Orthodontics

Smiling to rheumatoid arthritis: how an appropriate diagnostic iter can allow to treat orthodontic and gnathologic problems

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Aim: Rheumatoid arthritis is a chronic, systemic and debilitating inflammatory disease, with no clear etiology, but probably of autoimmune origin. It predominantly affects symmetrical joints, but also tendons, synovium joints, muscles, bags and other tissues. The onset is observed mainly at the end of adolescence or between 4th and 5th decade of life; a second peak is observed between 60 and 70 years. An early variant of RA is made by rheumatoid arthritis childhood. The objective is to develop a protocol by a 'multi-specialized medical team in order to allow an early diagnosis of the temporo-mandibular functional problems in patients affected by ARG.
Method: There have been 497 visits to specialists gnathological, orthodontic and rheumatologic, during which the clinical signs and symptoms present with diagnostic ultrasound findings were analyzed and Specific radiographers. Necessary step in the screening phase for all patients: 1) visit pediatric rheumatology , physical examination, identification of the risk factors involved in TMJ. 2) power Doppler ultrasound study of atm (contextual to the visit rheumatologic) is able to: identify synovitis , study the translation of the condyles. 3) visit orthognathic, extraoral inspection (profile, symmetry) and intraoral (type of occlusion), palpation (masticatory and neck muscles and joint capsule), loading (to detect indirect signs of no appreciable muscles EO). 4) X-ray examinations targeted at atm only if suspect a pathological picture making a TC Cone Beam (baseline and after 2 years), analysis of clinical signs and symptoms with diagnostic tests ultrasound-specific radiographic. 5) preventive-therapeutic approach, local and systemic therapy, correction of parafunctions, targeted physiotherapy, gnathological therapy, orthodontic treatment, arthrocentesis, maxillo-facial surgery.
Results: The protocol adopted by us represents a valid aid for the prevention of functional problems temporomandibular joint (atm) in patients with juvenile rheumatoid arthritis. No statistically significant correlation was found between symptoms reported by patients and detected clinical signs. No statistically significant correlation was foundbetween clinical signs detected by the visit and structural alterations highlighted radiographically.
Conclusion: This protocol is easy to use for orthodontists, gnathologists, rheumatologists, radiologists, pediatricians and primary care physicians who can perform an early diagnosis of functional problems temporomandibular joint and is also be extended to asymptomatic patients juvenile rheumatoid arthritis.

Smiling to severe Class II malocclusion: the influence of Twin Block therapy on mandibular growth

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Aim: The aim of this clinical study was to evaluate the treatment skeletal effects induced by Twin Block in the therapy of Class II malocclusion during or slightly after the onset of the pubertal peak in the growth velocity.
Method: The study sample was obtained from the records of the author's private practice and consisted

of a parent sample of 70 Class II division 1 subjects treated consecutively with the Twin-block appliance, from whom good quality lateral cephalograms were available. From this sample, 30 subjects (Study Sample) 15 males and 15 females, were selected according to the following inclusion criteria: ANB greater than or equal to 4°, full Class II or end-to-end molar relationships, no history of previous orthodontic treatment or surgery treatment, absence of congenital anomalies, same caucasian race. All patients received active treatment with Twin-block before or during their pubertal growth spurt, as assessed by the cervical vertebral maturation (CVM) method. Lateral cephalograms for each subject was digitized by a single author (AL) respectively at time 1 (T1), immediately before treatment, (mean age 10.0± 1.1years) and at time 2 (T2) immediately after treatment (mean age 12.0 ± 1.1 years). The error of the method was calculated with the formula described by Dahlberg (1940). In addition systematic error and the coefficient of reliability were determined as suggested by Houston. The Control Group consisted of untreated Class II subjects. A modification of the Twin-block appliance, originally developed by Clark, was used in this study. In the present study the mean duration of the Twin -block treatment was 1.2 ± 0.5 years.

Results: The statistical comparisons between Study Sample (treated subjects) and Control Group (untreated subject) during the T1–T2 observation showed significantly favourable changes: the total mandibular length (Co-Me) and ramus height (Co-Go) and corpus length (Go-Me) increased more in cases than in controls. Our results show a significantly higher average answer in the Study Sample, both in the paired t- test, comparing pre and post treatment, and in the unpaired t- test, comparing the Study Sample and the Control Group. Paired T-test data for the variables Co-Me, Co- Go, Go- Me, with a P = 0.05 significance level, lead us to reject the null hypothesis (differences average = 0) in favour of the alternative of a positive differences average, meaning that the average of the values is higher after the treatment.

Conclusion: The Twin Block appliance showed a higher increase of mandibular growth in the Study Sample than in the Control Group, but the most important parameter to use this appliance is the pubertal peak and its influence on the growth.

The Forsus appliance: most frequent complications and clinical tips

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Aim: One of the most frequent problems in Orthodontics is Class II malocclusion for this reason the ForsusTM Fatigue Resistant Device has become increasingly popular between orthodontists. A recent survey reported that 26% of american orthodontists use Forsus routinely to treat Class II malocclusion. Clinical effectiveness of the Forsus has been proved by the literature, and the no-compliance nature of this appliance can explain its rising use among orthodontist. As for all fixed appliance, breakages and minor problems may occur. The aim of this essay is to provide a clinical report of a comprehensive series of problems that can occur when using the Forsus appliance. Solutions are reported for each complication. The second aim is to analyze the relevant aspect of the patients' experiences and the detection of the acceptance.

Method: The clinical management of the Forsus appliance to correct Class II dental relationships, was analyzed for 120 consecutively treated patients at University Vita Salute, San Raffaele Hospital, Milan, Italy. The Forsus was used five months on average and pictures and clinical record were registered each time a patient had a problem. All minor and major problems related to the Forsus were recorded and each patient filled a Wong Backer formulary and also a five-point Likert scale was used to investigate the patients' feedback and level of acceptance.

Results: The most common problem (22%) was breakage of the appliance. Breakage could occur as debonding of the lower first premolars or as unsoldering of the tube of the upper first molar band. Upper bands need to be changed. Lower premolar debonding could be prevented with an extra layer of flow composite surrounding the bracket base. The same solution was possible to repair the appliance in the mouth. 18 % of the patients experienced the lesion of the cheek mucosa. In four cases it was necessary to temporarily remove the appliance from the mouth to allow for healing. A soft cotton pad used as "wax" was an effective solution to allow mucosa recovery. A minor problem (4%) was deformation of the spring module due to fatigue. Deformation can lead to enhanced friction between the spring module and the push rod module, that make it hard for the patient to open and close the mouth. The solution is to change the spring module. There was also a significative correspondence with complications and the increase of pain reveled on the Wong Baker faces scale by the patients and also the results of the Likert scale were coherent.

Conclusion: The ForsusTM Fatigue Resistant Device can be effectively managed to allow a full effective correction of Class II malocclusions. A comprehensive list of precautions to prevent problems and acts to repair breakage was presented to decrease the pain and discomfort for the patients, showing the importance

of a stable and long lasting appliance in the patients' experience.

Orthodontic anchorage with mini implants: clinical tips

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Aim: Mini-implants are becoming a frequent choice in orthodontics. They can represent a helpful anchorage device as a substitute for more traditional techniques requiring patient collaboration. Titanium mini implants are frequently used for their qualities like versatility, small size, low cost and the ease in positioning and removal; with this system osteointegration is not necessary and it can be used for a large range of orthodontical procedures. The use of mini implants is indicated for sagittal movements (retrusion/protraction) and for vertical movements (intrusion/extrusion). The aim of this poster is to demonstrate the clinical usage and show the benefits of mini implants in a 46-year-old female patient with a severely compromised dentature.
Method: Titanium mini-implants were placed between the maxillary second premolar and first molar (2R=2mm and lenght= 7mm). The loss of lower premolars and molars often bring to supereruption of the maxillar antagonist teeth causing insufficient space for the prosthetic rehabilitation. In this situation the possible treatments are odonoplasty of the extruded teeth with the necessary endodontic treatment, maxillary impaction surgery or orthodontic treatment. In this case report (T1 at 6 months distance from T0, and T0 at the moment of mini- screws placement) is shown the situation of an adult patient requiring the intrusion of the first maxillar molar to obtain enough space for a removable prosthesis in the fourth sector. Furthermore, in this case the utility of the mini implants to obtain a reduction of the upper incisor protrusion is demonstrated.
Results: The mini implant allows the intrusion and the backward movement of the maxillary anterior teeth. This treatment allows a high preservation of dental structures and a restoration of the mandibular dentition.
The patient obtained with this technique a safety and proper solution to her denture serious problems.
Conclusion: Mini implants used as temporary devices during orthodontic therapy are a solution in many different clinical situations. - Immediate loading of these devices with slight force is not a cause of their failure. - Stability of the mini implants can be obtained through: good bone quality (adequate cortical bone thickness and high trabecolar bone density); absence of inflamed perimplant soft tissues; limited distance between the centre of resistance of the mini implants; application point of the force and the correct placement procedure.

Bone depth and cortical bone thickness of mandibular buccal shelf for miniscrew insertion: a CBCT study

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Aim: The aim of this study was to evaluate buccal bone thickness, bone depth and cortical thickness of mandibular buccal shelf (MBS) to evaluate the most suitable sites for mini-screw insertion in this area.
Methods: The sample included CBCT records of 30 adult Caucasian subjects (mean age 30.9±7.0) retrospectively evaluated. All CBCT examinations were performed with i-CAT CBCT scanner (Imaging Sciences International, Hatfield, Pa) setting the acquisition parameters as follows: 120 kV, 5mA, 4s to 6s exposure time. Each exam was converted into DICOM format and processed with OsiriX Medical Imaging software. Proper view sections of MBS were obtained for quantitative and qualitative bone characteristics assessment. The methodology included the identification of the vestibular cement-enamel junction (CEJ) on each considered scan view root section. Evaluation of the buccal total bone thickness was performed on two horizontal reference lines apically dislocated at 6mm (TotThick-at-6) and 11mm (TotTick-at-11) from the CEJ. The evaluation of Apico -coronal total bone depth (cortical + medullary bone) and cortical coronal bone depth was measured on two vertical reference lines buccally dislocated at 4mm (TotDepth-at-4 and CortDepth-at-4) and 6mm (TotDepth-at-6 and CortDepth-at-6) from the CEJ. A set of 8 measurements was taken for each scan root plane assessing the total and cortical bone depth (at 4 and 6mm from CEJ) and buccal (at 6 and 11mm from CEJ) bone thickness.
Results: At the MBS area, mesial and distal second molars roots scan sections showed enough buccal bone for mini-screw insertion. The mesial root of second mandibular molar showed at 4 and 6mm an average bone depth of 18.51mm and 14.14mm respectively. The distal root of second mandibular molar showed, for the same parameters, values of 19.91mm and 16.5 mm. All sites showed cortical bone depth thickness greater that 2mm.
Conclusion: Specific sites of MBS offer enough bone quantity and adequate bone quality for mini-screw insertion. The best insertion site with the optimal anato-

mic characteristics is the buccal bone corresponding to the distal root of second molar; with screw insertion 4mm buccally dislocated to the cementoenamel junction. Considering the amount of cortical bone thickness in MBS area, pre-drilling is always recommended in order to avoid high insertion torque.

Rhinologic effects of rapid maxillary expansion in pediatric age

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Aim: Maxillary hypoplasia has been often correlated to a structural deficit of nasal cavities that means obstruction of upper airways and diminution of respiratory capacity. Many studies in the Literature have shown an improvement of respiratory function after Rapid Maxillary Expansion (RME) that is considered a well-founded technique for posterior crossbite correction, typical expression of maxillary hypoplasia. A recent pilot study has also described an improvement of olfactory function six months after the treatment. The aim of this study is to evaluate the effects induced by RME therapy, used as an early treatment of skeletal crossbite, on nasal respiratory and olfactory function, comparing treated patients with a control group similar for age, growth stage (prepubertal) and transversal skeletal deficiency.
Methods: We selected 22 consecutive patients aged 6-11 years old (mean age 8,27 ± 1,41) that presented unilateral or bilateral posterior crossbite, transversal discrepancy ≥ 4 mm between upper jaw and mandible and needed rapid maxillary expansion as initial phase of interceptive treatment. The subjects were selected regardless of sex, social class or race, with the following exclusion criteria: genetic disease or congenital syndromes; systemic diseases; periodontal disease; ENT diseases; bad habits and mouth breathing; previous orthodontic treatment. All patients were in mixed or early permanent dentition phase, with the first upper molars fully erupted and in prepubertal phase (stage CS1-CS2) according to CVM method. The subjects were randomized into two groups: the study group (11 subjects; 8 males and 3 females; mean age 8,27 ± 1,62 years), has undertaken the RME; the control group (11 subjects; 3 males and 8 females; mean age 8,27 ± 1,25 years), remained under observation for the period of the study, and was subsequently treated. All the patients have been subjected to respiratory tests (Active Anterior Rhinomanometry or AAR, Peak Nasal Inspiratory Flow or PNIF) and olfactory tests (Nez du Vin Test, Threshold Test with Sniffin' Sticks®) before (T0), after rapid maxillary expansion or after 30 days for the control group (T1) and after 6 months from the second evaluation (T2). They were also submitted the SNOT-22 Questionnaire, to exclude symptoms that could distort the tests. The average expansion of the study group treated with RME was of 6,04 ± 1,07 mm (range 5-8 mm) with an average of 30,18 ± 5,33 total activations of the screw (range 25-40).
Results: The Wilcoxon-Mann-Whitney test, with a 95% confidence interval, was used to identify if the changes of PNIF, AAR and Threshold values between T0, T1 and T2 and between the two groups showed a statistically significant change. Results show a statistically significant increase in PNIF values in treated patients compared to the control group (p=0.003) at T0, which is even more evident six months after RME (p=0.0005). This improvement is not shown by AAR values at both times (p=0.170 and p=0.205 respectively). Even Threshold Test results don't show an improvement of olfactory function immediately after RME (p=0.154), but significantly increase at T2 (p=0.0005).
Conclusion: RME significantly improves the respiratory capacity of treated patients measured by PNIF. At six months from RME treatment is also evident an improvement in olfactory function, measured by Threshold subtest. AAR however does not show a significant improvement of nasal patency. Further studies based on larger series should be performed in order to evaluate if also AAR could show any improvement after the treatment.

Rhinofibroscopic evaluation of patients with maxillary contraction treated with rapid maxillary expansion. A prospective pilot study

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Aim: The aim of this study was to evaluate through nasal fiberoptic endoscopy the patency of upper nasal airways in patients treated with rapid palatal expansion.
Methods: A sample of 34 Caucasian Children aged 7-11 years old and needing a RME treatment was selected. They all presented mixed dentition uni- or bilateral posterior crossbite involving at least deciduous canines and permanent first molars. Only 30 patients (12 males

and 18 females) were fitting the study purpose: 3 failed to return after initial records and 1 had the RME removed prematurely. The selected subjects underwent orthodontic as well as ear, nose and throat (ENT) examinations (T0). An experienced ENT specialist performed nasopharingoscopy before (T0) and after the rapid palatal expansion (T1). The examination was accomplished by using a flexible fiberoptic nasopharyngoscopy, which was pushed along the floor of the decongested nasal passage and reached the nasopharinx under topical anesthesia. The amount of nasopharynx obstruction was quantified with reference to the full choanal surface and the following 4 grades were defined:
Grade 0 = 0-25% of choanal surface obstructed
Grade 1 = 25-50% of choanal surface obstructed
Grade 2 = 50-75 % of choanal surface obstructed
Grade 3 = 75-100 % of choanal surface obstructed
Rapid maxillary expansion was realized using a Hyrax-type rapid expander cemented on first permanent molars. The activation protocol involved one quarter of turn (0.25) in the morning and one quarter in the evening for the first 2 weeks, then 1 activation a day until the upper molar palatal cusps were in contact with the lower molar buccal cusps. The amount of nasopharynx obstructionwas quantified with reference to the full choanal surface using the Wilcoxon Signed Rank test. The statistical significance of the correlation between T0-T1 differences in the amount of nasopharynx obstruction was assessed with the Spearman's correlation coefficient. In all the analyses the level of significance was set at $\alpha = 0.05$ and calculations were handled by SPSS 11.0 software (SPSS, Chicago, IL, USA). In conclusion the differences in nasopharynx obstruction between T0 and T1 were statistically evaluated.
Results: Nasoendoscopy performed at T0 showed that adenoid hypertrophy was the most common cause of airway obstruction (22 out of 30 patients). Inferior turbinates hypertrophy was the second most frequent cause (13 out of 30), followed by obstructive septal deviation (7 out of 30).No sleep apnea were reported by parents probably due to lack of knowledge of this kind of pathologies. Medical history showed no general health problems were related to severe obesity. The amount of nasopharynx obstruction decreased significantly after palatal expansion ($p<0.001$). A statistically significant positive correlation existed between the T1-T0 differences in amount of nasopharynx obstruction ($p = 0.03$).
Conclusions: The results of this study, confirm that RME has an influence on nasal resistance and the amount of nasopharynx obstruction. The obstruction can be improved in patients with minor or moderate breathing problems caused by the lack of patency of upper airways. Although palatal expansion cannot replace medical treatment (intranasal corticosteroids) or surgical procedures (adenoidectomy) when indicated.

Correlation between the incisors axis inclination and the exposure of the vermilion

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Aim: the enhancement of the lips through cosmetic techniques is a popular procedure. In literature there are not many studies which demonstrate all the aspects that influence this area which is so important for patients. Orthodontic biomechanics related to the incisors axis correction can change the patient aesthetic perception in this area of the face. The aim of this study is to investigate the possible correlation between the incisors' axis and the exposure of the vermilion area.
Methods: For this study, 26 patients aged 8-11 years old have been selected from the Orthodontic Department of the Policlinico Gemelli in Rome. The selection criterion of the study was the presence of an overjet between 0 and 12 mm. Three-dimensional images were acquired with a stereophotogrammetric technique (3dMD. Atlanta, Ga). From selected images, it was possible to calculate the areas of the upper lip and lower lip of each patient through a Geomagic Control software. The incisors inclination was measured on latero-lateral teleradiography through the Illinois analysis: the upper incisor axis inclination compared to the SN line (Sella – Nasion) and the lower incisor axis inclination compared to the ML line (Mandibular Line) have thus been measured. Two multiple linear regressions were performed by a SPSS software. The first regression examined as a dependent variable the upper lip areas and as an independent or predictor variable the inclination of the incisors' axis and the dental overjet. The second regression examined as a dependent variable the lower lip areas and as an independent the same variable of the first regression.
Results: Our statistical analysis through software showed that there isn't any correlation between the dental overjet and the appearance of the vermilion area; this is because even 0 is included inside the confidence interval (95%) of B coefficients not standardized from the incisors axis.
Conclusion: From the results obtained it was possible to highlight a possible orthodontics' limit in improving the exposure of vermilion. There is not a statistically significant correlation between teeth and lips position. This result suggests a possible limit of orthodontic treatment to improve the exposure of vermilion, which may have been influenced by the low number of samples examined. Prospective studies should then

increase the number of patients in order to investigate better the relationship between the orthodontic treatment and the exposure of the vermillion area.

Genetics of non-syndromic cleft lip and palate: a critical review

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Aim: Non-syndromic cleft lip and/or palate (NSCL/P) is considered a genetically complex trait supporting a multifactorial model of inheritance, in which genetic risk factor of small individual impact may interact with environmental contributions. The aim of the present work is to review the current literature regarding genetics of NSCL/P, focusing on the multiple methods of genetic investigation. Furthermore, genes and genetic loci best-supported as involved in NSCL/P are discussed.
Methods: A Medline and Scopus search was conducted in order to identify publications related to the topic, with no limitations of language or time period. Entry words included: "orofacial cleft", "cleft lip", "cleft palate", "genetics", "nonsyndromic". Relevant information was also derived from reference lists of the publications retrieved.
Results: Genetic approaches to non-syndromic CLP have included: linkage analysis, association studies, identification of chromosomal anomalies or microdeletions in cases and direct sequencing of affected individuals. These methods can be applied to candidate genes or genome-wide strategies can be used. To date, there have been eight independent genomic wide association studies (GWASs) for CL/P, a genome-wide meta-analysis of two CL/P GWASs, and two GWASs for isolated left palate (CP). For CL/P at least 20 different loci have been confirmed with statistical and biological supporting data. The genes and genetic loci best supported as involved in NSCL/P are: interferon regulatory factor 6 (IRF6) on chromosome 1q32.2, MAFB on 20q12, ARHGAP29 on 1p22, gene desert region on 8q24, ventral anterior homeobox 1 (VAX1) on 10q25.3, paired box protein Pax-7 (PAX7) on 1p36.13, forkhead box E1 (FOXE1) on 9q22.33, transforming growth factor alpha (TGFA) on 2p13.3, tumor protein p63 (TP63) on 3q28, bone morphogenetic protein 4 (BMP4) on 14q22.2. Notably, mutations in IRF6 were first discovered to be etiologic in an autosomal-dominant clefting syndrome (Van der Woude syndrome); subsequently, the causative role of this gene has been identified also for NSCL/P and independently replicated across the studies.
Conclusion: Among the new genomic tools, GWASs are considered ideal for dissecting common, complex (non-single-gene) traits and NSCL/P is one of the few birth-onset disorders to have been investigated with this powerful method. Collectively, these studies have demonstrated that orofacial clefts exhibit significant genetic heterogeneity, having successfully identified multiple genome-wide significant associations with CL/P as well as potential gene-environment interactions for CP. However, with the important exception of IRF6, the significant risk loci from GWAS of NSCL/P are diverse than the significant risk loci from genome-wide linkage analyses, this highlighting the different strengths of the two approaches.

Second molar management: a survey directed to italian orthodontists

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Aim: The studies of L. Andrews and RH. Roth represent the state of the art regarding the principles of occlusion. They define for the second molar certain values of tip, torque and in-out. In the literature there is no piece of work explaining the various implications of the proper management of the second molar in orthodontic treatments. Careful analysis of the occlusion shows that in many cases the inadequate closure, the incongruous overbite and the presence of joint problems or relapses are caused by the presence of rear pre-contacts especially at the second molars level. A survey was drafted to investigate how othodontists clinically manage the second mandibular molar during therapy.
Methods: In inter-university cooperation with the University of Trieste 15 questions were drawn up about the second mandibular molar in the orthodontic treatment in the base year 2014. The whole survey was submitted to 911 orthodontists either through e-mail messages, through the site survio.com, with both or a direct compilation during orthodontic events meeting.

Results: The results have shown that 73% of those with an EBO-IBO certification and 63% of the specialists always apply a bracket or a band on the second molar in contrast with those who have less orthodontic experience. In 90% of interceptive treatments the use of lip-bumper does not exceed half of the cases; 68,1% of those with a specialist certification and 84,5% of those with a diploma of excellence is more inclined to wait the coming out of the second molar of the mandible before removing the band. When the second molar has not come out yet, the control x-ray tests are done by almost 60% of those who have been in the field for more than 5 years and those who have been working for more than 15 years, by almost 80% of those who have a diploma of excellence and by 65% of specialists in orthodontics in contrast with those who are not specialist. No matter the category (specialist, non-specialist..), about 80% of orthodontists carry out tooth extractions from the lower set in no more than a quarter of cases. In more detail, the extractions carried out between a quarter and a half of the cases are performed by 13% of those who do not have a EBO-IBO certification and by 23% of those who have it. The extractions between half and three-quarters of the cases are not performed by anyone who does not have diplomas of excellence whereas they are carried out by 5% of those who graduated EBO-IBO or belongs to the Angle Society.
Conclusion: Greater attention to various aspects of the second molar control is paid by professionals with a title of specialization in orthodontics, diplomas of excellence and many years of experience. This suggests us to always include this tooth in the therapy, according to the clinical guidelines and to study a more accurate control of its three-dimensional position during orthodontic treatment to obtain an occlusal and functional stability over time.

Intraoral scanner in orthodontics: comparing 3D digital models obtained by three different procedures

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Aim: Successful orthodontic treatments rely on careful treatment planning based on accurate impressions which are crucially important to this process.
Accuracy of 3D digital models obtained by direct intraoral scanning of dental arches is not satisfactory. This study compares the accuracy of digital models fabricated using three different scanning methodologies.
Methods: A resine model was scanned by an independent laboratory specialized in measuring, designing and fabricating CAD/CAM structures to obtain a 3D digital reference; a fully automatic Zfx Evolution (Zimmer Dental) stripe light scanner which utilizes a green light and an open interface was used. The intraoral Zfx IntraScan (Zimmer Dental) scanner was utilized to obtain thirty full-arch scans of the same model by three different techniques; this type of scanner uses a confocal measuring system to measure the distance between the scanner and the structure scanned. Ten scans were acquired using Technique A, scanning from 2.7 up to (and including) element 1.7; Ten scans using Technique B, from element 1.1 up to (and including) element 1.7 and then from element 2.1 up to (and including) element 2.7; and finally 10 scans by Technique C, which includes the first scan from element 2.2 up to (and including) element 1.7, and the second scan from element 1.2 up to (and including) element 2.7. The STL files obtained were superimposed on and aligned to the reference scan.
Results: The results showed that Technique A's deviation with respect to the reference scan in terms of volumetric error was 302.47 ± 37.42 µm; Technique B had a mean deviation of 180.41 ± 29.84 µm; Technique C had a deviation with respect to the reference scan of 147.33 ± 28.23 µm.
Conclusion: The results show that the three methodologies do indeed have different accuracies: Technique C was the most accurate, followed by Technique B and Technique A. The longer the portion of arch that was scanned, the greater were the scanning errors that were uncovered (Technique A); this was due to a cumulative error linked to the data matching process by the software during acquisition. The error can be reduced by utilizing techniques that scan the two hemiarches at different times and subsequently pair the scans by means of a dedicated software (Technique C).

Smiling to OSAS: how an appropriate diagnostic approach can allow to treat OSAS only with oral devices

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Aim: Previous studies suggested that a possible solution to cure the Obstructive Sleep Apnea Syndrome (OSAS) and its systemic complications was the use of oral devices for the anterior-motion of the jaw. This clinical trial aims to demonstrate the efficacy of the use of removable bite for the anterior-translation of the jaw to treat OSAS in specific categories of patients, compared to Continuous Positive Airway Pressure devices (CPAP). In particular, the mandibular advancement device is the least invasive and the most compliant solution in patients with low to moderate OSAS, whose apnea is due to retro-lingual obstruction.
Methods: In order to establish the eligibility of the patient to treat OSAS with mandibular advancement devices, specific exams are needed. The first one is the polysomnography, which distinguishes between central and peripheral obstruction. If the problem is peripheral, a fibroscopy will be performed in order to understand which level of the pharynx is responsible of the airways obstruction (rino-, oro-, hypopharynx). In this process, the patient undergoes to the STOP-BANG questionnaire, aimed to classify the severity of OSAS (low-medium-high). Subsequently, an orthodontic visit allows to assess the relationship between the maxilla and the jaw and the kind of dental-occlusion. If the patient is eligible, radiographical examinations are required (Teleradiography L-L and Ortopantomograpy) for further investigation. Only suitable individuals can take the dental impression to create a removable transitory device, whose effectiveness is showed during the sleep endoscopy: an examination during which the sleeping phase is simulated. Uniquely in those cases in which the transitory dental-device has demonstrated a true effectiveness in the decrease of apneas, a definitive dental-appliance is manufactured.
Results: This bite for the anterior-translation of the jaw has to be used only during the night as a OSAS therapy, after careful patients selection. As a matter of fact, it avoids that the retro-lingual section glides backward to occlude the upper airways.
Conclusion: In those cases, accurately selected with the clinical and radiographic examinations previously described, the appliance for the anterior-translation of the jaw is the most valid solution to cure OSAS and its systemic complications. A correct diagnostic procedure is necessary to select patients with OSAS and to choose the most suitable therapy for each single case.

Prevalence of tooth agenesis evaluation in Angle Class I, II, III

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Aim: Tooth agenesis or hypodontia consists of the developmental absence of one or more teeth. Many studies confirm that this condition is almost frequent in general population; the prevalence reported is between 2,7% and 11,3%. According to Bozga's study published on JMedLife in 2014, mandibular second premolar is the tooth most affected, followed by maxillary lateral incisor, maxillary second premolar, mandibular central incisor, mandibular second molar and mandibular lateral incisor. This condition shows a multifactorial etiology: genetic factors (genes most commonly involved are: MSX1, PAX9, AXIN2 and WTNT10A), hereditary factors, environmental factors, local or general infective processes, radiations, drugs and traumas. Genes involved are: MSX1, PAX9 and VTN4A. A Japanese study published by Kanako Ota in 2015 on AJODO, reports a prevalence of tooth agenesis doubled in subjects with Angle Class II Division II malocclusion, compared to other Angle's Classes. The aim of this retrospective study was to evaluate the prevalence of tooth agenesis in a general orthodontic population, considering each Angle's Class.
Methods: In this retrospective study, 150 patients of the Padua dental clinic were analyzed through intraoral photographs, panoramic radiographs and lateral cephalograms. The diagnostic records of each patient were studied by two operators. The inclusion criteria were: no previous orthodontic treatment and absence of any syndrome. Any doubtful case, like previous surgical treatments or missing teeth with uncertain dental history were kept out.
Results: Angle Class II Division II malocclusion is the most common class with tooth agenesis (as found in the Japanese study published by Kanako Ota) followed by Angle class II Division I malocclusion, Angle Class I malocclusion and Angle Class III. The most common missing teeth in the general population analyzed in this study are: lower second premolar, upper second premolar and upper lateral incisor.
Conclusion: The study confirms a specific relationship between tooth agenesis and Angle Classes malocclusion. Angle Class II Divison II is the most common class with tooth agenesis. The most frequent missing teeth are: lower second premolar, upper second premolar and upper lateral incisor.

Stress distribution on TMJ during mandibular advancement device (MAD) use for OSAS treatment. A FEM (Finite Element Method) pilot study

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Aim: Obstructive sleep apnea (OSAS) is one of the most common sleep disorders: in fact its prevalence in adult population varies from 3 to 28% depending on the study. Apneas in OSAS are caused by obstruction of upper airway (snoring is the first sign) developed for both anatomic and neurological patient's problems. OSAS patients show excessive daytime sleepiness and impaired cognitive ability. This syndrome is currently recognized as a public health problem and a risk of cardiovascular, cerebrovascular and metabolic diseases. Polysomnography (PSG) is the standard test to diagnose OSAS and the severity of the disease is rated with apnea-hypoapnea index (AHI). In several studies it was attested that MADs (Mandibular Advancement Device) are a treatment option to reduce snoring and AHI. MADs function is to push forward the mandible to solve the upper airway obstruction. This study was designed to evaluate patterns of stress generation in the temporo-mandibular joint (TMJ) during mandibular protraction. Finite Element Method (FEM) allows to examine the forces generated by positioning the mandible forward: FEM is a numeric analysis done with high-fidelity computers software and it allows a reliable approximation of biologic tissue.
Methods: The CBCT, RMI, arch models and a construction bite of a skeletal Class I normodivergent female patient were used. All this data were collected to perform the following FEM analysis on an ideal patient. The target position was recorded at 4 mm of sagittal advancement. The mandibular advancement device (MAD) was obtained with a head to head position of upper and lower incisor with a saggital advancement of 4 mm. A computer aided design (CAD) model of the stomatognathic system was built from the CBCT. The posterior connective tissue, the capsule and the oblique and horizontal band of the TMJ were designed from RMI, anatomy text-books and medical literature. The 3-dimensional computer aided design model was created using MIMICS software and then analyzed with ANSYS software for FEM analysis. The MAD was scanned and STL 3-dimensional model was created and included in ANYS analysis.
Results: FEM analysis shows the areas of tension and compression on mandibular condylar region and glenoid fossa. A pattern of stress in created on TMJ when MAD protracts the mandible forward.
Conclusions: This FEM study is useful to create a model and to show biological response to stress and loading, but it is limited because it can analize only instantaneous stress patterns. More studies are needed to estimate variations between initial and follow-up model of TMJ.

Comparative experimental study of the jaws between the ancient and modern skulls through linear and angular measurements of 3D software

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Aim: The objective of this study is to determine, through the study of fossils of ancient skulls, the quantitative changes that suffered the jaw bone in the course of two millennia. This will clarify the evolutionary trend of the jaw and the problems that orthodontists will face more and more often. The hypothesis of this study is that the size of the jaw have changed over time in response to different functional demands.
Methods: This study is based on a comparison with measurements of 9 skulls of Opi, small town in Abruzzo, dating back to 200 A. C. with nine patients of the Department of Orthodontics of the Dental Clinic of the University of Chieti. All measurements were performed using Dolphin software.
Results: We observed a reduction in both the maxilla and the mandible. The maxilla has shrunk more than the mandible.
Conclusion: The comparative analysis of quantitative changes showed a reduction in both the maxilla and the mandible in modern patients. The maxilla has shrunk more than the mandible whose reduction is minimal and not significant with the exception of the anterior segment. This size reduction is justified by the loss of function that has had all the masticatory system. With the evolution in fact, the power has become more nutritious and easy to eat more and more, thanks to more and more processed foods.

Changes in masseter activity and coordination after correction of unilateral posterior crossbites: functional reasons

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Aim: Unilateral posterior crossbite is a serious asymmetric malocclusion that may become clinically evident in early childhood, involving structures that are actively developing, including motor control of masticatory function. In fact, the significant presence of reverse chewing cycles has been well established in patients with unilateral posterior crossbite, during

chewing on the crossbite side only. As a result, there is a serious asymmetry of the masticatory function. Mirroring the kinematic pattern, the activation of the masseter muscles is altered as well. During chewing on the crossbite side, patients show decreased activity of the masseter on the crossbite side and increased masseter activation on the contralateral side during reverse cycles, resulting in a reduced side to side difference in masseter muscle activity, whereas normally, unilateral chewing is characterized by a significant difference in activation between the ipsilateral and contralateral masseter muscles. The aim of this work was to describe the effects of functional therapy on masseter activity and chewing kinematic in patients with unilateral posterior crossbite.
Methods: Fifty children (9.1 ± 2.3 years) with unilateral posterior crossbite (34 on the right side, 16 on the left side) and twenty children (9.5 ± 2.6 years) with normal occlusion were selected for the study. The mandibular motion and the muscular activity during chewing soft and hard boli were simultaneously recorded with a K7 kinesiograph (Myotronics, USA) before and after correction of unilateral posterior crossbite with the appliance Function Generating Bite (mean treatment time of 7.3 ± 2.4 months plus the retention time of 5–6 months). Chewing cycles were divided into non-reverse and reverse, based on the vectorial direction of closure. Since the amplitude of the EMG signal is influenced by individual anatomical characteristics, the percent difference between ipsilateral and contralateral peaks of the masseter amplitude was computed together with the percentage of reverse cycles. Significance level was set at $P < 0.05$.
Results: Before therapy, the percentage of reverse cycles on the crossbite side was greater in patients than in controls ($P < 0.001$) and significantly reduced after therapy ($P < 0.001$) towards the reference normal value (soft bolus; pre: 57 ± 30%, post:12 ± 17%; hard bolus; pre: 65 ± 34%, post: 12 ± 13%; reference value: soft bolus 4 ± 2%, hard bolus 5 ± 3%). Before therapy the percent difference between electromyography envelope peaks in patients was lower than in controls ($P < 0.01$) and significantly increased after therapy ($P < 0.05$) becoming similar to the reference normal value. The normalization of coordination between the bilateral masseters after therapy was due to a significant reduction of the activity of the contralateral masseter muscle for both bolus types.
Conclusion: The altered muscular activation and the altered kinematics in presence of unilateral posterior crossbite might be considered a useful indicator of the severity of the masticatory function involvement. The correction of the malocclusion with a functional appliance induced a favorable change in the neuromuscular control of chewing of patients, who recovered a significant reduction of the reverse chewing patterns and a normal-like coordination between the masseter muscles. Interestingly, results showed that the normal-like coordination of masseters between sides was reached thanks to the lowering of the hyperactivity of the normal side. In comparison, the hypoactivity of the masseter of the crossbite side showed a limited improvement, meaning that a longer time is required to restore the hypotrophy of a muscle.

Epidemiological evaluation of impacted permanent mandibular canines

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Aim: Mandibular canine impaction is a very rare phenomenon and there are very few studies concerning this event. Because of the paucity of data and the discrepancies in the literature, the aim of the present study was to evaluate the actual epidemiological features and patterns of impacted mandibular canine teeth in an orthodontic patient population treated inside the Dental School of Turin, Italy.
Methods: This is a retrospective study. Panoramic radiographs, intraoral photographs and dental casts of 1479 patients (682 male (46,11 %)and 797 females (53,89 %)) who attended the clinical department of Orthodontics of Dental School , University of Turin, Italy, from 1995 to 2016, were retrospectively reviewed in order to detect impacted mandibular canine teeth. Observations were made on missing permanent mandibular canines, retained deciduous canines, sex and age of patients , side and number of mandibular canines and any other associated pathology or symptoms. A customized data entry was prepared to record and evaluate the status of impacted canine teeth.
Results: The prevalence of mandibular canine impaction was found to be 1.6% in the 1479 patients of this orthodontic population. A total of 24 patients had impacted mandibular canines with 13 being males and 11 being females. No statistical difference was found among gender. 13 (54,2 %) of the patients had unilaterally impacted canines (9 on the left side and 4 on the right side), while 11 (45,8 %) of the patients had bilateral impaction. In 16 of the patients there were retained mandibular deciduous canines. In 3 of the patients there was an early loss of the mandibular deciduous canines, while in three cases the impacted canines were transposed in the region of lateral incisors. In 1 of the patients there was a supernumerary tooth in the lateral incisor region and the deciduous canine was still in the arch.
Conclusion: Maxillary canine impaction is more frequent than mandibular canine impaction. Mandibular canine impaction prevalence in this study was found

to be higher than in the published literature to date. The reason for this higher prevalence may be related to the patient selection from the Orthodontic department. This result may not represent the general population, but definitely this study provides a baseline regarding the frequency and types of impacted mandibular canines in this particular population. Also this higher prevalence value can be the evidence of an actual increase of the number of impacted mandibular canine teeth among patients. The early detection of mandibular impacted canines is crucial for successful treatment.

Prevalence of tooth agenesis in cleft patients

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Aim: Clefts are one of the most prevalent deformities of the oral and facial region related to the birth. Clefts are usually associated with dental anomalies in the structure, size, shape. Tooth number anomalies or hypodontia are also associated with clefts. Hypodontia is the congenital absence of at least one permanent teeth. Hypodontia shows an high incidence in the human population, that was evaluated between 2,7 and 11,3%. A study made in 1991 by Polastri et al. in the Italian population evaluates 700 patients and found a prevalence of 5,14%. Hypodontia shows a multifactorial etiology like as genetic factors (MSX1 and PAX9 genes mutations), hereditary factors, ambiental factors, radiations, drugs. There are several studies that evaluates an higher prevalence of tooth agenesis in cleft patients.The aim of this study was to evaluate the prevalence of tooth agenesis in patients with unilateral and bilateral cleft lip and palate in the italian population using orthopanoramic radiographs.
Methods: This is a retrospective study. Orthopanoramic radiographs were evaluated at the Padua dental clinic. 120 patients were evaluated in the study: 40 patients with bilateral cleft lip and palate, 40 patients with mono lateral cleft lip and palate in the right side and 40 patients with unilateral cleft lip and palate in the left side. In this study were evaluated patients between six and fifteen years old. All radiographs were evaluated by the same operator.
Results: In this study hypodontia is found in the permanent dentition and the data reported are highest in the cleft region. The maxillary lateral incisor on the cleft side is the tooth most commonly missing. An higher prevalence of tooth agenesis was also found outside the cleft site, the most prevalent tooth that shows agenesis is the second maxillary premolar. Tooth agenesis are reported both in the upper and in the lower arches, but the upper arch show an higher prevalence of hypodontia
Conclusion: Bilateral cleft and lip palate patients show an higher prevalence of tooth agenesis than the other groups. The most commonly missing tooth is the maxillary lateral incisor on the cleft side.

Taurodontism and orthodontics treatment

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Aim: The purpose of this work is to discuss the problems that may occur during the orthodontic treatment in patients with taurodontism and to suggest approaches to reduce the risk of complications during the phases of the orthodontic movement.
Methods: An initial research of the abstracts has been carried out using the scientific archive "PubMed" by using the keywords "taurodontism", "taurodontic tooth", "taurodontism in orthodontics" "taurodontism & syndromes". The research was limited to the international literature in the English language including systematic reviews and case reports published from 1980 up to the present. Only the articles with scientific accuracy in explaining the problem were selected for a total of 21 articles.
Results: Taurodontism is an anomaly in the root form of multi-rooted teeth which results from an ectodermal defect in the invagination of the Hertwig foil. It occurs in the 18% of the general population, and in the 37.5% of subjects with a condition of hypo- and oligodontia. It's characterized by an elongated shape of the pulp chamber, by a more apical position of the portion of the fork than in normal conditions and by the lack of the natural shrinkage at the level of the cementoenamel line tooth. This alteration can be diagnosed only radiographically as at physical examination these teeth present a normal clinical crown. Taurodontism can be found isolated, associated with other dental abnormalities such as agenesis or amelogenesis imperfecta, or forming part of different syndromes such as Mohr's syndrome, Down's syndrome, Van der Woude syndrome, cleft lip and palate. There are different classifications and diagnostic criteria for the diagnosis of taurodontism. The first study that introduced mathematical criteria for classifying it was conducted by Shiffman and Chananel (1978): a tooth is considered 'taurodontic' if the distance from

the most apical point of the pulp chamber roof (A) to the most coronal point of the chamber floor (B) divided by the distance from A to the root apex (C) is greater than or equal to 0.2. Tulensalo et al. described a radiographic method for diagnosing taurodontism in permanent teeth with incomplete root development, measuring on the orthopantomography the distance between the most coronal point of the pulp chamber floor and the line passing between the distal and mesial CEJ: this distance must be greater than 3.5mm. It is important to consider the clinical implications of this anomaly in the various dental disciplines including orthodontics in order to achieve the most appropriate treatment plan.
Conclusion: The orthodontic treatment must be properly planned in patients with taurodontic elements. It must be taken into consideration that the peculiar morphology of these teeth determines less anchorage during orthodontic movements and, at the same time, it creates a greater risk of root resorption if the teeth are subjected to too heavy tractions. Moreover, a taurodontic tooth has less surface area than a normal tooth, this is why very short and thin roots do not oppose to orthodontic movements with the same force as well represented roots. It's frequent an association between taurodontism and hypodontia. The best treatment option in presence of edentulous gaps in the posterior zone is the correct repositioning of taurodontic teeth through very light and intermittent orthodontic forces. Alternatively we recommend the clinician to rehabilitate the edentulous gap using these elements as prosthetic pillars.

Upper and lower jaw short-term sagittal modifications in 6 to 10 years old patients treated with McNamara rapid palatal expander

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Aim: The aim of this study is to evaluate the sagittal skeletal and dento-alveolar short-term effects on the upper jaw and the consequences on the mandible of the rapid palatal expansion in 18 subjects aged between 6 and 10 years with posterior unilateral or bilateral cross-bite, using McNamara acrylic-splint rapid palatal expander.
Methods: A comparison between the skeletal and dento-alveolar variables, measured before(T0) and after (T1) therapy on latero-lateral teleradiographs, was performed using a digital cephalometric analysis.The same variables were compared within the sub-group of patients with a full or moderate class II malocclusion at T0. All the patients showed a cervical vertebral maturation stage CS1 or CS2 (according to Franchi and Baccetti). The statistical comparison of the variables was performed with the paired sample t test, with significance equal to 0,05.
Results: The collected data show a significant decrease of ANB angle (-0,96±1,75°). The sagittal position of the mandible, given by the Pg-OLP distance (OLP: perpendicular line to occlusal plane passing by S point) and the total lenght of the mandible, given by the summa of the distances Co-OLP and Pg-OLP, show an average significant increase of 4,25±6,07mm and 4,89±6,65mm. The FMA angle has significantly decreased (-1,26±2,47mm). Moreover, a significant increase of the SNB angle (1,37±2,14°) has been registered in the sub-group of patients with the II class malocclusion.
Conclusion: The outcomes of this study show an improvement of the skeletal relationship between the upper and the lower jaw, a facial height reduction, a likely anterior repositioning of the mandible and an increased mandible length itself, especially in the class II patients. These results suggest that the presence of the occlusal resin-splints frees the mandible from the inter-maxillary occlusal relationships, allowing it to develop freely with an anterior repositioning. The treatment with this type of rapid palatal expander has proved to be an effective therapy of transversal maxillary deficiency in the early mixed dentition. Besides it could be an advantageous therapeutic option in those patients that, in addition to the transversal discrepancy, show a class II malocclusion characterized by an insufficient growth of the mandible or a hyperdivergence or tendency toward a mandibular growth in a vertical way rather than a horizontal one.

Treatment of open bite in patient with TMJ disorder using invisalign: case report

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Aim: Resolution of a skeletal Class III malocclusion with open bite using invisible aligners. The patient with tmj disorder presented back repositioned jaw, contract maxilla, dental crowding in both arches and open bite. The patient also reported frequent episodes of headache and neck pain.
Methods: Treatment, conducted with Invisalign aligners, was aimed at expanding the upper arch, to solve the overcrowding by stripping and for the proper management of the torque incisal.
Conclusion: Bite closure achieved in 15 months. The

mandible was repositioned forward with remission of neck pain. The stability of the treatment is performed by passive aligners and the proper application of anti-squeezing protocol.

Effectiveness of orthodontics-orthognathic surgery combined treatment: electromyographic and clinical study

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Aim: Orthognathic treatment aims to normalize the skeletal relations of the masticatory apparatus by achieving a class I molar configuration. To achieve this, resorting to a combination of orthodontic and orthognathic surgery is often necessary. Evaluating the outcome of the intervention involves assessing both the occlusal, periodontal, aesthetic results and the functional recovery of the rehabilitated district. Clinical parameters that may be recorded for this purpose comprise the masticatory efficiency; the maximum bite force, the number and distribution of the occlusal contacts, the functionality of the temporomandibular joint, the maximum range of mandibular movements. Additionally, the neuromuscular post-surgical recovery may be assessed with electromyography (EMG). This study evaluates retrospectively if the initial electromyography (EMG) status of patients who underwent orthognathic surgery correlates with the extent of post-surgical EMG functional recovery.
Methods: Clinical records were selected among those of patients who underwent orthognathic surgery through Le Fort I and/or sagittal osteotomy of the mandibular ramus to correct 20 patients with skeletal dental class III malocclusions. Other inclusion criteria were: absence of any clinical signs indicating a TMJ disorder, pre-surgical EMG recording performed the day before surgery; post-surgical EMG recording performed not earlier than one year after surgery, and after completion of the post-surgical orthodontic treatment. Ten clinical records concerning skeletal dental class I healthy subjects, not showing clinical signs of TMJ disorder were selected to collect EMG data for further comparison with those of the treated patients. EMG data had been collected according to standard measuring procedures with single-use, bipolar electrodes applied on the patient's skin. EMG measurements concerned the activity of the anterior temporal muscles and of the two masseter muscles in three conditions: at rest, with teeth in occlusion (clench 1 condition) or with teeth clenching on cotton rolls (clench 2 condition).
Results: Retrieved clinical records concerned 20 patients, 5 men and 15 women, between 20 and 44 years (average: 30.1 $\pm$ 8.2). All subjects had been treated by the same surgeon. Details about patients and their surgeries are respectively. All patients had been subjected to post-surgical intermaxillary fixation, as surgery did not involve any rigid internal fixation of the mandibular sections. No patients in the present study showed any pre-surgical peculiarity or post-surgical compliances as it had been observed in previous studies. A significant increase of the average EMG activity after orthognathic corrective surgery was observed (p=.01). The post-surgical increase of EMG values showed a negative correlation trend with those collected before surgery (r=-.38, clenching on teeth; r=-.33, clenching on cotton rolls). None of the independent variables had any effect on the post-surgical outcome.
Conclusions: Results of the present study confirm that corrective orthognathic surgery improves the masticatory muscular activity force of patients who present class III malocclusions, and that such improvement can be objectively assessed by performing EMG measurements. Additionally, they suggest that patients whose masticatory muscle force benefits more from orthognathic surgery are those displaying the lowest pre-surgical EMG activity. Such hypothesis should be further investigate with proper, controlled prospective clinical studies. If it were proved true, pre-surgical EMG might be used to screen patients before surgery in order to predict if the surgical outcome would imply only an aesthetic improvement or also a muscular benefit.

Polarized light as valid alternative treatment of temporomandibular disorders

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Aim: The objective was to assess the effectiveness of a therapy using low energy polarized light (PL) devices, in reducing pain, promoting healing of soft tissue injuries and reducing inflammation, improving function and quality of life of the temporomandibular disorders (TMD) patients.
Methods: 35 patients (20 female), with TMD diagnosed using standard criteria, were assessed using electromyography (EMG) and computerized mandibular scan (K6). 8 minute PL therapy has been applied, 3 times per week for 4 weeks. No other treatment was given and patients were asked to refrain from taking analgesics during the course of the study. Polarized

light therapy used a non-invasive optical device to project a beam of light on to the skin and mucosa. This light has four characteristics: polarization – the light waves move in parallel planes, producing a narrow, concentrated beam, unlike ordinary light, where waves oscillate in all directions; polychromy – it contains a broad spectrum of wavelengths or colours, including visible light & part of the infrared range, enabling it to stimulate a range of light receptors on the skin (cf. lasers, which are monochromatic, i.e. they contain only one wavelength); incoherency – the light waves are out of phase or unsynchronized, unlike laser light, which is coherent; it has low energy density, unlike laser light, which may have high or low energy density. Patient-reported questionnaires (PORs) and performance measures are used to assess TMD pain and function in clinical practice. PROs assess the patient's perspective, while performance measures assess functions such as mandibular kinesiology (mouth opening and closing or other standardized maneuvers) in a controlled setting. Standardized assessment of patient outcomes allows physicians to measure the success or failure of diagnostics and treatments that TMD patients receive.
Results: Electromyographical, kinesiographical and clinical data showed statistically significant reductions in pain and muscular spams, improvements in function and increases in muscular strength were reported (compared to baseline measures). (P<0.01).
Conclusion: Joint pain typically involving the TMJ is the predominant complaint of people living with temporomandibular disorders. Pain is what drives patients to seek medical care. People with TMD are most distressed by the intensity, quality, and predictability of their joint pain, as well as its impact on physical function, sleep, fatigue, and mood. Valid and reliable PROs and performance measures are available to assess these aspects of the pain experience. The polarized light characteristics enable to penetrate the skin and underlying tissues in order to stimulate various biological processes. PL improves microcirculation, stimulates regeneration and repair, promotes wound healing and relieves pain, with no adverse effects. Low energy polarized light could be a valid alternative or concomitant treatment of temporomandibular disorders.

3D versus 2D: a more reliable and accurate cephalometric analysis

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Aim: This study was to combine the huge amount of information of low dose Cone Beam CT with a cephalometric simplified protocol thanks to the latest informatics aids. Cephalometry is an essential clinical and research tool in orthodontics. It has been used for decades to obtain absolute and relative measures of the craniofacial skeleton. Lateral cephalograms are two-dimensional (2D) radiographs that are used to depict three-dimensional (3D) structures. Consequently, cephalograms have inherent limitations as a result of distortion and differential magnification of the craniofacial complex. This may lead to errors of identification and reduced measurement accuracy. The introduction of maxillofacial Cone Beam (CBCT) has made 3D imaging more readily available for dental applications.
Methods: A low-dose CBCT machine was used to acquire the radiographic images in this study of the ten-point 3D cephalometry method. The image quality of CBCT compares favorably to that of multi-slice CT, as it has minimum image noise and a maximum signal-to-noise ratio. 130 patients were selected randomly for the study. They ranged in age from 8 to 42 years; there were 80 females and 50 males. Each patient had already had lateral and posteroanterior cephalograms taken less than 6 months earlier. The cephalometric analysis was performed by three operators repeating the measurements twice (15 days apart) with a calibration meeting. The positions of the maxilla and mandible in 3D space were determined using low-dose CBCT by assigning three reference planes to obtain the (x, y, z) position of each point of the skull relative to point S with coordinates (0, 0, 0), which was automatically determined by the computer as the intersection of the reference planes. The position of the jaws in 3D space was determined by assigning 18 easily identified, repeatable cephalometric point. By analyzing the relationships among the surfaces created and the angular and linear evaluations based on reported criteria, the program automatically detects the expansion of the jaws with very high precision, facial asymmetry in the three spatial planes, the skeletal class, and the anterior vertical dimension.
Results: Statistically significant differences were found between angular and linear measurements taken with conventional radiographs and those taken with CBCT (p<0.01).
Conclusions: Three-dimensional imaging provides information and images of craniofacial structures free from perspective distortion, with none of the magnification or superimposition associated with 2D images. The 3D cephalometric analysis is easier to interpret than 2D cephalometric analysis (interpolation of cephalometric values on different projections) because it allows movement from a purely mathematical interpretation (evaluation of angles and linear measurements) to a graphical interpretation, with verification of the results using mathematical values

(volumetric). Another aid to the clinician is the repeatability and reproducibility of this method, which reduces human error in cephalometric analysis. This method saves time and increases precision, offering a valuable aid to orthodontic diagnosis. This preliminary study expands the landscape of diagnostic methods, allowing for more extensive studies to confirm the clinical effectiveness and validation of the 18-point 3D cephalometric analysis. The value of a 3D image model directly corresponds to the quality of the information, the accurate anatomic data derived, and its collection in a 3D anatomic database. Used appropriately, 3D cephalometrics allows clinicians to analyze, diagnose, plan, and communicate. Treatment changes can then be recommended based on a patient's individual preference within his or her biologic, physiologic, and anatomic limits.

Technical validation of a new 3D stereophotogrammetry system

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Aim: The measurements obtained with stereophotogrammetry 3D systems are sufficiently accurate for clinical use and research in the field of dysmorphoses and for orthodontic and/or surgical diagnosis and planning. One of the problems you may encounter using this technique is to find a correct position of the head allowing proper detection of data and that it is easily repeatable. The aim of the study is to evaluate the reproducibility and accuracy of Face Shape 3D Maxi Line photogrammetric scanner developed by Polishape Srl and investigate the influence of head position in a three-dimensional sterephotogrammetry system.
Methods: The scanner includes 6 high definition reflex cameras (Canon EOS) mounted on a rigid support placed at a distance of one metre from the subject to be photographed, and connected to a computer for remote control of the system and storing scanned images. A mannequin was selected as "model" for validation in vitro. The mannequin was positioned on a stand with a graduated scale, in order to record the angular value of rotation of the head. Subsequently different anthropometric points were plotted on the mannequin with an eyeliner: Glabella (Gb), Nasion (N), Pronasle (Prn), Subnasale (Sn), Labiale superius (Ls), Labiale inferius (Li), Sublabiale (Sl), Pogonion (Pg), Frontotemporalis (Ft r/l), Zygion (Zy r/l), Tragion (Tr r/l), Gonion (Gn r/l), Cheek (Ch r/l), Cheilion (Chel r/l), Orbitale inferius (Or inf r/l). The dummy was subjected to stereophotogrammetry with the following degrees of rotation of the head to the left (rotation along z axis): - ten shots with the manikin's head not rotate (0 degrees); - one shot for each of the following rotation degrees: 1, 2, 3, 4, 5, 8, 12, 16. All the 3D images were processed and analyzed by Viewbox®, a 3D management software able to develop a custom template by typing the anthropometric points corresponding to those chosen for the analysis of our interest. On each image the anthropometric points described before were typed by the same operator in order to eliminate inter-operator error. The software allows to calculate three-dimensional coordinates (x, y, z) and so obtain 14 measurements of distance on each three-dimensional reconstruction: Chel-Chel, N-Prn, Sn-Pg, Glab-Chr, Glab-Chl, Glab-Ftr, Glab-Ftl, Zyr-Trr, Zyl-Trl, Chr-Trr, Chl-Trl, Chr-Gnr, Chl-Gnl). The measures were compared with the real measurements taken with a electronic calipers. For each distance the differences were analyzed in terms of average, standard deviation, standard error and coefficient of variation, in order to assess the possible influence of rotation on linear measurements of distances between points.
Results: The first data reveals a high correlation between real measurements and those detected by the machine with differences always inferior to system error (0,425 mm) and the presence of greater precision in frontal and nose areas. Even the variations observed between shots made at different angular values are mostly below the system error.
Conclusions: This study allows to validate the reliability of this stereophotogrammetric system. Horizontal rotation of the face does not seem to affect most of the measurements. Additional data and statistical analysis are required, also to analyze head movements in the other two planes of the space.

Rhinomanometric evaluation of patients with maxillary contraction treated with rapid maxillary expansion. A prospective pilot study

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Aim: The aim of this prospective study was to evaluate, through rhinomanometry, the changes of the upper nasal airway before and after rapid palatal expansion.
Methods: Were collected 34 Caucasian children aged 7-11 years, in need of RME trearment, mixed dentition,

with uni- or bi-lateral posterior crossbite involving at least deciduous canines and permanent first molars. Of the selected subjects, 30 were enrolled in the study because 3 dind't show up after initial records and 1 had the RME removed prematurely. Of these 30 patients, 12 were males and 18 females (mean age 8.7 years with a standard deviation of 0.9). They were enrolled in the prospective study and submitted to orthodontic, ear, nose and throat examinations. A specialist did the rhinomanometric examination before (T0) and after rapid palatal expansion (T1). For this analysis Atmos Rhinomanometer 300® and a facemask were used. The rate of airflow and the pressure gradient between nasopharynx and nostrils were measured. Nasal resistance was recorded in Pa/cm 3 /s on the right and the left nostril. Measurements of both sided were then combined. Rapid maxillary expansion was realized by a Hyrax-type rapid expander with a palatinal split screw, cemented on first permanent molars. The activation protocol provided 2 activation a day for the first 2 weeks, then 1 activation a day until the upper molar palatal cusps were in contact with the lower molar buccal cusps. The differences in nasal resistance between T0 and T1 were statistically evaluated with the Paired Samples 't' Test to assess the significance of T0-T1 and with Kolmogorov-Smirnov test and Levene test to check homogeneity and normal distribution.
Results: Total nasal inspiration and expiration resistance significantly decreased at T1 ($p<0.001$). The reduction ranged between 0. 23 and 0. 66 Pa/cm3/s for inspiration and between 0. 20 and 0,.58 Pa/cm3/s for expiration. A statistically significant positive correlation existed between the T1-T0 differences in expiration nasal airway resistance (Spearman's correlation coefficient rho = 0.38; p = 0.03).
Conclusions: Nasal resistance can be improved by rapid maxillary exspansion in patients with minor or moderate breathing problems caused by the presence of nasal obstruction. Despite this the maxillary exspansion cannot replace medical or surgical treatment when needed.

The importance of the evaluation of available space in the jaws as a variable that can be modified by treatment for the solution of cases of space deficiency or eccess

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Aim: The aim of this work is to provide a critical view of space analysis, that is traditionally focused on the measurement of the mesio-distal diameter of teeth. However, in most cases, mesio-distal dental diameter is normal (see reference tables) and the etiology of space-related problems has to be ascribed to the amount of available space in the jaws, that can be in excess, clinically appearing with the presence of diastemata, or in deficiency, clinically appearing with crowding.
Methods: Presentation of clinical cases of crowding or presence of diastemata for space excess solved by the modification of the lenght of osseous basis (palatal expansion, osseous distraction, median ostectomy) and rewiew of literature to point out the more significative indexes that must be included in the space analysis to evaluate the amount of available space.
Results: In cases of severe crowding, orthodontic and surgical combined methods represent a valid alternative to extractions in order to correct the problem at the origin of the dento-basal disorder, that is a transversal deficit of basal bone. this therapy can lead to excellent esthetic outcomes, emproving the facial profile. extraction therapy, in contrary, results in a flattening of the profile and biretrusion. Osseous distraction provides new bone generation by an osteotomy and a gradual separation of the two bone surfaces, stimulating the natural biological tissue reparation processes. This technique can be applied both to the maxilla and mandible. In the upper jaw distraction force is applied to the palatal suture (rapid palatal expansion or scheletal anchorage devices) and in the mandible to the simphysis. Vice versa, in cases of severe space eccess and presence of diastemata, mandibular or maxillary median ostectomy, reverse palatal distraction for the maxilla in growing patients for the treatment of scissor bite in patients affected by Brodie's syndrome represent a valid treatment option.
Conclusions: In conclusion it is recommended to evaluate the severity and etiology of crowding or presence of diastemata during the procedure of space analysis and take in consideration orthodontic and surgical combined methods in cases of severe lack or eccess of available space to obtain satisfying esthetic and functional results.

Relationship between periodontal biotype and dental malocclusion: a longitudinal cohort study

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Aim: In clinical practice, a proper diagnosis of the periodontal biotype is considered important with respect to the decision-making. Periodontal biotype and the gingival thickness is considered as an important factor, which affects the success of periodontal and orthodontic treatment results. Long-term studies that evaluated the association between the gingival recession and orthodontic treatment were concluded that gingival recession was more frequent in individuals who have been treated orthodontically and mandibular incisors were more prone to gingival recession than the other teeth. The aim of this study was to assess the prevalence of the gingival biotypes in a group of patients and to evaluate if the gingival biotypes were related with the different types of Angle's classification of malocclusion.
Methods: This a longitudinal cohort study was conducted on 74 patients (35 males, 38 females, mean age 14.7 years old). Gingival thickness was assessed clinically, on each patient by a single calibrated examiner. Intra- examiner agreement was verified by calculating Cohen's k coefficient. The kappa coefficients were calculated for the measurements obtained at each different examination. Gingival biotypes were assessed with the evaluation on the translucence of a periodontal probe through the gingival margin of the tooth during the probing, at the mid facial aspect of both maxillary central, lateral incisors and canine on each patient, Angle's classification of malocclusion was also recorded. Dental occlusion was clinically assessed using Angle's classification of malocclusion. In order to assess the association between gender, gingival biotype and Angle's classification of malocclusion (categorical variables) χ^2 (Chi square) test was used. For continuous variables, Student's t-test was performed in order to compare male and female subjects and, therefore, thin and thick gingival biotype.
Results: The prevalence in the whole sample of thin gingival biotype was 42.3% and thick gingival biotype was 52.4%. The frequency of female gender with thin gingival biotype was significantly less respect to male patients (41.2% and 52.4%, respectively) while the frequency of thick gingival biotype was higher in the female respect to male patients (54.5% and 46.3%, respectively) ($\chi 2=1.337$, $p=0.245$). The mean age of patients with thin gingival type (14.6 ± 0.5 years) was statistically, but not clinically, significantly higher respect to the patients with thick gingival type (14.1 ± 0.7 years), $p=0.026$. There was not a significant association between type of malocclusion and gingival biotype ($p=0.143$) and there was a prevalence of thick gingival biotype in patient with class II malocclusion and a slight prevalence of thin gingival biotype in patient with class I malocclusion.
Conclusion: Patient age, health status of periodontal tissues, duration of treatment, the amount and type of tooth movement, the width of keratinized gingiva and gingival thickness are considered risk factors of gingival recession that can be seen especially in mandibular incisors area depending on orthodontic treatment. The present longitudinal cohort study showed that that female subjects presented a higher prevalence of thin gingival biotype respect to male subjects and that no relationship was found between gingival biotypes and malocclusion, based on Angle's classification. Further studies are needed, in a large scale, to confirm this important relationship between gingival biotype, skeletal profile and facial type.

Asymmetric molars' mesial rotation and mesialization in unilateral functional posterior crossbite and implications for interceptive treatment in the mixed dentition

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Aim: Symmetric transverse expansion is the main outcome of the early treatment in subjects with unilateral functional posterior crossbite. The aim of this study was to analyse mesial rotation and mesialization of upper first molars as sagittal parameters to be corrected in the treatment of these patients during the mixed dentition.
Methods: Digital dental cast measurements (rotation and mesialization) were performed in a sample of 48 subjects with unilateral posterior crossbite (UPXB; 19 males and 29 females, mean age 10.2 ± 1.2 years) and in a control group of 35 subjects with normal Class I occlusion (17 males and 18 females, mean age 9.9 ± 1.3 years). An independent sample t-test, the Mann–Whitney test, Fisher's exact test, and Pearson correlation were used for statistical comparison.
Results: The amount of upper molar rotation was signi-

ficantly greater in the experimental group when compared with the control group. A clinically significant 'upper molar rotation' (UMR) was present in 66.7 per cent of the subjects with UPXB versus 5.7 per cent of the control group. The UMR group presented also a significant mesialization of upper first molars when compared with the control group. In the experimental group, there was a significant difference between rotation and mesialization in the right and left side and a correlation has been found between these two variables and the amount of Class II molar relationship at the crossbite side. Limitations: This is an epidemiological case–control study and the discussed effects of an early correction of the asymmetric upper molars' migration are only speculations based on an association relationship.
Conclusions: The findings of this study show an asymmetric upper first molars' migration (rotation and mesialization) in unilateral functional posterior crossbite versus a control group. An early evaluation and correction of the molars' migration during the mixed dentition should be considered in order to obtain a correct inter-occlusal sagittal molar relationship, space for an adequate eruption of permanent teeth, and perhaps reduce the need of a following fixed appliance treatment in the permanent dentition.

Evaluation of non-extraction orthodontic treatment effects on the periodontal structure by digital and cephalometric analysis

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Aim: In accordance with Muhlemann and Zander during the initial phase of the tooth movement there is a new positioning of periodontal fibers to support the tensile forces. The periodontal system, during normal masticatory cicles, is subjected to hard and intermitted forces in the range of 2 - 50 kg. According to the priciples of hydrodynamics forces, the fluids inside the periodontal ligament do not leak, allowing the cushioning action, that they convert compression forces in trophic stimulation for bone architecture. The orthodontic forces must be able to induce a direct reabsorption in the bone. The aim of this research is to evaluate the periodontal changes after non-extraction orthodontic treatment by digital and cephalometric analysis.
Methods: In this study we are analyzed 22 patients (7 males, 15 females) with a 12,3 years mean age, all treated with non-extraction orthodontic treatment. Using intraoral scanner (Trios 3 ® shape) and cephalometric analysis it was possible to evaluate the following parameters: i) evaluation of incisal edge displacement in the sagittal and vertical plane; ii) variation of vestibular gingiva after treatment; iii) distance between incisal edge of upper central incisor and perpedicular line to the Frankfurt plane trough SNA point; iv) angle between incisive axis and Palatal plane (IncSup^PP); v) distance between Prostion and Palatal plane. These data were analyzed in inizial orthodontic treatment (T0) and after orthodontic treatment (T1). The initial and final models are superimposed by "n point" method. The landmarks used are nasopalatin papilla and palatine premaxillari wrinkles, consequently the dentals intercuspidation guaranteed the correct localizzation of mandible bone.
Results: The data showed on the lower central left incisor: a) vestibular displacement of incisal edge of 2,7 mm and apical displacement of incisal edge of 0,99 mm; b) variation of gingiva in vertical plane of 2,7 mm; c) displacement of free gingival edge of 0,04 mm; d) coronal displacement of incisal edge of 1 mm; e) mean esoinclination of 1,3°. On the upper central left incisor: a) apical displacement of 0,51 mm; b) mean esoinclination of 4,38°. Using Spearman correlation we showed an increased statistical significance between sagittal displacement of incisal edge and esoinclination of lower central left incisor, and between vertical displacement of incisal edge and vertical displacement of maxilla bone.
Conclusions: Using digital analysis we identified the relationship of periodontal fibers changes after dental displacement on the vertical, sagittal and trasversal planes. We confirmed the no-relation between vestibular displacemnt and incisal edge position. Instead the vestibular gingiva is modified after orthodontic treatment more than estrusion movement. The modifications on the lower central left incisor are: vestibularization and increased on the vertical plane of dental crown, thickening of vestibular gingiva and no-variation of free gingival edge. The modification on the upper central left incisor are: esoinclination end relative intrusion of dental crown, vertical increase of the whole tooth.

Smiling to OSAS: the role of interdisciplinarity

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Aim: Too often the obstructive sleep apnea syndro-

me (OSAS) is not taken sufficiently into account, although it's a disease which affects about 6% of the population. The aim of this study is to highlight the importance of having a team of specialists, which includes a dentist, an otorhinolaryngologist, a nephrologist, a neurologist, a pulmonologist and a nutritionist, working synergistically to treat this disease. Furthermore this study aims to demonstrate how this condition should not be underestimated and indeed requires early intervention, since its effects are reflected on everyday life: going from the risk of accidents caused by somnolence to clinical consequences which can bring to cardiovascular, cerebrovascular and nephrological problems.
Methods: Why involve nephrologist? Apneas in obese, or even just overweight patients, don't allow an adequate oxygenation of their entire organism. The first organs to be affected are the ones which are usually the most perfused such as kidneys, and in the long term episodes of renal ischemia may occur. It has been shown that after such ischemic injuries these patients may become affected by hypertension, resulting in a concrete risk of stroke. Why involve nutritionist? The role of the nutritionist is to keep under control hypertension and proteinuria (resulting from kidney damage) by educating them about correct dietary habits. Why involve pulmonologist? The pulmonologist is often the first specialist to be interviewed by the patient suffering from sleep apnea. He prescribes to the patient the polysomnography, a diagnostic test that records the progress and changes of some physiological parameters during REM and NON-REM sleep in individuals with suspected sleep disorders. CPAP (Continuous Positive Airway Pressure) are given to people who have major problems that don't allowed them to breath spontaneously. Why involve otorhinolaryngologist? This figure can improve the quality of these patients' sleep through interventions of functional nasal surgery such as septoplasty and the reduction of the inferior turbinate. In addition, after performing a polysomnography and having received the data, he can request a Sleep Endoscopy that can be used to identify the type of intervention which could be more effective against the specific cause each patient's sleep apnea. Why involve dentist? During the session of Sleep Endoscopy MADs (Mandibular Advancement Devices), made by the dentist after a careful examination, are applied to see if they can work for that specific patient. In case of a positive effect these devices could be a valid alternative to CPAP (which is more bulky and presents more side effects such as claustrophobia, aerophagy and earache). Furthermore, the compliance of patients using MADs turns out to be higher than that of patients using CPAP (65%).
Results: The main result that this study aims to achieve is an interdisciplinary approach to this disease. This is essential, not only for systemic health correlations, but also to prevent the patient from feeling abandoned by making him able to rely on the most experienced specialists in the field which can help him solve this problem.
Conclusion: After explaining what risks and complications a patient suffering from sleep apnea can undergo to, the aim is that of taking care of the patient in Day Hospital so to perform in a single day: Holter monitoring, sleep endoscopy, dental exam, neurological exam, pneumological exam and visit by the nutritionist.

Effectiveness of orthodontic treatment with headgear in the Class II malocclusion: a systematic review and meta-analysis

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Aim: The aim of this systematic review and meta-analysis was to evaluate the skeletal and dental effects of headgear treatment on growing Class II patients using published RCTs and CCTs in order to achieve the highest quality of evidence on this topic.
Methods: This systematic review and meta-analysis was conducted according to the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions (version 5.1.0) and is reported according to the PRISMA statement. A survey of articles published up to June 2016 about the effects of headgear for the treatment of Class II malocclusion was performed using nineteen electronic databases. Only randomized clinical trials and prospective controlled clinical trials investigating Class II malocclusion growing patients treated with headgear were included. Two authors accomplished independently study selection, data extraction, and risk of bias assessment. All pooled analyses of data were based on random-effects models. Statistical heterogeneity was evaluated.
Results: In total, 5 studies were included (3 randomized clinical trials, 2 prospective controlled clinical trials) that collected data from 318 patients (161 treated, 157 untreated controls). The ages of the patients varied across the studies but the majority of the trials had a sample with an age range between 8 and 9 years. The times of daily wear of the appliance varied across studies from 8 to 14 hours per day. The mean differences in treatment effect of headgear, relative to the untreated controls, were -1.35°

per year (95% CI, -2.14° to -0.57°) for SNA angle, -0.59 mm per year (95% CI, -0.86 mm to -0.32 mm) for anterior maxillary displacement, - 1.41° per year (95% CI, -2.09° to -0.73°) for ANB angle, and - 1.38 mm per year (95% CI, -2.67 mm to -0.10 mm) for overjet. However, the treated group showed no statistically significant changes for the following parameters: SNB angle - 0.19° per year (95% CI, -0.46° to 0.08°); overbite - 0.14 mm per year (95% CI, -0.54 mm to 0.25 mm); palatal plane rotation 0.92° per year (95% CI, -1.37° to -3.21°).
Conclusion: Headgear therapy in growing subjects with Class II malocclusion with a marked maxillary prognathism is effective in the short term. Moreover, early treatment with traction allows a significant reduction of overjet and consequently reduces the risk of dental trauma in the growing patients.

Smile to Wiskott-Aldrich syndrome: oral and orthodontic manifestations

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Aim: The oral cavity is an anatomical structure characterized by the juxtaposition of soft and hard tissues and which is continuously subject to challenge by the external environment and foreign material. Diseases and disorders caused by oral microorganisms are very common, in particular dental caries, periodontitis and halitosis. Oral diseases can be secondary to systemic pathologies, such as Wiskott-Aldrich syndrome, a rare X-linked primary immunodeficiency. Despite progress in its diagnosis and treatment, its prognosis remains poor. The aim of this study is to find possible common oral and, more specifically orthodontic manifestations among individuals with Wiskott-Aldrich syndrome, in order to establish precautions that help to improve patient's quality of life, particularly related to dental aspects.
Methods: Eighteen patients (18 males, mean age 11 ±1 years) with Wiskott-Aldrich syndrome were recruited between 2010 and 2015 from referrals to the Immunoematology Department at San Raffaele Hospital, Scientific Institute, Milan, Italy. Routine diagnostic records were obtained. Statistical analyses using the sign test were performed. For all these patients were conducted the following exams: laboratory tests, microbiological evaluation, hematological and immunological evaluation, brain MRI, brain TC, orthopantomografy and hand – wrist radiografy in order to evaluate the effect of Wiskott-Aldrich syndrome on growth and an oral examination.
Results: Medical signs and symptoms such as recurrent infections, eczema, bleeding, thrombocytopenia, anemia, petechiae, ecchymosis, hemorrhagic diathesis, major bleeding were usually observed. Oral examination revealed gingivitis, periodontitis, aphthous lesions, gingival bleeding, oral petechiae and severe oral infections (caries, pulpitis, abscesses). As regards the othodontic aspect, an higher incidence of alterations in the physiological eruptive sequence, with more inclusions and transpositions, was observed, probably due to untreated inflammatory and infectious processes. Infective processes affecting the permanent tooth may also result in malocclusion, that could possibly represent the cause of future skeletal problems. Moreover Wiskott-Aldrich syndrome could compromise and interfere with the orthodontic treatment which has the purpose of aligning teeth and solving skeletal issues.
Conclusions: Since Wiskott-Aldrich syndrome presents a wide spectrum of symptoms and complications, it is mandatory to increase awareness of this entity and to apply a multidisciplinary approach that should include the dentist, in order to intercept pathologies of the oral cavity and to improve patients' quality of life.

Dental-skeletal effects of the treatment with aligners in adult

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Aim: The aim of the present study is to evaluate the craniofacial modifications on vertical plane with invisible aligners. The use of this device in adults is a topic both for general dentist or specialist. The invisible aligners treatment was about 8 months. Authors of the present paper evaluated the dental-skeletal effects pairing the results with adult patients treated with fixed appliance.
Methods: In this study 18 patients at the end of growth (cervical vertebral maturation stage VI), orthodontically treated at the Dental Clinic of the University of Foggia, were considered. 9 patients were treated with

CAT method (Clear Aligner Treatment) and 9 with standard biomechanics. Patients treated with aligners wore the device for 18 months while those treated with standard biomechanics for 24 months. Cephalograms at the start of the treatment (T0) and at the end of the treatment (T1) were performed; SN-PM (cranial angle between the anterior cranial basis and the mandibular plan), Plan I (angle between the perpendicular to the anterior cranial base and the bi-spinal plan), PP-AM (angle between the bi-spinal plan and the mandibular plan), PF-1 (upper central incisor incisal edge to the perpendicular at the Frankfurt plan) were evaluated. All the values obtained were processed by GraphPad InStat® statistical software; for each index considered these values were considered: arithmetic mean, standard deviation, average statistical difference, P-value and pairing mean test.

Results: The data obtained by the statistical analysis have been considered among the two groups of subjects. Considering the difference of the average statistics the test group showed an increase of mandibular divergence (SN-PM) of 3°, while the control group of -0.2°. In the evaluation of the Plan I the difference of the average statistics in the test group was -4.8°, -1.1° in the control group. PP-PM: the difference of the average statistics in the test group was 0.2°, -0.1 ° in the control group. PF-1: the value obtained in the test group was 1.4 mm versus - 2.4 mm in the control group.

Conclusion: The research evidenced that invisible aligners treatment generated a post-rotation on dental-skeletal complex respect to the patients treated with the fixed appliance. In patients treated with CAT method it has been possible to observe an increase in the vertical dimension of the lower third of the face but also an increased gummy exposure. Within the limits of this work we can observe that the aligners determine major skeletal changes compared to the classical biomechanics.

Product analysis of the main stabilometric and baropodometric platforms used in dental practice currently on market

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Aim: Nowadays there are more and more studies highlighting the relationship between the stomatognathic system and the tonic postural system. In fact, in addition to the well-known functions of mastication, deglutition, phonation and respiration, the stomatognathic system seems to play a role in maintaining body balance. Alongside the visual, vestibular and podalic systems, the stomatognathic system provides input to the tonic postural system, which controls and manages the three-dimensional positioning of the body in its surrounding space. Taking the above into consideration, it is useful for a clinician who is attempting to understand a dysfunctional patient to adopt a global perspective that synthesises interdisciplinary medical elements by taking into account the way in which the stomatognathic system interacts with the tonic postural system. To this end, the 2011 ministerial guidelines report that a dysfunctional patient who also presents postural problems should be administered the following for diagnostic purposes: a postural examination, the detection of anthropometric data, an analysis of the overall joint mobility, the examination on the stabilometric platform, an electromyography and a mandibular kinesiography. These assessment measures provide stabilometric data by assessing the quality and quantity of the oscillations of the center of pressure (CoP) and posturometric informations by identifying the soil projection of postural load. The following work performs a product analysis of the main stabilometric and baropodometric platforms currently available on the market in order to help the clinician to choose the best instrument.

Methods: The product research we conducted for this study examined the technical details provided on the website of the manufacturer for each stabilometric and baropodometric platform commonly used in dentistry. These instruments are considered to be a valid diagnostic aid, drawing on a global, interdisciplinary perspective that allows the integration of orthognatodontic clinical data with instrumental information about posture and balance.

Results and Conclusions: Data obtained from the results of this research are used to create a table containing technical and functional characteristics of each platform. Technical characteristics such as size, thickness, weight, power and connection technologies adumbrate for a potential buyer the design and the workability of the instrument so that he can decide whether the instrument is compatible or not with the space and the technologies present in his office. The functional information concerns the number of load cells, the kind of sensors and the static and dynamic types of analysis performed by the software of each platform in order to provide a potential buyer with data that is more useful for clinical practice.

The role of dental hygienist and oral hygene motivation on the gingival health of patients undergoing orthodontic treatment with multibracket fixed appliance and clear aligners

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Aim: The maintenance of adequate gingival health has always been a crucial issue for orthodontic patients. The aim of the current study was to compare the effectiveness of oral hygiene motivation and professional oral hygiene on the gingival health of adult patients undergoing orthodontic treatment with multibracket fixed appliances and clear aligners.
Methods: The sample comprised 36 ongoing orthodontic patients (24 females; 12 males, mean age 24.4±7.6 years) recruited at the Section of Orthodontics and Temporomandibular Disorders of the University of Naples Federico II (Italy), with full permanent dentition and without periodontal disease. Seventeen subjects (mean age 21.9±5.3 years) were undergoing multibracket fixed orthodontic therapy (Fixed Group – F), while 19 subjects (mean age 26.7±8.7 years) were in treatment with clear aligners (Clear Aligners Group – CA). At the baseline (T0) the patients were submitted to an evaluation of Full-Mouth Bleeding Score and Full-Mouth Plaque Score. Subsequently, the patients underwent a professional oral hygiene, along with periodontal scaling for removing of supra- and subgingival bacterial plaque/biofilm and calculus. Finally, all the patients were instructed for individualized tooth-brushing technique. Every two weeks, the subjects were re-called for reinforcement of the instructions of the daily oral hygiene. After 2 months (T1), Full-Mouth Bleeding Score and Full-Mouth Plaque Score were re-evaluated. The intra-group comparisons (T1 vs. T0) were calculated with a paired sample t-test. The comparisons between groups (F vs. CA) were performed with an independent sample t-test. The significant level was set at $p<0.05$.
Results: The intra-group comparisons showed statistically significant differences for all the variables examined, except for the bleeding score of the group wearing multibracket fixed appliance ($p=0.085$). On the other hand, the between-groups comparisons revealed statistically significant differences for the plaque score (F: -65.02 ± 15.4 vs. CA: -46.37 ± 19.0; $p<0.005$) and for the bleeding score (F: -7.68 ± 16.0 vs. CA: -23.87 ± 13.7; $p<0.005$).
Conclusions: The plaque and the bleeding scores decreased during the study period in both groups (F vs. CA). The current findings support the implementation of motivational technique, individualized tooth-brushing technique and the intervention of a professional oral hygienist during the orthodontic treatment for the improvement of gingival health in patients with both fixed orthodontics and clear aligners, in a two months of follow-up.

Missing lateral maxillary incisors: approach and treatment with a mini-screw anchored apparatus

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Aim: Missing lateral maxillary incisors is a common tooth anomaly associated to therapeutic set of problems; the management of these clinical cases often requires an integrated orthodontic and restorative approach.
Methods: Authors reported a therapy note referred to a patient of 14 years old, man, affected by missing maxillary lateral incisors, bilateral dental second class e deep bite, treated at the Department of Orthodontics of the University of Messina. An orthodontic treatment has been planned with the aim of distalize maxillary first molars and the space recovery necessary for the prosthetic restoration of missing lateral incisor. For the distalization of maxillary molars has been used a Distal Jet supported by mini screw. After seven months of treatment with distal screw maxillary molar distalization has been completed, obtaining a bilateral molar first class. A multi-bracket orthodontic appliance was bonded in the upper and lower arch using Enpower Brackets, to finalize the occlusion.
Results: Class II molar relationship has been over-corrected to Class I in about seven months. The orientation of the force vector resulted in a distal tipping and rotation of the first molars, without significant vertical changes.
Conclusions: Mini screw anchored Distal Jet seems to be effective in molar distalization without any type of side effects. The advantages of this device are the absence of patient compliance, relatively predictable outcomes, favorable aesthetics, possibility of different activations in each side.

Treatment of ectopic eruption of permanent maxillary first molar: case reports

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Aim: To present a new approach for patients with ectopically erupting first permanent molars (EEM), with undermining reabsorption of second primary molars.
Methods: EEM has a prevalence of 2.5% among patients eligible for orthodontic therapy. It occurs 20 times more frequently in maxillary first molars than

for mandibular first molars. Frequently, in 2/3rds of cases, after the reabsorption of the distal root surface of the second primary molar, the permanent molar is able to erupt into a normal position, with self-correction of the problem. In the remaining cases, the first molar is blocked by the second primary molar and remains in an ectopic position, until orthodontic treatment or premature exfoliation of the primary tooth occurs. This eruption's abnormality is associated with severe crowding and posterior interarch transverse discrepancies. It is commonly treated with removable plates with distal screws or separating ligatures. In this clinical report two EEM cases are presented, treated with a special design Quadhelix, fixed on a resin splint cemented on the primary molars. The first patient is 7.7 years old male. He shows a severe crowding with mild class III tendency. EEM is detectable on the left side. The appliance was worn for 15 weeks, until the correction of the eruption of 2.6 was obtained. The second patient is 8.6 years old female, she presents a severe crowding with posterior transverse deficiency and a open bite tendency. EEM is detectable on the right side. The appliance was worn for 8 months to allow arch expansion and a correct eruption path of 1.6.
Results: Both patients treated with this special design Quadhelix showed a good correction of the EEM. Further orthodontic treatment is needed
Conclusions: The special design Quadhelix presented is an effective alternative to correct ectopic eruption of permanent maxillary first molar, and it obtained good results, being independent by the compliance of the patient.

Split mouth analysis of gingival crevicular fluid during orthodontic treatment with Invisalign® aligners

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Aim: The aim of this study is to analyze gingival crevicular fluid changes in human subjects undergoing orthodontic treatment with Invisalign aligners.
Methods: 10 consecutive healthy adult patients, matched for sex and age, were selected to undergo treatment with Invisalign aligners. For each of them 2 teeth were selected: an upper second molar on which distalization was applied from the first aligner and a frontal tooth on which no force was applied for at least 4 aligners. Plaque Index, Gingival Index and Bleeding on Probing scores were recorded on test and control teeth at baseline and after any sampling stage, in order to identify any possible alteration of crevicular fluid due to increase in bacteria concentration. Gingival crevicular fluid sampling was executed in the mesial and distal sides of the considered teeth. Gingival crevicular fluid was taken through the application of PerioPaper Strips (Oraflow NY) for 30 seconds at 1mm depth. Sampling was carried out before force application (T0), after one hour (T1), one week (T2) and 3 weeks (T3) from the beginning of the treatment. Quantitative analysis was obtained through an electronic analyzer (Periotron 8000, Oraflow NY). Strips were then placed in a buffered solution of NaCl, stored at -80 C° and analyzed by ELISA test to measure IL-1β, RANKL, TGF β, osteogenin and osteoprotegerin concentration.
Results: No significant changes for Plaque Index, Gingival Index and Bleeding on Probing were recorded for test and control teeth in any stage of the study. Orthodontics forces produced tissue-degrading enzymes and inflammatory mediators, as well as an increase of flow rate occurred before the biochemical changes. The expression of the enzymes and mediators did change, with an increase in the molar group, indicating the efficiency of the force applied in order to obtain the distalization.
Conclusions: Results from this pilot study suggest the hypothesis that a different biochemical response doesn't occur in the gingival tissues of the two groups.

Down syndrome: proposal of a new orthodontic treatment need index according to patient's psychological evaluation

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Aim: Down Syndrome (DS) is a craniofacial syndrome caused by trisomy 21, the most common chromosomal abnormality associated with intellectual impairment. Craniofacial abnormalities include a

characteristic pattern of dysmorphic features. As reported by Andersson et al., dental malocclusion is very common among persons with DS and phenotypic characteristics are openbite, crossbite and Class III malocclusion. There is a reduction in the mastication and phonation which leads to increase difficulty in reaching autonomy and social integration. The main aim of orthodontic care for these patients is restore mastication, improving breathing and speech. The use of orthodontic treatment need index is important in order to provide specific care and treatment. In patients with DS a careful assessment of the psychological profile is important to programme the most appropriate treatment plan according to the patient's compliance and to evaluate any improvements over time. The aim of this study is to propose a new orthodontic treatment need index in patients with DS according to patient's compliance.
Methods: A questionnaire was created to evaluate cooperation of the individual, it was compiled by the clinician at the end of the first dental visit and then updated during the following sessions. It consists of three levels, each of which is assigned a score to assess the degree of collaboration. Each question of each level is assigned a score of 0 in case of a negative answer; in case of a positive answer the score is assigned according to the time required to carry out the procedure (minimum score of 1, maximum score of 3). Level I includes the steps of the first approach to the patient. Once you have completed Level I, a score is assigned by summing the various points associated to each question.
Level II includes procedures performed during the II orthodontic visit and less invasive dental procedures. Level III is intended to evaluate the cooperation of the patient in the short- and long-term recall.
Results: All the levels are then summed to evaluate the overall score. Score between 0 and 10: the patient with DS is uncooperative and incurable. This influences the specialist to choose the type of treatment. Score between 10 and 20: the patient is as a partial cooperator, treatable with simple therapies. The specialist can carry out professional hygiene procedures, fluoride applications, conservative treatments and insert simple orthodontic appliances. Score over 20: the best score desirable, the patient is cooperative and curable even with complex therapies.
Conclusion: The tests revealed that an adequate approach to patients with DS is necessary to rehabilitate them in a proper way; therefore, during the first visit, it would be better to have an empathetic attitude towards the patient, by using the method "tell-show-do" with particular attention to the psychological aspect and dialogue. The clinic should be as much as possible quiet, with few operators around and short visit time and the physician's voice tone should be calm and low. These individuals, indeed, as A. Rahim et al. reported, perceive dental treatment with exaggerated levels of apprehension.
For this reason, a proper understanding of the patient's psychology is essential in order to establish a good patient-physician relationship and to make dental sessions the least disruptive possible.

A blinded multi-centered study to analyse the correlations between cervical vertebrae maturation and tooth mineralization for pubertal skeletal growth spurt assessment

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Aim: The aim of the study was determining the possible correlations between the cervical vertebrae maturation method (CVM) and the mineralization of mandibular teeth (TMS) in a sample of the Mediterranean area. In the last decades several authors performed studies in order to obtain the most reliable method to determine the pubertal skeletal growth spurt (PGS) in adolescent. As widely descibred in literature, infact, the accuracy of PGS identification is fundamental to perform an efficient and effective orthopedic treatment.
Methods: A cross-sectional study was conducted in three orthodontic centers, two in Italy (Milan and Turin) and one in Greece (Thessaloniki). Two blinded operators analyzed pre-treatment panoramic (OPG) and lateral x-rays of 667 orthodontic patients (379 females, 288 males). TMS of mandibular left canine, first and second premolars and second molar were evaluated through the method described by Demirjian et al. The growth phase was assessed using the CVM method proposed by Baccetti et al. Statistical correlations and multiple regression analysis

for different predictors adjusted for covariates (sex and group) were performed by a blinded statistician. Post-hoc power analysis conducted after the study has been completed, and uses the obtained sample size and effect size to determine what the power was in the study; the post-hoc power was about 1.
Results: Significant correlations between CVM and TMS stages were identified for each tooth. Significant age differences resulted for CVM, second molar and second premolar ($p<0.05$). Among the female sample, significant correlations for second molar ($p<0.01$ – rho=0.853) were observed between TMS D and CVM I-II, TMS G and CVM III-IV, TMS H and CVM V-VI. Regarding males, significant correlations resulted for second molar ($p<0.01$, rho=0.813) between TMS D and CVM I-II, TMS G and CVM III, TMS H and CVM IV-V-VI.
Conclusions: The present study confirmed a relationship between CVM and Demirjian methods to assess pubertal growth spurt (PGS). Thus OPG could be suggested as a reliable method to identify PGS. The results obtained by this study confirmed that mandibular second molar is the best predictor for skeletal maturity and that stage G for both sexes indicates the ongoing of growth peak. Stage G for boys and stage H for girls correlate significantly with the late part of PGS. First premolar stage G for boys and stage F for girls are associated with PGS. However, first premolar is not recommended as a first choice indicator, due to the variability of data about it.

Multidisciplinary approach to a Class II hypodivergent growing patient

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Aim: The use of removable functional appliances in growing individuals with skeletal Class II growing pattern, has demonstrated to be effective for treatment of Class II malocclusion. These functional devices are commonly used to improve mandibular length in skeletal class II patients. This case report assesses skeletal and dento-alveolar effects of removable functional appliances in Class II malocclusion treatment in a pubertal patient. Indeed, regarding evidence on the efficiency of functional treatment, when a class II patient is treated during the pubertal growth spurt, more favorable skeletal response is seen, even though large individual remains responsiveness. This clinical case also shows how significant tooth size discrepancy (TSD) prevents to get an ideal occlusion at the end of orthodontic treatment. W.A. Bolton in 1958 suggested that mesio-distal width was an important factor of the occlusion and Bolton's ratio has been suggested as the seventh "key" for an ideal occlusion. Anterior Bolton discrepancy involved the six anterior teeth from left side canine to the right side. Anterior TSDs, showed a prevalence between 17% and 31% among orthodontic patients and were more common in Class II division 1 malocclusions and in Class III malocclusions. In this case Bolton discrepancy was solved through direct restorative treatment of the upper frontal teeth.
Methods: The patient started Orthodontic treatment at the age of 13 at the Dental Clinic of the Hospital of Padua. Timing to start the treatment with functional appliance has been established with hand wrist radiographic control. At the pubertal spurt the patient was treated with a removable Herbst appliance on acrylic splint for one year, to get a class II overcorrection. At the end of the first phase of treatment, a preadjusted MBT fixed appliances was used to finalize the occlusion. Leveling and aligning phase was performed with 0.16 NiTi and 0.19x0.25 NiTi. Intermaxillary short class II elastics were used since 0.16 NiTi arch for the control of molar class. Spaces closure was performed with 0.19x0.25 SS, maintaining spaces for reconstructions with passive coils between lateral incisors and canines. 0.19x0.25 multibraided was used for the finishing phase. At the end of the orthodontic treatment the patient underwent a restorative treatment. The restorative treatments have been performed according to a diagnostic wax, realized on the plaster models taken immediately after the orthodontic treatment. The size and shape of dental restorations have been based on the golden proportion, so the relation between central and lateral incisors was calculated in order to achieve the most desirable aesthetic result. The restorative treatment was performed using the adhesive technique. Thanks to restorations, the smile design had become much harmonious.
Results: At the end of the treatment the patient presented an ideal Class I occlusion, with a good canine guidance function and molar intercuspidation. Class II resolution was confirmed by cephalometric analysis and photographic reports, despite the patient maintained a retrusive pattern. The restorative treatment improved aesthetics and gave a harmonic shape to the teeth.
Conclusion: An accurate treatment planning and a multidisciplinary approach allow to get excellent aesthetic and functional results.

Correlated variation between the lateral and the middle basicranium and the face: a geometric morphometric longitudinal study

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Aim: Thanks to new geometric morphometric analysis, the role of the cranial base in the growth and development of facial bones is still a subject of study and investigation. There is literature that contains incongruous results in the degrees of correlation between the shape of the skull base and the development of the face. Some authors have speculated that the reason for this disagreement is a different relationship between the lateral skull base and the central one with the face. The aim of this longitudinal study is to analyze and compare the patterns of morphological variation between the face and the lateral cranial base with those between the face and the central skull base in subjects before and after the pubertal peak.
Methods: 47 male subjects were selected from the archives made available by the "American Association of Orthodontists Foundation" in particular those from the archive of the "Bolton-Brush study". The subjects' cephalometric x-rays were analyzed before the pubertal peak and at the end of growth. After being superimposed by means of the "Procrustes superimposition", the "Principal component analysis" was used to describe the changes in the two groups and the "partial least square analysis" has been used to study the correlation among the shapes of facial bones, the lateral and central skull base.
Results: In the subjects analyzed pre-pubertal peak the first two "singular axes" show statistically significant correlations between the central skull base and the face, while only the SAs-1 between the lateral portion and the face is significant. The variations of the base of the skull are strongly connected with the variations in the vertical growth of the face. No SAs between central portion of skull base and the face is statistically significant in the analysis at the end of growth. The SAs-1, however, remains statistically significant between lateral skull base and the face. This axis describes more than 60% of the coarctation between the two forms.
Conclusion: The study confirms the central role of the cranial base during the development of the face. The relationship between the morphology of the skull base and the face in children before pubertal peak is statistically and clinically significant. The study also confirms the need to distinguish between the growth patterns of the central portion of skull base and those of the lateral portion. The facial bones, despite also growing on the basis of "environmental" and "functional" stimuli, maintain a larger growth ratio with the lateral skull base than the one with the central portion.

JIA and ultrasound: evaluation of sample

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Aim: The purpose of this work is the evaluation of the effectiveness of the ultrasound examination for early diagnosis of pathological changes of temporomandibular joint. We analyzed the information obtained by ultrasound examinations in a sample of pediatric patients with juvenile rheumatoid arthritis. In this study we included 65 patients with juvenile idiopathic arthritis: 10 males and 55 females aged between 1 and 23 years with a mean age of 12.8 years and median of 13.1. The course of the disease from the diagnosis of JIA is between 0 and 20 years with a mean of 7.9 and median of 6.5. All patients were clinically examined: clinical examination included analysis of the face, intraoral examination and functional exam of temporomandibular joint.
Methods: All patients were subjected to ultrasound examination, with standardized technique, by 1 single operator. The operator who performed the ultrasound examinations is a doctor with a specialization in Radiology of the Radiology Unit - Pediatric Division Fondazione IRCCS Ca' Granda General Hospital. Ultrasound examination was carried out with standardized technique with the patient lying down. At least 2-3 oblique and axial scans were performed for each ATM right and left, having the articular bone heads as reference, in particular the mandibular condyle. The patients were examined with all the same equipment of ultrasound platform (branded GE model Logic E9) and high-frequency linear array transducer (12 to 18 MHz depending on the age of the patient).
Results: By Ultrasound examinations carried out, the interpretation of ultrasound images and the reading of the reports, we can summarize the following data. Analyzed the case histories of 70 ultrasound evaluations: 11 instrumental testing proves negative to any pathological changes (0 reports altered) (16% of the total); with an average age of 8.5 years (range 3-19.5) and with a mean of 4.7 years after the onset of AIG (range 0-10.5) - 21 instrumental tests show bilateral alterations (30%); - 31 instrumental tests unilateral alterations; - 7 instrumental tests show abnormalities not to the condylar structure. A balance between changes of condylar profile on the right and left sides can be observed: 36 and 37 cases

respectively. (51%, 53%).
Conclusion: Thanks to the analysis of the data, we can say that US examination can be considered a tool for diagnosing condylar structure's alterations ,especially in patients with AIG, despite it does not allow three-dimensional visualization of the whole structure. It is emphasized at the same time that ultrasounds represent easily repeatable tests without biological costs. It is also important to underline that the ultrasound examination is well-accepted by the patient and its parents as a diagnostic test. We conclude supporting the importance of as early as possible diagnosis in Orthodontics for all the patients ,particularly in patients with arthritis. Therefore we consider interesting in the future to keep an indication of ultrasounds as toll for study initial TMJ involvement: above all, we suggest US exams in small patients who increasingly are presenting at our Dental Clinic directed by the Hospital or other centers.

Etiology and treatment of white spot in patients undergoing orthodontic treatmeant by fixed bonding: state-of-the-art and demographic survey

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Aim: The purpose of the study is to perform an analysis collecting demographic data related to white spots formation and check the effectiveness of treatment with GC Tooth Mousse in a group of patients under fixed multi-bracket orthodontic treatment.

Methods: The study was performed at Department of Dentistry in San Raffaele Hospital (Milan) (Dean: Prof. Enrico F. Gherlone). All selected patients had to submit a questionnaire aimed to assess their knowledge about "correlation between orthodontic therapy and white spots". Data were obtained from 70 selected patients, all undergoing orthodontic treatment. The only inclusion criteria was the presence of orthodontic brackets on vestibular tooth face. All the questions who patients had to answer were enough easy to be understood by patients.
Then 60 patients were selected, divided randomly in 2 groups: group A patients were treated with GC Tooth Mousse and group B patients were treated with a placebo (T0). After one month (T1) was verified the result from the use of GC Tooth Mousse protocol.
Results: The aim of the survey was to compare the knowledge of patients about spots with demineralization. The questionnaire showed that the 56% of patients were aware of what white spots are, and that 21% develop at least on of this kind of lesions on the vestibular enamel surface of tooth. The majority of patients surveyed reported that they were satisfied with their smile and do not believe that white spots can affect the beauty of their smile. Then the efficacy of GC Tooth Mousse protocol was evaluated. In T0, there were no statistically significant differences in number ($p = 0.6359$) and average size ($p = 0.5475$) of White Spots between the group A and the group B. After one month (T1), statistically significant differences both in number ($p < 0.0001$) and size ($p < 0.001$) of white spots were observed between A and B groups.
Conclusion: White spots do not affect, according to the patient's point of view, the beauty of their smile. Data shows a serious lack of communication related to the problem of white spots from dentists to patients; from this situation results a general misinformation of the patients. Moreover, from our study we can have a first evidence of the effectiveness of GC Tooth Mousse in blocking the progression of tooth demineralization. There is also evidence of reduction of number and size of white spot on enamel surface. Finally recommend GC Tooth Mousse as prophylaxis or as a treatment in presence of demineralization and white spot lesions.