dimensional status of alveolar bone.

Results : .The results indicated that initial labial alveolar bone contour is correlated with The amount of contour change after treatment and Initial upper incisor inclination. The thickness of alveolar bone below alveolar crest is correlated with the initial inclination of upper incisor and corresponding labial alveolar bone relative to palatal plane. Interestingly, the alveolar bone thickness change showed from positive to negative values which indicates that positive bone balance was obtained in some patients rather than bone loss in labial surface.

Conclusion : Based on the findings above, initial labial bone contour and upper incisors inclination indicates the prediction of alveolar bone remodeling during incisors retraction and intrusion. Therefore, it is recommended that contour inconsistency between the teeth and bone as well as initial upper incisor inclination should be evaluated in orthodontic diagnosis who need upper incisors retraction and intrusion.

O-7

Facebow transfer in natural head position
Janghoon Ahn
Department of Orthodontics, Kangnam Sacred Heart Hospital, Hallym University
Medical Center

Introduction : It is very important to mount the casts of patients when we orthodontists diagnose them and set up the treatment planning and orthognathic surgical planning. Moreover, it is necessary to make set-up models and trasfer jigs for lingual orthodontic treatment, and perform model surgery and make surgical guide for orthognathic surgery. As described above, mounting models on an articulator gives us many information and usefulness to us.

Discussion : We have to transfer a facebow on a patient before we mount the casts. Facebow transfer is the inevitable procedure to make up the reference of mounting. Usually we utilize FH plane for mounting as a reference plane. However, FH plane do not synchronize true horizontal plane often because the position of porion and orbitale may be variable vertically. In this case, the diagnosis and treatment planning can be erroneous. Therefore, we orthodontists need a new method to transfer facebow according to true horizontal plane.

Conclusion : Basically, true horizontal plane can be obtained from the patient in natural head position. Natural head position is generally reproducible and reliable. There have been many methods to take natural head position for long time. Therefore, I will explain the procedure to get natural head position of a patient according to Solow and Tallgrens method and transfer true horizontal plane with a facebow of a SAM articulator as well in this presentation.

O-8

Correction of Excessive Vertical Growth of the Maxilla using Palatal Absolute
Anchorage

SUNGLYUK LEE
Barunee Yeon-hap Dental Clinic

Introduction : Moving the maxilla up with a Lefort I osteotomy is highly stable and
predictable and made it possible to correct anterior open bite/long-face problems
previously could not be treated.

These days maxillary teeth can be intruded using skeletal anchorage, however, the
long-term stability and the limits of posterior teeth intrusion of this treatment have not
been established yet.

I would like to show you lots of dramatic orthodontic outcomes and the interesting
relapse pattern of this treatment.

Case Summary : Skeletal open bite is due to maxillary vertical overgrowth and
backward rotation of the mandible. Intrusion of the elongated posterior teeth could
allow the mandible to rotate upward, bring the incisor teeth together. This made it
possible to treat severe open bite with non-surgical and non-extraction method.

Excessive display of maxillary gingiva on smile in the long face pattern was
corrected dramatically by the parallel elevation of the maxillary occlusal plane.

Ant. Elevation of the maxillary occlusal plane with distal movement was performed to
treat the class-II, anterior deep bite adult case without backward rotation of the
mandible.

Depressing upper molar teeth in the growing class-II long face patient could let the
mandible grow forward and this bringed about the prominent improvement of the
convex profile.

The objective of the graphic image files of the cephalometric superimposition is to
visualize the contribution of upward and backward movement of the maxillary
dentition to the correction of A-P and vertical discrepancies.

Conclusion : Palatal absolute anchorage consisted of two micro-implants and the
splinting bar provides excellent anchorage for the correction of the maxillary vertical
overgrowth and skeletal class-II pattern.

O-9
Vertical and angular changes of impacted mandibular third molars after second
molar protraction
Un-Bong Baik
Smilewith Orthodontic Clinic

Objectives : To investigate vertical eruption pattern and angular change of impacted
mandibular third molars after protraction of the mandibular second molar.
d
Material and Methods : The inclusion criteria was (1) missing mandibular first
molars (L-6) or missing deciduous mandibular second molars with missing
succedaneous premolar. (L-E) (2) initially impacted mandibular third molars, and (3)
successful space closure with root paralleling.
About the vertical eruption pattern, 52 cases were included and about the angular
changes, 41 cases were included. Panoramic radiographs at start of treatment (T1)
and at time of space closure (T2) were collected.
Results : About the vertical eruption pattern, age, gender, Nolla stage, and angle of
the third molars did not show significant correlations, whereas the depth of third
molar impaction and available space showed significant correlations.
About the angular changes, Age, third molar angulation at T1, rate of third molar
eruption, and rate of second molar protraction were significant factors for predicting
third molar angulation at T2.
Conclusion : Impacted mandibular third molars vertically erupted spontaneously as
a result of second molar protraction. The vertical eruption is affected by the initial
vertical location of impacted third molars and available space. While, age, gender,
Nolla stage, and angle of the third molars did not show significant correlations with
the vertical change.
The impacted third molars may undergo either mesial tipping, maintenance, or distal
uprighting as a result of second molar protraction. Older patients with third molars in
greater Nollas stage, have a greater chance for third molar uprighting. And an
increase in second molar protraction rate results in mesial tipping of the third molars.

O-10

Use of clear aligner in orthognathic surgery patients

Yong Kim[1], Hyeon-Shik Hwang[2], Jung Min Kim[3], Hee Soo Oh[4], Robert L. Boyd[4]
[1]Seoul USC Orthodontics
[2]Korean Adult Orthodontic Research Institute
[3]Barun-E Orthothodontic Dental Clinic (SeoSan)
[4]University of Pacific, Arthur A. Dugoni School of Dentistry, Orthodontic Department

Introduction : Currently, Invisalign is getting huge popularity from clinicians in the US, Japan, European countries and other advanced countries. The use of Invisalign was limited to simple cases when the Invisalign was first introduced. However, development of the attachment and new aligner material tremendously expanded the scope of Invisalign treatment. Invisalign is now started to be used in the treatment of orthognathic surgery patients. Hence, it is required to understand basic mechanics of aligner therapy in orthognathic surgery patient. Treatment protocol also needs to be established.

Case Summary : For successful surgery of maxillofacial deformity patient, precise post-surgical occlusion of upper and lower dentition is essential. Presurgical orthodontic treatment has been traditionally performed for dental decompensation, leveling and alignment, and arch coordination. Among them, arch coordination of maxillary and mandibular dentition is most challenging. Without taking impression, it is even difficult to properly evaluate arch coordination.

On the contrary, aligners provide huge advantages for presurgical orthodontics. Arch coordination is easier and predictable with aligners when compared with fixed appliances. Intermaxillary fixation is conducted with screw implant. Post-surgical orthodontic treatment is completed with preplanned and prefabricated aligners. Virtual setup is carried out and orthodontic tooth movement is simulated in Invisalign patients. After surgery, regional accelerating phenomenon speeds up tooth movement. Considering these, surgery-first orthodontics is favored when aligners are used in orthognathic surgery patients,

Conclusion : This presentation will discuss about proper use of clear aligner in orthognathic surgery patients, and suggest how to communicate with lab technician for the fabrication of SF splint and SF aligners. Proper clinical guidelines will be presented with typical clinical cases so that aligners are used efficiently in orthognathic surgery patients.

O-11
5 practical PEARLs for successful application of mandibular advancement device in
obstructive sleep apnea patients

SU-JUNG KIM
Department of Orthodontics, Kyung Hee University Dental Hospital

Introduction : In place of accommodating the recent enforcement of national medical insurance for the polysomnography (PSG), a gold standard of diagnosing obstructive sleep apnea (OSA), we orthodontists are required to play an extended role in the interdisciplinary treatment of OSA. In particular, anatomical phenotype of OSA, which is defined as OSA caused mostly by maxillomandibular anatomical vulnerability constricting upper airway dimension, is increasingly referred from sleep doctors for the craniofacial modification treatment to open the airway.

Discussion : As a temporary pharyngeal opening modality, mandibular advancement device (MAD) has been widely applied to the elderly OSA patients who failed to para-pharyngeal soft tissue surgery or to positive airway pressure (PAP) treatment. According to our preliminary study, however, the success rate of MAD was 52.9% at most (as evaluated by AHI reduction ratio greater than 50% of initial AHI), and the success rate was influenced by the severity of OSA, patients phenotype, and MAD protocols. MAD needs to be deliberately prescribed to the OSA patient based on the consideration of the effectiveness, efficiency, individualization, and long-term management. This presentation will give you instructive feedbacks from both good and poor responders of MAD, and encourage you to utilize it in a strategic way. We suggest 5 clinical PEARLs for the successful MAD application: Patient selection (indication); Efficiency (cooperation); Appliance design (type and material); bite Registration (jaw calibration); Long-term management (periodic check-up). How can we attain it?

Conclusion : This presentation will help orthodontists contribute to interdisciplinary treatment of increasing elderly OSA patients on the basis of the rule of PEARLs for the successful application of MAD.

O-12

Application of Artificial Intelligence to Orthodontics: starting from Automatic Landmark Identification.

Jeong-Ho Choi[1], Minkyung Lee[2], Yeong-Gil Shin[2], Seung-Mo Ku[3], Hyoung-Mok Kim[3]
[1]Smile Future Orthodontics
[2]Department of Computer Science and Engineering, College of Engineering, Seoul National University
[3] System Development Team, OSSTEM IMPLANT Co., Ltd.

Objectives : (This presentation includes a scientific research, introduction to artificial intelligence (AI) & deep learning, and current applications of AI in dental & orthodontic fields.)
The purpose of this scientific research was to develop, train, and test an AI program which can automatically identify landmarks on digital lateral cephalogram.

Material and Methods : The subjects included 741 lateral cephalograms from 7 different digital cephalostats and its tracings. Neural network models for landmark identification were constructed using deep learning algorithm. The subjects were used for training(590) and validation(151) sets for deep learning. More than 40 cephalometric landmarks were trained and tested.

Results : The AI program can automatically identify cephalometric landmarks with very high accuracy. We have optimized the AI algorithm and it can find more than 40 landmarks in a common digital cephalogram within 3seconds on a regular PC. These landmarks can be transferred to cephalometric analysis software for various analysis available. This AI program was trained to be used for lateral cephalogram from any devices.

Conclusion : This study suggests that AI program with neural network deep learning can be used in daily orthodontic practice in cephalometric analysis. Improved performance and accuracy were achieved by proper selection of the subjects, appropriate algorithm and optimization. AI can be applied to orthodontics from basic science research to clinical diagnosis and treatment in various ways in the near future.

O-13
Treatment of malocclusion by myofunctional therapy using dental silicone appliances
Jae Ho Baek
We.Smile Orthodontic Clinic

Introduction : In these days the prevalence of diseases related to muscle imbalances including mouth breathing, sleep apnea, snoring, and temporomandibular joint disorders(TMD) has been increased remarkably. These diseases are also deeply involved in various malocclusion such as open bite, large overjet, and deep overbite. This presentation will introduce the long term myofuctional therapeutic results collected from We.Smile orthodontic clinic to correct those diseases and malocclusion effectively.
Discussion : The patients suffering from myofunctional issues were evaluated by 1) interview, 2) radiographic examination including CBCT, 3) soft tissue analysis including 3D imaging, and 4) occlusion analysis using T-scan. Most of the patients having muscle imbalances show 1) lip incompetence, 2) large tonsil and adenoid, 3) respiratory disease including sleep apnea and snoring, 4)TMD, 5) unstable mandibular pathway, 6) allergic disease, 7) pronunciation problem, 8) headache-typically migraine, and 9) various malocclusion including open bite. Treatments were run according to the main cause. The procedures were consisted with 1) psychological counseling, 2) physical training including walking exercise and book reading exercise, and 3) night wearing orthodontic and orthopedic silicone appliances. The night wearing silicone appliances were designed to manifest muscle exercise effects which were done in daytime. The clinical effects of the treatment were evaluated every 3~4 months.
Conclusion : 74% of the patients with this program showed visible changes after first 6 months. The problems related to respiratory were solved first, and then orthodontic problem, other muscle problem by sequence. The adaptability and intimacy of the silicone appliances used in the presentation to the patients were higher than traditional appliances because those can be made in clinic on site with the patients without other complex laboratory procedures. Although the effects of the silicone appliances were remarkable, but the patients have done muscle exercises during daytime and regular night wearing silicone appliances showed the best results.

O-14

Hygienic Fixed Retainer: 20 Years of Experience

Hoon Kim

Kim Hoon Orthodontics

Introduction : Fixed retainers are routinely placed at the completion of orthodontic treatment. Wires of various types and sizes are available.

Discussion : The long-term studies have reported that various factors including late growth, establishment of functional occlusion, and periodontal tissue remodeling can affect post-treatment stability. Fixed retainers may be an essential element in preventing the relapse of anterior teeth. Straight fixed retainer made of multi-stranded wires is the most common type, which is bonded across the lingual surface of anterior teeth. However, the design of such type of retainers makes it difficult for the patients to maintain their oral hygiene because the wire on the lingual surfaces easily accumulates plaque and it also prevents them from flossing the area properly. In attempt to improve oral hygiene, stability, and patient acceptance, a curved, or hygienic, type fixed retainer made of 0.018 Australian wires has been utilized for about 20 years in my practice. The purpose of this presentation is to provide an overview of the hygienic fixed retainer, to illustrate its fabrication and bonding process, and to discuss pros and cons of its use.

Conclusion : The hygienic fixed retainer that can be placed by an indirect bonding technique is a clinically useful tool in maintaining oral hygiene and alignment of anterior teeth.

O-15
What makes crowded teeth straightened? Alignment without using brackets
Tae Kyung Kim
BFO orthodontic clinic

Introduction : Almost every patient has crowding, and the crowding might be the most common reason they seek orthodontic treatment.
At the beginning stage of the treatment, brackets are bonded, then the NiTi wire is inserted into the brackets which results in crowded teeth being straightened. Therefore, unconsciously many orthodontists tend to think that the crowding is relieved because of the appropriate NiTi wire inserted into the properly positioned brackets.

Discussion : Crowding is able to be straightened without neither the brackets nor the NiTi wire. Back in time, even when the NiTi archwire and the bracket did not exist, the crowding was able to be straightened out, because there were other methods of applying orthodontic force to the teeth. It is natural enough for us to forget, but the only principle to move the teeth is applying orthodontic force to them. In the alignment stage, it is just that nowadays, a most commonly accepted method used for applying orthodontic force to the teeth in the alignment stage is the NiTi wire deflected by bonded brackets. This approach may be the effective one for the orthodontists. However, that makes the patients uncomfortable, is unaesthetic, and poses difficulties in maintaining their oral hygiene.

Conclusion : In the presentation, I would like to discuss how the crowded teeth can be straightened out and, whether the most effective tool to alleviate crowding is using brackets and NiTi wire. Finally, I wish I could share my years of experiences with some cases those crowding have been relieved effectively and efficiently without using brackets.

O-16
Consideration at decrowding stage in lingual orthodontics - easy approach

Jongsam Nam
Prime S orthodontic hospital

Introduction : There are various problems in lingual orthodontic treatment. Multiple limitation of force mechanic, short inter-bracket width, short inter-dental space and a lot of lab works makes difficulties. If an orthodontist overcome these issues, then achieve a good result in lingual orthodontics

In practice, treatment using a lingual orthodontic device often suffers from significant difficulties about decrowding of the anterior teeth in the early stages of treatment.

Discussion : Factors that make this alignment difficult in clinical use include 1) Lack of sufficient space for alignment, 2) Incorrect attachment position of lingual orthodontic device, 3) Deformation of orthodontic wire, 4) Inadequate position slot of orthodontic wire, 5) Excessive friction between bracket and orthodontic wire, 6) Large play between bracket slot and orthodontic wire.

Especially in lingual orthodontic treatment, because of narrow inter-dental space and narrow inter-bracket space, decrowding is often more difficult at early treatment stage.

Many clinicians apply various complex solution to overcome difficulties of decrowding in lingual orthodontic treatment, 1) To attach with selective bonding for teeth that are advantageous to the alignment, 2) Active space gaining with open coil spring elastic chain at early stage, 3) Using multiple re-position, 4) Using superelastic NiTi wires, 5) Teeth alignment using various elastic loops, 6) Using additional elastic tie for rotation, and 7) To attach buttons to lingual surface of teeth.

However, in theory, the alignment of anterior teeth in lingual orthodontic is more favorable than labial orthodontic, except for the limited force application of narrow inter-dental space and narrow inter-bracket space

Despite these advantages, many clinicians have the prejudice, that it is difficult to arrange anterior teeth in lingual orthodontic treatment.

Conclusion : In response, I will explain advantage and disadvantage of decrowding in lingual orthodontic treatment and introduce some simple ways to improve it