19th Annual Scientific Convention and 5th International Symposium of Iranian Association of Orthodontists

Future Orthodontics: Creativity, Art and Innovation
12-14 Jan 2022
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Guests of Honor
How to set-up an in-office clear aligner system

Rooz Khosravi

Clinical Assistant Professor of Orthodontics, University of Washington, USA

CAD/CAM driven aligner therapy has been around since 1997 pioneered by the Align technology. Aligner systems on the market have incrementally evolved in this over two decades toward more robust systems with advanced features. Significant enhancements in digital technology including increasing adoption of desktop plug & play 3D printers during the last 5 years introduced a shift in protocols to deliver orthodontic care using aligners. Implementation of an in-office aligner system is one of changes in orthodontic clinics opting to increase utilization of digital technology. Nonetheless, this trend is in its early adoption stage. Establishing an in-office aligner system requires optimizing multiple parts. These subsystems are 3D image acquisitions, digital treatment planning, dental models 3D printing, and aligner fabrication and delivery protocol. Scalability of an in-office aligner system directly correlates with how well these subsystems are linked and smoothly operates. One can argue that bringing aligner fabrication adds too much stress to a practice hence it makes more sense to use a third manufactured aligner system. In this talk, I will discuss a spectrum of approaches to implement an in-office aligner system at various degrees of integration. Additionally, I will review critical factors for each of the aforementioned subsystems to operate smoothly thereby allowing scalability of an in-office aligner system.
Use of clincheck software for interdisciplinary diagnosis and treatment planning

Shiva Khatami
Associate Professor, Nova Southeastern University, Fort Lauderdale, FL

This presentation reviews application of Clincheck software as a communication tool for diagnosis and treatment planning of interdisciplinary cases. Five interdisciplinary cases will be presented to demonstrate features of the software that assist in prediction of tooth movement. The table of tooth movement, Bolton Analysis, Overjet and Overbite, and Arch width are used for space management in preparation for restoration of missing teeth upon completion of orthodontic treatment. Using CBCT, clinicians can map the alveolar bone thickness and compare the initial and final crown and root positions in relation to periodontal support and plan for bone and/or soft tissue grafting prior to, or after, completing orthodontic treatment. Virtual planning helps clinicians and patients visualize the final position of teeth and communicate the need for adjunct procedures such as bone or soft tissue grafts, buildup of narrow teeth, or any compromises in the final occlusion or esthetics. This provides an opportunity to make informed decisions prior to commencing orthodontic treatment.
New concepts in orthognathic surgery

Dr. Nasser Nadjmi
MD, DDS, PhD, Professor and coordinating program director for OMFS at the University of Antwerp (UA), Belgium

In this presentation an attempt is made to introduce our latest clinical studies on hard and soft tissue changes after orthognathic surgery.

In the last two decades an enormous progress has been made to enhance the planning, predictability, performed technics and the achieved results in orthognathic surgery. The introduction of the 3D technology and digitally produced splints has significantly increased the precision of the planning and the predictability of the aimed results.

Additionally in our journey to excellence we have introduced novel technics to minimize the adverse effect on the esthetics and function of our orthognathic patient population. They will be discussed as follows:

1. The influence of our tissue redraping after Le Fort I type osteotomy.
2. Prevention of condylar torque in bilateral sagittal ramus osteotomy when using bicortical screw fixation
3. Surgical management of transversal deficiencies
4. New minimally invasive techniques
5. Orthodontic – Surgical management in cases with idiopathic root resorption
Multidisciplinary orthodontic treatment approach in adult patients

Niloufar Azami
DDS, MDS, Assistant Professor, Division of Orthodontics, Department of Craniofacial Sciences School of Dental Medicine University of Connecticut Health Center

The number of adult patients seeking orthodontic treatment has been increasing in the last decade. Treatment of adult patients often requires a multidisciplinary approach; the conventional orthodontic appliances are not efficient enough in treating the majority of adult patients due to the presence of multiple missing teeth, restorations, caries, and periodontal problems. Temporary anchorage devices (TADs) have expanded the boundaries of orthodontic tooth movement and increased the scope of orthodontic corrections. Molar intrusion, uprighting of the molars, posterior protraction, molar distalization, and anchorage reinforcement is possible by using TADs in adult patients. To achieve optimal esthetic outcomes and restore the occlusion and function, communication between different specialties including prosthodontists, oral surgeons, periodontists, etc., is essential. In addition, to address the esthetic concern of adult patients, clear aligners could be used to improve patient satisfaction with treatment. This presentation will discuss the key points in the multidisciplinary treatment planning of adult patients with indications and biomechanics of using TADs with fixed or clear aligner appliances.
Fixed functional therapy in Class II mandibular deficiency

Bahram Ghassemi
Certificate of Advanced Graduate Study in Orthodontics, Boston University Boston, MA U.S.A

Many clinical case describing the treatment of class II deep bite with mandibular deficiency will be presented. The appliances used were an inclined acrylic plane which is connected to maxillary molar bands via heavy gauge wire. Most of cases are in late mixed dentition with severe overbite and overjet. At the conclusion of treatments all cases will end up with class I occlusion and ideal overbite and overjet without any need for patient compliance. This treatment creates a significant facial improvement and excellent Naso-Labial angle.
Moving teeth with math: A step-by-step clinical showcase of patients treated with BRIUS®

Hessam Rahimi
DDS, DMSc, MBA, Diplomate, American Board of Orthodontics

BRIUS® technologies has developed a new orthodontic system that uses Finite Element Analysis (FEA) to design and manufacture a high precision device that is made of a series of NiTi cantilevers attached to an anchorage base on one end and to the teeth on the other. Each cantilever determines the final position of each tooth in 3 dimensions by moving the teeth on a direct path to the preplanned position. The technology introduces this method of clinically independent tooth movement as the third way of moving teeth after braces and aligners.

In this presentation, we will discuss the fundamentals this new technology is based upon and then showcase a series of patients treated with BRIUS® to demonstrate the clinical performance of this new technology. Simple to complicated cases will be presented with step-by-step records and the final outcome will be compared with digital simulation of the treatment to determine the accuracy of the technology and its ability to handle a variety of clinical scenarios.
Orthognathic management of anterior open bite

Farhad B. Naini
Consultant Orthodontist at Kingston and St George's University Hospitals in London, UK

Severe anterior open bites are often a considerable challenge, both for the patient and the treating clinical team. The purpose of this presentation is to describe the diagnostic and treatment planning process in the management of severe anterior open bites. Combined orthodontic-surgical treatment will be described and the role of each team member and the interaction of the orthodontist-surgeon team will be emphasized.
Esthetic zone and orthognathic surgery

Hossein Behnia
DMD OMFS DICOI, Full Professor and Chairman of OMFS Department at School of Dentistry Shahid Beheshti University of Medical Sciences

The main goals and outcomes of orthognathic surgery are to achieve esthetic, functional and stability for the patient. The problem-oriented approach to diagnosis and treatment planning depends on:

- Facial harmony symmetry
- Facial and dental midlines
- Lip line
- Tooth show/ Gingival show
- Inclination of upper incisors
- Roll- Yaw- Pitch
- Occlusal plane
- Buccal corridor

In this presentation we will discuss the problems related to above mentioned factors and considerations of comprehensive treatment planning.
Accepted Oral Lectures
Dynamic mechanical and thermal properties of clear aligners after thermoforming and aging

Kazem Dalaie¹, Seyyed Mostafa Fatemi² and Samin Ghaaffari¹³

¹Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Daneshju Boulevard, Velenjak District, Tehran, Iran.
²Department of Dental Biomaterials, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
³Dentofacial Deformities Research Center, Research Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Introduction: Based on the role of properties of aligner materials on their efficiency, we aimed to assess their thermomechanical properties after thermoforming and simulated aging.

Methods & Materials: In this experimental study, 96 samples of polyethylene terephthalate glycol (PETG) aligners (Duran and Erkodur) were prepared and divided to three groups: control (C), after thermoforming (T), after thermoforming and aging (TA). Thermoforming was done through 3D-printed molds, and aging was exerted by 200 thermal cycles after immersion in 37°C distilled water for 24h. Flexural modulus, hardness, glass transition temperature (Tg), elastic and viscous modulus, and loss factor were evaluated. Two-way ANOVA, T-independent, and Tukey HSD tests were done for statistical analysis and significance level was set to 0.05.

Results: In both materials, flexural modulus decreased significantly after thermoforming, 88% in Duran and 70% in Erkodur, but did not change significantly after aging. After thermoforming, hardness decreased significantly in both materials (22% in Duran and 7.6% in Erkodur). Dynamic Tg was significantly lower in T and TA in both materials. At all temperatures (25, 37, 55°C) in Duran, the elastic modulus difference was only significant between C and TA, but in Erkodur, it decreased significantly in T, and there was no significant change after aging. Viscous modulus and loss factor showed the same change patterns at all temperatures. In both materials, they increased after thermoforming, but did not change significantly after aging.

Conclusion: Thermoforming had more prominent role than aging in diminishing of thermomechanical properties. In general, Duran had greater thermomechanical stability than Erkodur.
Influence of a bleaching agent on surface and mechanical properties of orthodontic thermoplastic retainer materials

Neda Babanouri¹, Nazanin Ahmadi¹, Hamid Reza Pakshir¹, Shabnam Ajami¹, Raha Habibagahi¹
¹ Orthodontic Research Center, School of Dentistry, Shiraz University of Medical Sciences, Qom Abad Blv, Ghasrodasht AV, Shiraz, Iran

Introduction: To investigate the effect of a tooth whitening agent on surface roughness, surface hardness, and force delivery properties of polyethylene terephthalate glycol (PETG) thermoplastic retainer materials of two different thicknesses.

Methods & Materials: PETG sheets (1mm and 1.5mm) were thermoformed over a 30×60×10mm³ rectangular stone model. Surface hardness, surface roughness, and results of a three-point bending test were evaluated before and after treatment (5h daily for 14 days) with a 15% carbamide peroxide home bleaching agent. Data were analyzed using an independent sample t-test.

Results: Exposure of PETG specimens to the bleaching agent for 14 days significantly reduced surface hardness and increased surface roughness of samples of both thicknesses. The magnitude of force at different deflection points decreased significantly in the 1.5mm thickness specimens treated with the bleaching agent, but no significant change was observed in the specimens with 1mm thickness.

Conclusion: Use of a home bleaching agent could have adverse effects on surface roughness and hardness of PETG materials leading to reduced survival time of thermoplastic orthodontic retainers.
Evaluation of the effect of Lactogum probiotic product on amount of salivary streptococcus mutans in comparison to fluoride mouthwash in fixed orthodontic patients: A single-blind, randomized clinical trial

Fahimeh Farzanegan1, Amirreza Faraji2
1Associate professor, Orthodontic Dept., School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
2Dentist, Private Practice
Hamid Ghorbani, Infectious Diseases Specialist, Hepatitis Research Center, Jihad University

Introduction: Fixed orthodontic patients have higher plaque formation and caries incidence during their treatment. The purpose of this study is to compare the effect of Lactogum, a product containing probiotic bacteria, with fluoride mouthwash on level of streptococcus mutans in saliva among patients undergoing fixed orthodontic treatment.

Methods & Materials: This randomized, single-blind, crossover study was conducted on 17 subjects aged 10-35 years seeking fixed orthodontic treatment. Immediately before bonding of orthodontic braces, saliva samples were taken from all patients as baseline sample; Then each patient was randomly given one of the following three products: Lactogum lozenges tabs containing at least 10^9 CFU of streptococcus salivarius K12 and M18, placebo lozenges, and 0.05% sodium fluoride mouthwash. Patients were asked to use the products once a day for three weeks and then entered a three-week washout phase. New samples were taken at the end of each product receiving period. The count of salivary streptococcus mutans was measured by microbial culture. The significance level was 0.05.

Results: The mean number of streptococcus mutans in patients’ saliva in placebo group was significantly higher than that of Lactogum and fluoride mouthwash groups and also higher than baseline sample (P<0.05). The mean number of salivary streptococcus mutans of Lactogum group was lower in comparison to fluoride mouthwash; but the difference was not statistically significant.

Conclusion: Short-term daily use of Lactogum probiotic lozenge has a significant effect on reducing the population of streptococcus mutans in saliva of patients undergoing fixed orthodontic treatment, the same efficacy as fluoride mouthwash.
Comparative assessment of the orthodontic wire’s friction coated with zinc oxide nanoparticles by two methods of chemical precipitation and hydrothermal

Behrad Tanbakuchi¹, Sharmin Kharrazi², Sadegh Akhoundi³, Matin Nikfarjam⁴, Atefe Saffar Shahroudi⁵
¹Behrad Tanbakuchi, Assistant Professor, Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences
²Sharmin Kharrazi, Associate Professor of Medical Nanotechnology, Tehran University of Medical Sciences
³Sadegh Akhoundi, Full Professor, Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences
⁴Matin Nikfarjam, Dentist, Private Practice
⁵Atefe Saffar Shahroudi, Assistant Professor, Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences

Introduction: In orthodontic treatment with sliding technique, reduction of frictional forces could result in a more effective treatment. Recently, wire coating with nanoparticles were proposed to reduce frictional forces. The aim of this study was to evaluate the effect of coating wires with zinc oxide nanoparticle by two methods of chemical precipitation and direct hydrothermal process on the wire-bracket frictional force.

Methods & Materials: In this study, 30 pieces of stainless-steel arch wire with and without zinc oxide nanoparticles and 30 metal brackets with 0.022-inch slot were divided into three groups: 1- control (uncoated wires) 2- wires coated with zinc oxide nanoparticles, 3- wires with thin layer of nanostructured zinc oxide. In the first method, the nanoparticles were made by chemical precipitation method, and in the second method, nanostructure was directly formed on wires. Additionally, SEM observations were used to confirm the presence of nanoparticles on the wires. Friction between wires and brackets was measured using Universal Testing Machine. SPSS softwareV20 and ANOVA test was used in order to analyze the data. The significance level was considered as P-value <0.05.

Results: The mean value of frictional forces were 1.73 N, 1.52 N and 1.56 N in control group, chemical precipitation method group and thin layer of nanostructured zinc oxide group, respectively. There was no significant difference in friction rate between brackets and stainless-steel wire coated by any of these two methods (p-value = 0.555).

Conclusion: Coating of orthodontic wires with zinc oxide nanoparticles can reduce friction with brackets during sliding. However, there was no difference between coating of orthodontic wires with chemical precipitation method and thin layer coating method.
Surface microhardness, masking, and color stability of artificially induced white spot lesions infiltrated by Icon versus an experimental resin containing MA-POSS nanoparticles

Sooodeh Tahmasbi¹, Shiva Tavakol Davani², Mahshid Namdari³, Mohammad Atai⁴

¹Associate Professor, Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
²Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
³Community Oral Health Department, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
⁴Iran Polymer and Petrochemical Institute (IPPI), P.O.Box: 15651/115, Tehran, Iran.

Introduction: The aim of this study was to compare the efficacy of an experimental resin containing polyhedral oligomeric silsesquioxanes nanoparticles with methacrylate groups (MA-POSS) versus the Icon resin (DMG, Germany) regarding the masking, color stability, and surface microhardness of artificially induced WSLs.

Methods & Materials: Sixty bovine enamel samples were prepared and assigned to two groups for assessment of color (group C) and surface microhardness (group M). The samples were first immersed in a demineralizing solution to induce WSLs, and then in a remineralizing solution. Each group was then divided into two subgroups for the application of experimental resin and Icon. The color and surface microhardness of specimens were measured respectively, after the induction of WSLs, and after infiltration. Group C samples were immersed in coffee (1 hour a day for one week) and their color was measured again. ANCOVA was used to compare the efficacy of the two resins in improving the microhardness. To compare the masking and staining of infiltrated lesions, ΔE, ΔL and L* values after infiltration and staining were compared with the values after the induction of WSLs using independent t-test and repeated measures ANCOVA (α=0.05).

Results: Microhardness analysis by ANCOVA revealed no significant difference between the groups following resin infiltration (P=0.144). The performance of the two resins after infiltration [P=0.75(ΔE), P=0.20(ΔL), P=0.57(L*)] and after staining [P=0.31(ΔE), P=0.07(ΔL), P=0.32(L*)] was not significantly different.

Conclusion: The experimental resin had a good performance in increasing the surface microhardness and optimal masking and color stability of infiltrated WSLs.
COVID-19 transmission risk and protective protocols in dentistry: A systematic review

Morteza Banakar¹, Kamran Bagheri Lankarani¹, Dana Jafarpour², Sedigheh Moayedi³, Mohammad Hasan Banakar⁴ and Ashkan MohammadSadeghi⁵

¹Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran.
²Biomaterials Research Center, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.
³Department of Orthodontics, Mashhad University of Medical Sciences, School of Dentistry, Mashhad, Iran.
⁴School of Dentistry, Yasuj University of Medical Sciences, Yasuj, Iran.
⁵School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran.

Introduction: Among several potential transmission sources in the spreading of the COVID-19, dental services have received a high volume of attention. Several reports, papers, guidelines, and suggestions have been released on how this infection could be transmitted through dental services and what should be done. This study aimed to review the guidelines in order to develop a practical feasibility protocol for the re-opening of dental clinics and the reorientation of dental services.

Methods and Materials: This study systematically reviewed the published literature and the guidelines of international health care institutions on dentistry and COVID-19. We searched Pubmed, Web of Science, and SCOPUS electronic databases using MESH terms. The recommendations identified were tested with a convenience sample of experienced practitioners, and a practical step-by-step protocol is presented in this paper.

Results: To the date this paper was drafted, 38 articles were found, of which 9 satisfied our inclusion criteria. As all the nine studies were proposed in a general consensus, any elective non-emergency dental care for patients with suspected or known COVID-19 should be postponed for at least 2 weeks during the COVID-19 pandemic. Only urgent treatment of dental diseases can be performed during the COVID-19 outbreak taking into consideration pharmacological management as the first line and contagion-reduced minimally invasive emergency treatment as the secondary and final management.

Conclusions: While the currently available evidence has not demonstrated a clear and direct relationship between dental treatment or surgery and the possibility of the transmission of COVID-19, there is clearly the potential for transmission. Therefore, following the protective protocols in the COVID-19 crisis is of utmost importance in a dental setting.
Comparative study of the effect of fluoride-containing compounds on fluoride released from orthodontic adhesives

Dr. Mostafa Abtahi¹, Dr. Neda Eslami², Dr. Ali Abaee³

¹Associate Professor of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
²Associate Professor of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
³Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: The aim of this study was to compare the effect of fluoride-containing compounds on fluoride released from orthodontic adhesives over 28 days.

Methods & Materials: In this study, 96 healthy maxillary premolars were used to bond orthodontic brackets. No-mix composite, Transbond XT, and Fuji II LC glass ionomer were used for bonding orthodontic brackets. After bonding the brackets, three fluoride compounds were used: 250PPM sodium fluoride mouthwash, 1500PPM sodium fluoride toothpaste, and 500PPM fluoride varnish to expose fluoride to orthodontic bracket adhesives. During days 1, 7, 14 and 28 after bonding the brackets, the amount of fluoride ion released from orthodontic adhesives was evaluated by ion analysis technique and WTW ionimeter, and compared between the groups.

Results: In all types of adhesives, the greatest amount of released fluoride was observed at the first day of study and gradually decreased during the study. No mix composite, Transbond XT composite and Fuji II LC glass ionomer each showed different responses to different fluoride compounds in the early days of the study. However, this difference in fluoride release gradually diminished on days 14 and 28 when exposed to fluoride compounds. The amount of fluoride released from different adhesives was not significant at days 14 and 28 of the study. Also, on days 1 and 7 of the study, the difference in fluoride release was significant only between sound enamel and other adhesive groups, while there was no two-by-two difference between different adhesives in terms of fluoride release.

Conclusion: In all types of adhesives, the amount of fluoride released from orthodontic adhesives decreases over time. In the long run, there seems to be no preference between Transbond XT, RMGI and No-mix composite in terms of fluoride released in the mouth.
Designing and development of an oral health educational game and evaluation of its effect on 8-12-year-old children’s oral health: A randomized clinical Trial

Azin Nourian1, Marzieh Samanipour2, Nima Motamed3

1Assistant Professor, Department of Orthodontics, Faculty of Dentistry, Zanjan University of Medical Sciences.
2Dentist, private practice, Zanjan, Iran
3Associate Professor of Social Medicine, Department of Medicine, Zanjan University of Medical Sciences.

Introduction: Health education for school-age children is a specialized component of the oral health promotion program. This study aimed to design and develop an oral health educational game and assess its effect on the oral health of children aged 8 to 12 years.

Methods & Materials: In this experimental study, 40 patients aged 8-12 years referring to a private dental clinic were selected by using convenience sampling and were then randomly assigned to the experimental and control groups. The experimental group received oral health training by using a game; while, the control group received oral hygiene instructions. The simplified oral hygiene index (OHI-S) with two components of debris index (DI-S) and calculus index (CI-S) was measured before the intervention, and at one week, and one month after the intervention to assess the effect of oral health skills. Data were analyzed by the Chi-square test, independent sample t-test, and Fisher's exact test.

Results: The DI-S scores in the experimental group at one week and one month after the intervention were significantly lower than the values in the control group (P=0.003 and P=0.001, respectively). The OHI-S scores in the experimental group at one week and one month after the intervention were significantly lower than the values in the control group (P=0.012 and P=0.007, respectively). No significant difference was noticed in the follow-up CI-S scores at one week and one month after the intervention (P>0.05).

Conclusion: The game designed in this study would improve the children’s oral health skills; hence, it can be used to promote oral health in children.
Effects of orthodontic bonding containing TiO2 and ZnO nanoparticles on prevention of white spot lesions: An in vitro study

Mohammad Behnaz¹, Shahin Kasraei², Zahra Yadegari³, Faeze Zare⁴, Golkaz Nahvi¹, Katayoun Talebi Rafa-Jan¹

1 Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran;  
2 Department of Operative Dentistry, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran;  
3 Department of Pharmacology and Biotechnology, Shahid Beheshti University of Medical Sciences, Tehran, Iran;  
4 Department of Maxillofacial Radiology, School of Dentistry, Azad University of Medical Sciences, Tehran, Iran

Introduction: Demineralization is a common problem following orthodontic treatments. Today using antibacterial nanoparticles in preventing white spot lesions is being discussed. Given that ZnO and TiO2 nanoparticles have direct antibacterial known properties, this study aims to evaluate these nanoparticles' antibacterial effects in orthodontic bondings' composition on preventing white spot lesions.

Materials & Methods: In this in vitro experimental study, 43 sound human premolar teeth were divided into five groups according to the adhesive utilized for bracket bonding: None group consisting of 12 teeth bonded with Transbond XT, TiO2 Group consisting of 12 teeth with Transbond XT and TiO2 nanoparticles, ZnO group consisting of 12 teeth with Transbond XT and ZnO nanoparticles, a positive control group consisting of 5 teeth without brackets and negative control groups consisting of 5 teeth in a sterile medium. All teeth were stored in a medium consisting of 1cc brain heart infusion (BHI) + sucrose 1%+ 0.5 McFarland Streptococcus mutans bacteria for 28 days. The medium was replaced every 48 hours. All the samples were examined every week for 4 weeks using DIAGNOdent and photography to detect white spots.

Results: The results of this study revealed that adding TiO2 and ZnO nanoparticles to Transbond XT bonding caused a decrease in enamel lesions occurrence and incidence of white spots (p value= 0.00). The results did not reveal significant differences between TiO2 and ZnO groups.

Conclusion: Novel bonding agents containing TiO2 and ZnO nanoparticles represent promising candidates in combating enamel white spot lesions.
Effects of different stretching extents, morphologies, and brands on initial force and force decay of orthodontic elastomeric chains: An in vitro study

Seyed Mohammad Mousavi¹, Sara Mahboobi¹, Vahid Rakhshan²

¹Department of Orthodontics, Faculty of Dentistry, Ahvaz Jundishapur of Medical Sciences, Ahvaz
²Dentist in Private Practice, Tehran, Iran

Introduction: Elastomeric chains are of clinical importance to orthodontics. Therefore, their behavior should be assessed under different conditions. Some of their critical aspects remain unstudied (including effects of different elongations and chain forms on their force properties). Therefore, we aimed to assess these factors.

Methods & Materials: This in vitro study was performed on 540 observations: first, 90 chains (10 specimens per subgroup of three brands [American orthodontics, ortho technology (OT), and G&H], each from three chain types [closed, short, and long]) were stretched for three extents (40%, 60%, and 100%) and their forces were measured using a universal testing machine. Afterward, 270 new chains of the same brands/types were stretched for the same extents by installing them onto pairs of pins with different interpin distances. Plates holding pins/chains were incubated in artificial saliva at 37°C for 4 weeks. Afterward, their forces were measured and analyzed using partial correlation coefficient, three-way analysis of variance (ANOVA), Tukey, Student’s t, and Mann–Whitney tests (α = 0.001).

Results: Forces degraded significantly from an overall mean of 3.97 ± 0.97 N to 1.29 ± 0.39 N after 4 weeks (all P = 0.000, t-test/Mann–Whitney). ANOVA showed highly significant differences among brands, types, and elongations, in terms of “initial force, force decay, and residual force” (all P = 0.000). Almost all post hoc pairwise comparisons were significant (Tukey P = 0.000). There was a strong positive correlation between elongation extent and force loss (r = 0.846, P = 0.000).

Conclusions: OT might be the most preferable brand. Closed chains might usually show better results, especially in OT chains. Instead of using chains half of the size of the space (to elongate for 100%), longer chains should be used to stretch for lesser extents.
Digital paradigm shift in orthodontic diagnosis and treatment planning

Alireza Jafari-Naeimi
Assistant Professor, Dept. of Orthodontics, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, IRAN

The skull with its dento-facial structures is a complex anatomical system that has been the focal point for vertebrate biology studies for more than two centuries. Interactions between different parts of the dento-facial complex play an important role in causing malocclusion or developmental problems but are not yet well understood. On the other hand, to achieve facial beauty with structural balance, an orthodontist needs tools to arrive at an accurate diagnosis and a perfect treatment plan to begin with. In conventional orthodontic diagnosis all that was needed was a set of records like patient examination form, dental imaging, panoramic and cephalometric radiography and a well-trimmed orthodontic study model. However, these conventional orthodontic records do not significantly improve the diagnostic ability of an orthodontist despite careful clinical examination and collection of accurate records. This could be explained by the fact that there may be a significant loss of clinical information from these disintegrated formats of records. How are records for example a study cast and lateral cephalogram merged? Today with the development of digital dentistry, it seems that by integrating all patient records into a patient digital data set, we can gain a better understanding of the dento-facial complex and the interactions between different developmental problems like malocclusions. For example, digital orthodontic office management software and electronic orthodontic diagnostic records, such as electronic orthodontic examination forms, three-dimensional radiographic records (e.g., CBCT file format DICOM), intraoral imaging, intraoral dental scans (in STL file format) can all be integrated into a patient digital dataset. This dataset is then used to create an individualized and interactive 3D rendering of an orthodontic patient. This also allows orthodontists to fully customize a treatment plan to address the specific needs of a patient. This integrated digital data set can also be used to create individualized appliances with CAD software and CAM technology (like clear aligners).

The clinical aspect of the different digital solutions in orthodontic diagnosis and treatment will be presented with real example of cases.
The effects of computerized treatment simulation on perceptions and motivations of orthodontic patients with moderate to severe sagittal malocclusions

Shabnam Ajami¹, Mehrnoosh Alborzi²
¹ Associate professor, Orthodontic Research Center, Shiraz University of Medical Sciences
² Undergraduate student, Orthodontic Research Center, Shiraz University of Medical Sciences

Introduction: This study aims to identify the role of computerized post-treatment simulated images on orthodontic patients’ satisfaction with appearance, motives, expectations, and self-perception.

Methods & Materials: 48 patients with moderate to severe sagittal malocclusion requiring orthognathic surgery were assigned into two groups. Patients in group 1 had decided to undergo orthognathic surgery and patients in group 2 had decided against it. Patients were asked to fill in a questionnaire once after being presented with pre-treatment photos of their own facial profiles, and once after viewing the post-treatment simulated images.

Results: Most patients (70.8% of patients in group 1 and 95.8% patients in group 2) reported “having irregular teeth” as a reason for seeking orthodontic treatment. Patients in group 1 were significantly less happy with their dental appearance (P=.012) and were much more willing to change their facial appearance (P=.001). The computerized simulations did not have any significant influence on the patients’ perceptions and expectations. However, after viewing their computerized simulations, patients who had decided against surgery showed significantly greater desire for having orthognathic surgery. (P=.008).

Conclusion: This suggests that although treatment simulations do not elevate patients’ expectations or affect their self-images, they seem to be able to bring the viewpoint of patients closer to professional opinion.
Comparative three-dimensional evaluation of spheno-occipital synchondrosis and zygomatico-maxillary suture in cleft lip and palate children versus the normal population

Arezoo Jahanbin1, Alireza Chamani2, Seyed Hosein Hoseinizarch3, Saeedeh Hajebi Khaniki4
1Department of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
2Assistant professor of Orthodontics, Department of Orthodontics, School of dentistry, Zahedan University of medical sciences, Zahedan, Iran
3Department of Oral and Maxillofacial Radiology, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
4Student research committee, Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: The purpose of the present study was a three-dimensional evaluation of the sphenooccipital synchondrosis (SOS) and zygomatico-maxillary suture (ZMS) in cleft lip and palate patients versus the normal population.

Methods & Materials: In the case-control study, cone beam computed tomography scans of 153 unilateral or bilateral cleft lip and palate patients and 153 scans of healthy non-cleft individuals with skeletal Class I occlusion from 6 to 18 years were selected. Then the ZMS and SOS maturation stages were determined. Mann-whitney test, spearman correlation, repeated measurement, and bayesian transition analysis were used for statistical analysis. P-value < 0.05 was considered as significant.

Results: The result of this study showed ZMS maturation in cleft lip and palate patients was significantly earlier than control group; although, there were no statistically significant differences between case and control groups in SOS maturational stages. This study showed that in the normal population, the mean age of stage B, which is the ultimate level of favorable response to growth modification in ZMS development, is 11.50 ± 1.50 years for females and 10.79 ± 1.89 years for males and in cleft lip and palate patients, the mean age of stage B is 9.53 ± 1.46 years for females and 9.71 ± 1.36 years for males. There was no significant difference in mean age at any of maturational stages of ZMS and SOS between unilateral and bilateral cleft lip and palate patients (P>0.05).

Conclusion: Maturation of zygomatico-maxillary suture in cleft lip and palate was earlier than non-cleft children, however sphenooccipital synchondrosis did not show any significant differences in maturational stages between cleft lip and palate patients and healthy controls.
Assessment of the relationship between facial and dental midlines with anatomical landmarks of the face and oral cavity

Abolfazl Farahani1, Karim Jafari2, Ali Hemmati3, Abbas Naghizadeh4, Rahman Nemati5, MohammadHossein Farahani6
1Private Practice, Arak, Iran
2Department of Prosthodontics, Ardabil University of Medical Sciences School of Dentistry, Ardabil, Iran
3Private Practice, Zahedan, Iran
4Department of Physical Education, Ardabil University of Medical Science School of Medicine, Ardabil, Iran
5Department of Orthodontics, Ardabil University of Medical Sciences School of Dentistry, Ardabil, Iran
6Dental Research Center, Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences School of Dentistry, Tehran, Iran

Introduction: The purpose of the present study was to determine the facial anatomical landmarks, in order of accuracy, closest to the midline of the face, as well as oral cavity midline, and to specify which intraoral anatomical landmarks are closer to the dental midline.

Methods & Materials: Three commonly used anatomical landmarks including nasion, nose, and philtrum tips were marked clinically in 108 subjects. A frontal full-face digital image was used for midline analysis in accordance with the esthetic frame. Deviations from the facial and oral midlines were measured for the three clinical landmarks. Dental midline was considered as the fourth landmark. Alginate impressions were taken, and casts were analyzed under standardized conditions. The labial frenum and incisive papilla were marked. Cast images were taken and analyzed.

Results: Data showed difference between the mean ratios of the selected anatomical landmarks and the facial and oral midlines (p≤0.05). The anatomical landmark hierarchies, in proximity to the facial midline, are commissural midlines, nasion, philtrum tip, nose tip, and dental midline, respectively. The anatomical landmark hierarchies, in proximity to the commissural midline, include dental midline, philtrum tip, nose tip, and nasion. The labial frenum was less deviated from the dental midline than the incisive papilla.

Conclusion: With respect to shortcomings, the results showed that all of the anatomical landmarks were deviated from the facial and oral midlines. The order of proximity of the anatomical landmarks to the facial midline was as follows: commissural midline, nasion, philtrum, and dental midline.
Introduction: This study aimed to compare the accuracy of photography versus digital scanning of lateral cephalograms for linear and angular measurements.

Methods & materials: Thirty lateral cephalograms were first scanned by a digital scanner and then underwent photography with a DSLR digital camera as well as a smartphone camera (iPhone 7) with 0, +10, and -10-degree tilts horizontally and vertically, and also at 30, 55, 80, and 105 cm distances. Finally, all digital images were transferred to Viewbox 4 software for 5 linear and 9 angular measurements.

Results: The results indicated significant differences in some measurements between the scanned and photographed images, which were clinically unacceptable. The difference in resolution of DSLR and smartphone cameras had no significant effect on the results.

Conclusion: Within the limitations of this pilot study, the results indicated that the accuracy of photography was not acceptably high compared with digital scanning of lateral cephalograms for some linear and angular measurements. Unacceptable, significant differences were mainly due to tilting rather than distance.
Unusual extraction combinations in orthodontics

Elham Sayanjali¹, Alireza Jafari-Naeimi²
¹ Assistant Professor, Department of Orthodontics, School of Dental Medicine, Islamic Azad University
² Assistant Professor, Department of Orthodontics, School of Dental Medicine, Islamic Azad University, Tehran, Iran

Extractions in orthodontics has been an important area of consideration as it is one of the most important factors, responsible for the success of treatment. Conventionally, the premolar extractions are the most followed. But as years passed by, finishing of the case has been given utmost importance. A proper extraction decision is the key for a good case finish. In other words, traditional extraction considerations needs to be reconsidered to satisfy the patient needs. This paper provides a review of the advantages and dis-advantages of unusual and asymmetric extraction combinations which can be considered at various clinical situations.
The effect of heparin on bone metabolism and orthodontic tooth movement in rats

Behzad Salari¹, Shahroo Etemad-Moghadam², Yasaman Kheirandish³, Reza Moradian⁴
¹Assistant professor, Department Orthodontics, Aja University of Medical Sciences, Tehran, Iran
²Department Orthodontics, Islamic Azad University of Medical Sciences, Tehran, Iran
³Dental Research Center, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran
⁴Assistant Professor, Department of Oral and Maxillofacial Radiology, School of Dentistry, Tehran
⁵Private practice, Tehran, Iran

Introduction: to determine the effect of different doses of heparin on the factors related to bone metabolism and orthodontic tooth movement (OTM) in rats.

Methods & Materials: A total number of 45 Sprague-Dawley rats were randomly divided into three groups of ten animals each and injected 0 (control), 3000 and 6000 Unit/Kg per day heparin sulfate for 4 weeks. Orthodontic forces were applied after 14th day of this study. Two weeks later, OTM, bone density and amount of parathyroid hormone (PTH) were assessed for each rat. Haematoxylin/eosin-stained sections of the molars were prepared and the mesial roots of each sacrificed rat were examined for osteoclast number and resorption-lacunae depth.

Results: A significant increase in OTM, resorptive lacunae and PTH secretion was observed in the 6000 Unit/Kg injection compared to the 3000 Unit/Kg (P=0.005, P=0.043 and P=0.001). The rats with 3000 Unit/Kg showed a non-significant increase for these parameters (P=0.78 and P=0.02). The higher dose of heparin decreased bone density compared to the other heparin group (P=0.04). No significant difference was noted regarding the number of osteoclasts among these groups (P>0.05).

Conclusion: Injection of heparin in some doses could increase the OTM, PTH and depth of resorptive lacunae. Furthermore it could decrease optical density of alveolar bone in rats.
Antibacterial properties and shear bond strength of an orthodontic composite following addition of copper oxide/chitosan nanoparticles

Mohammad Taghi Vatandoust¹, Atefeh Saffar Shahrudi², Ahmad Sodagar³
¹Department of Orthodontics, School of Dentistry, Shahed University of Medical Sciences, Tehran, Iran
²Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran
³Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Introductions: This study assessed the antibacterial properties and shear bond strength (SBS) of an orthodontic composite following addition of copper oxide (CuO)/chitosan nanoparticles (NPs).

Methods & Materials: Forty-eight bovine teeth were randomized into 4 groups (n=12) for stainless steel bracket bonding with 0% (control), 1%, 0.5%, and 0.1% CuO/chitosan NPs added to Transbond XT composite. The bracket-tooth SBS was measured, and the adhesive remnant index (ARI) score was determined under a stereomicroscope. Transbond XT composite discs with 5 mm diameter were fabricated with 0%, 1%, 0.5%, and 0.1% CuO/chitosan NPs. The antibacterial properties of the discs were assessed against Streptococcus mutans (S. mutans), Streptococcus sanguinis (S. sanguinis), and Lactobacillus acidophilus (L. acidophilus) using the disc agar diffusion (DAD), eluted component, and biofilm inhibition tests.

Results: The maximum and minimum SBS values were recorded in the control, and 1% NP group, respectively. The 1% NP group had significantly lower SBS than other groups (P<0.05). The control group had significant differences with the three NP groups regarding the ARI score. The biofilm inhibition test showed significant differences among the groups in all three tested bacteria (P<0.05). The DAD test revealed no growth inhibition zone. The eluted component test indicated significant results for all groups and all bacteria (P<0.001).

Conclusion: CuO/chitosan NPs in 0.1% and 0.5% concentrations significantly inhibited the biofilm formation by all three bacteria while preserved the SBS within the clinically acceptable range. However, the NPs did not show optimal solubility and dispersion at the tested concentrations.
Effect of miniscrew insertion angle in the maxillary buccal plate on its clinical survival: A randomized clinical trial

Amin Golshah1, Kimia Gorji 2, Nafiseh Nikkerdar 3
1 orthodontic department dental school kermanshah university of medical sciences
2 Student research committee dental school kermanshah university of medical science
3 Oral and maxillofacial radiology department dental school kermanshah university of medical science

Introduction: This study sought to assess the effect of miniscrew insertion angle (vertical and oblique) on its clinical survival under shearing forces in orthodontic patients undergoing canine retraction.

Materials & methods: In this split-mouth randomized controlled clinical trial, 50 miniscrews were placed bilaterally in 25 patients with 45° and 90° insertion angles relative to a line perpendicular to the occlusal plane distal to the maxillary first premolar extraction site. Allocation of insertion angles to the right/left side was random using the Random Allocation Software. The patients, clinician, and statistician were blinded to the allocation of miniscrews to the side of jaw. The patients were followed-up monthly for 6 months. The primary outcome was the clinical survival of miniscrews, which was evaluated at each follow-up session. The secondary outcomes were the miniscrew stability based on the Periotest value (PTV) and the level of pain experienced by patients at 1, 12, and 24 h, and 7 days after miniscrew placement using a visual analog scale (VAS). Data were analyzed using paired t-test, repeated measures ANOVA, and McNemar’s test.

Results: The clinical survival rate of miniscrews placed at 90° and 45° angles was 76% and 88%, respectively. This difference was not statistically significant (P = 0.375). No significant difference was noted between the two groups regarding the PTV or the pain score either (P > 0.05).

Conclusion: Clinically, the insertion angle of miniscrews (90° versus 45° relative to a line perpendicular to the occlusal plane) has no significant effect on the miniscrew survival rate or stability during orthodontic treatment.
My experience with TADs- A clinical review of challenging cases

Nima Baniasad
Assistant professor, Dept. of Orthodontics, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran

Introduction: Anchorage control and performing some tooth movements can be extremely difficult, requiring complex mechanics and bulky extra-oral appliances, occasionally compromising the treatment plan. Skeletal anchorage devices provide orthodontists to overcome these problems, given that the correct treatment planning and mechanics are chosen. Mini screws are particularly useful for closing spaces from missing teeth, distalizing or retracting teeth, intruding overerupted teeth, correcting midline discrepancies, reduction of occlusal plane cants and in most situations where there is a lack of sufficient tooth material for anchorage.

Methods & Materials: In this presentation, I present my cases which was treated with orthodontic mini-screws for different purposes such as treatment of gummy smile, intrusion of individual teeth, forced eruption of impacted canine, correction of transverse cant of occlusal plane, distalization and mesialization of one or both buccal segments, etc. However in my opinion an orthodontist should save the TADs for when they are truly indicated and do not overuse them instead of using acceptable and less expensive yet a bit more complex treatment mechanics.

Conclusion: Orthodontic mini screws are inevitably the best options in many orthodontic mechanotherapies and as they improve and the techniques are refined, they will become a standard feature of the orthodontist’s armamentarium given that they are used based on correct mechanics and used with creativity not just following the cook book orders.
Effects of a ceramic active self-ligating bracket on retraction/tipping/rotation of canine, premolar mesialization, and transverse arch dimensions: A preliminary single-blind split-mouth randomized clinical trial

Mehrnaz Moradinejad¹, Nasim Ghorani², Majid Heidarpour³, Meysam Noori⁴, Vahid Rakhshan⁵

¹Assistant professor, department of orthodontics, faculty of dentistry, Ahvaz University of Medical Sciences, Ahvaz, Iran
²Assistant professor, department of orthodontics, school of dentistry, Islamic Azad University, Isfahan (khorasgan) branch, Iran
³Assistant professor, department of orthodontics, school of dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁴Orthodontist in private practice, Tehran, Iran
⁵Lecturer, Department of Dental Anatomy and Morphology, Tehran Dental School, Islamic Azad University, Tehran, Iran

Introduction: There is no clinical study on ceramic self-ligating brackets (SLBs). Therefore, this preliminary study was conducted for the first time to address its effects.

Methods & Materials: This split-mouth randomized trial was performed on 32 quadrants in 16 orthodontic patients needing extraction of maxillary premolars and distalization of canines. In each blinded patient, right/left sides were randomized into control (ceramic bracket) and experimental (ceramic SLB) groups. Dental stone models were taken before canine retraction and 3 months into retraction. Models were digitized as three-dimensional models. Changes were measured on superimposed models. Groups were compared using Wilcoxon signed-rank test (\( \alpha = 0.05, \beta = 0.1 \)).

Results: Both bracket types caused significant changes after 3 months in terms of all assessed clinical outcomes (\( P \leq 0.002 \)). Compared to conventional ceramic brackets (control), ceramic SLBs reduced retraction rate (\( P = 0.001 \)), canine rotation (\( P = 0.001 \)), canine tipping (\( P = 0.002 \)), and arch expansion at the canine site (\( P = 0.003 \)). However, the extents of anchorage loss (\( P = 0.796 \)) and arch constriction in the premolar area (\( P = 0.605 \)) were not statistically different between the bracket types.

Conclusion: Compared to conventional metal-lined ceramic brackets, active ceramic SLB can increase the duration of canine distalization, while reducing canine rotation and tipping (inducing more bodily movements). The loss of anchorage with ceramic SLB was similar to that of conventional ceramic bracket after 3 months of treatment (considering the lower rate of SLB canine retraction during that time). Both brackets similarly constricted the arch at the premolar site. In the canine area, they expanded the arch, with the SLB causing smaller extents of expansion.
Innovative application of miniscrew-based jigs for dental arch mesialization

Siamak Hemmatpour¹, Golnaz Nahvi², Mehdi Oonchi³
¹ Department of Orthodontics, School of dentistry, Islamic Azad University, Tehran, Iran
² Department of Orthodontics, School of dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
³ Faculty of Dentistry, University of British Columbia, Canada

Objective: To introduce a novel approach based on temporary anchorage devices (TADs) to treat challenging orthodontic cases by unilateral or bilateral dental arches mesialization.

Materials and methods: Clinical application of TAD-based custom-made jigs exclusively designed for three different orthodontic/orthognathic cases is demonstrated in this research. Corrective treatment plans consisted of unilateral or bilateral total arch mesialization in the upper, lower or both dental arches using an innovative TAD-assisted jigs. The jigs are made of stainless steel wires and crimpable lever arms. The jig is connected to inserted mini-screws by Sentalloy closed coil springs to reinforce the anchorage and exert suitable force for total dental arch mesialization.

Results: The overall treatments were accomplished in a reasonable time period with significant improvement in facial aesthetics and optimal periodontal status. This innovative clinical biomechanical setup of miniscrew-anchored sliding jigs helped us achieve all the treatment goals (such as total uni/bilateral dental arches mesialization, derotation of dental arches asymmetries and dental midline deviation correction and also achievement of ideal final aesthetic and occlusal results).

Conclusions: With proper treatment planning, innovative designs based on TADs are effective alternatives in challenging cases such as dental arches asymmetry correction or retreatment of previous orthodontic malpractices. Nowadays the versatility of temporary anchorage devices has simplified the creative use of miniscrews for various treatment goals such as uni/bilateral total dental arches mesialization.
How can we use low level laser therapy (LLLT) for alleviating pain in orthodontic patients?

Farzaneh Ahrari
DDS, MS. Associate Professor of Orthodontics, Dental Research Center, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Pain/discomfort is a common experience in subjects wearing fixed orthodontic appliances. Pain usually affects routine activities such as sleep, eating and chewing, and may even encourage some patients to undergo early termination of therapy. Traditionally, prescription of non-steroidal anti-inflammatory drugs (NSAIDs) has been considered as the most effective strategy for controlling pain, but the use of these drugs has raised health concerns due to the reported side effects like gastrointestinal problems, thrombocytopenia, and renal insufficiency. Low level laser therapy (LLLT) has been widely used in dentistry because of the analgesic and anti-inflammatory effects and its great benefits in accelerating the wound healing process. Some studies employed LLLT over the course of orthodontic treatment for controlling pain initiated after separator or arch wire placement or during canine retraction, but the results are controversial. In this lecture, some recent studies on the application of lasers for alleviating pain in orthodontic patients are reviewed, focusing on the optimal laser settings to achieve the best therapeutic result.
Tooth alignment and pain experience with A-NiTi versus Cu-NiTi: A randomized clinical trial

Fatemeh Azizi¹, Aida Extiari² and Mohammad Moslem Imani¹
¹ Department of Orthodontics, Faculty of Dentistry, Kermanshah University of Medical Sciences, Kermanshah, Iran.
² Students Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran

Introduction: Nickel-titanium (NiTi) archwires are routinely used for initial leveling and alignment of teeth in orthodontic treatment. This study aimed to clinically compare the level of pain and tooth alignment in orthodontic treatment with A-NiTi versus Cu-NiTi archwires.

Methods & Materials: In this parallel randomized clinical trial, 88 orthodontic patients (12–25 years) with an irregularity index > 2 mm in the anterior site of the lower dental arch who required non-extraction orthodontic treatment of the lower arch were randomized into two age- and sex-matched groups (n = 44) for treatment with A-NiTi and Cu-NiTi initial archwires. Each archwire was used for 6 weeks. After 6 weeks, the irregularity index was measured, and the level of pain was scored using the Modified McGill pain questionnaire (MPQ) and visual analog scale (VAS) according to the time of onset and duration of pain, and analgesic intake. Data were analyzed by paired t test, independent samples t test, and Chi-square test (P < 0.05).

Results: The irregularity index significantly decreased in both groups after 6 weeks of treatment (P < 0.001). However, the difference in this respect was not significant between the two groups (P > 0.05). Pain perception (P = 0.487), duration of pain (P = 0.546), and analgesic intake (P = 0.102) were not significantly different between the two groups either.

Conclusion: Both A-NiTi and Cu-NiTi archwires are equally effective for tooth alignment in the anterior site of the lower dental arch and have no significant difference with regard to the level of pain experienced by patients.
Updates of diagnosis and clinical significance of the various TMJ disorders in planning and performing orthodontic therapy and orthognatic surgery

Maryam Sohrabi
OMFS.fellowship of maxillofacial surgical oncology
Assistant professor of oral and maxillofacial surgery department of dentistry school of TUMS

Various possible association between orthodontic and orthognatic surgery treatments and temporomandibular disorders (TMD) is a topic of great interest in the current literature. Caution should be exercised when planning, performing and finalizing orthodontics, especially in patients who with history of signs and symptoms of TMD. This article reviews these aspects and presents a detailed clinical guide for the examination of the orthodontic patient, considering aspects related to TMJ disorders beginning of the orthodontics therapy. We will discuss prevalence of TMJ pathologies in Angle Class I, II, III patients ,and will explain which group that deserves the greatest caution before and after surgery for control and prevention TMJ pathologies. And also ,Which kind of Rotation of the Maxillomandibular Complex affects the Stability of Orthognathic Surgery ,more in Temporomandibular Joint Pathology Then We will introduce The use of several diagnostic and legally documental tools such as MRI and.... Present review aimed to present the current evidence-based answers to challenging questions which was developed in professionals orthodontist and surgeons concerning temporomandibular disorder and treatment planning for their patients and ,Occasionally, undesirable post-surgical symptoms of temporomandibular disorder (TMD) and pain have been observed. The aim of this paper is to show how often and to which degree TMJ pathologies occur in orthognathic surgery candidates before surgery, making it recommendable to consider these TMJ pathologies during treatment planning. patient, Muscle incoordination, unstable disc-condyle relationship and bone alterations are usual TMD conditions that can interfere with the presenting occlusal relationship. TMD conditions that can interfere with the presenting occlusal relationship. This article reviews these aspects and presents a detailed clinical guide for the examination of the orthodontic It is this group that deserves the greatest caution before and after surgery (TMJ pathologies Occasionally, undesirable post-surgical symptoms of temporomandibular disorder (TMD) and pain have been observed. The aim of this paper is to show how often and to which degree TMJ pathologies occur in orthognathic surgery candidates before surgery, making it recommendable to consider these TMJ pathologies during treatment planning.
Assessment of association between condylar position and vertical growth pattern by CBCT

Negar Afshari¹, Alireza Jafari-Naeimi², Ladan Hafezi³

¹Dentist, (Ex-student, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran).
²Assistant Professor, Dept. of Orthodontics, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran.
³Assistant Professor, Dept. of Oral and Maxillofacial Radiology, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran.

Introduction: The position of the condyle in the glenoid fossa can affect masticatory muscle activity and temporomandibular joint pain. Evaluation of the condylar position is effective in orthodontic diagnosis and treatment plan, TMJ efficiency and resolving TMD problems.

The purpose of this study was to determine the condylar position in subjects with different vertical skeletal pattern using cone-beam computed tomography.

Methods & Materials: 69 patients (mean age: 26/1± 4/85), resultant full CBCT of the left and right temporomandibular joints(TMJ) were obtained. For each subject lateral cephalogram was analyzed on OnDemand3D application. The vertical skeletal pattern was classified on basis of FMA and Gonial angle into hypodivergent, normodivergent and hyperdivergent.

anterior, posterior, superior, medial and lateral joint spaces were examined with ondemand 3D application using CBCT images.

Results: No significant differences were found in the posterior, anterior and lateral joint space among the three vertical growth pattern group. Superior joint space was significantly greater in the low angle group than in high angle(p=0.000) and normal angle group (p=0.001). Medial condyle joint space was lower in high angle group than low angle(p<0.05).

Conclusion: The condyles were more posteriorly and inferiorly positioned in patients with low angle vertical pattern than in those with normal and high angle vertical pattern. The condyle is located closer to the inner wall of the glenoid fossa in the vertical and normal growth pattern than the horizontal growth pattern.
An overview of surgery-first orthognathic approach: History, indications and limitations, protocols, and dentoskeletal stability

Atefe Ahmadvand¹, Shiva Alavi², Saeed Hasani Mehraban³

¹Department of Orthodontics, Dental Students’ Research Committee, School of Dentistry, Isfahan University of Medical Sciences
²Department of Orthodontics, Dental Research Center, School of Dentistry, Dental Research Institute, Isfahan University of Medical Sciences, Isfahan
³Department of Oral and Maxillofacial Surgery, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

The most common orthognathic surgery approach consists of three steps: presurgical orthodontic treatment, surgery, and postsurgical orthodontic treatment. Despite its advantages, this technique has some disadvantages, too, including a long treatment period, problems in mastication and articulation, temporary worsening of the patient’s appearance, and psychological problems for the patient. The introduction of the surgery-first orthognathic approach has been an attempt to overcome these problems. In this article, we wish to provide a comprehensive overview on this approach. In this approach, which consists of surgery without orthodontic preparation and a short period of orthodontic treatment after it, the overall duration of treatment decreases and the patient’s appearance improves. The skeletal anchorage, placed at the time of surgery, can be used to facilitate tooth movements after surgery. Despite the advantages of this technique, it is associated with some limitations; in particular, occlusion cannot have a guiding role during surgery. Therefore, correct diagnosis, prediction of the outcomes, and simulating correction with the model setup are of crucial importance. The surgeon’s knowledge and expertise have a significant role in this respect.
Does maxillomandibular counterclockwise rotation affect surgical stability in Class III skeletal patients with high plane angle? A retrospective longitudinal study

Nazanin Senagoo¹, Kazem Dalaie², Reza Tabrizi³

¹Department of Orthodontics, School of Dentistry, Zanjan University of Medical Sciences, Zanjan, Iran
²Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
³Department of Oral and Maxillofacial Surgery, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Introduction: In class III, skeletal patients with high plane angle, counterclockwise rotation of maxillomandibular units is necessary. The study was aimed to evaluate the long-term stability of the change of mandibular plane in patients with class III deformity.

Methods & Materials: This is a retrospective longitudinal clinical study. Patients with class III skeletal deformity and high plane angles who underwent maxillary advancement and superior repositioning with mandibular set back were studied. The change of mandibular plane (MP) was predictive factors of the study. Age, gender, the amount of movement of the maxillary advancement, and mandibular set back following orthognathic surgeries were variables. The amount of relapse at the A and B points 12 months after orthognathic surgeries was outcomes of the study. Pearson correlation test was used to determine any correlation between relapse at the A and B points following bimaxillary orthognathic surgery.

Results: Fifty-one patients were studied. The mean of MP changes immediately after osteotomies was 4.66 (1.64) degrees. The horizontal relapse at B point 12 months after surgeries was 1.08 (0.81) mm, and the vertical relapse was 1.38 (0.44) mm. There was a correlation between the horizontal and vertical relapse with MP change (P = 0.001).

Conclusion: It seems that the counterclockwise rotation of maxillomandibular units in patients with class III skeletal deformity and high plane angle may be associated with the vertical and horizontal relapse that was noticed at the B point.
Posters
Evaluation of bond strength of orthodontic brackets using light- and chemical-cure adhesives systems over time: An in-vitro study

Maryam Omidkhoda¹, Neda Eslami², Maryam Mazloum³, Mostafa Entezari⁴
¹Dental Materials Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
²Associate Professor of Orthodontics, Department of orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
³Dentist
⁴Post-gratuate student of Orthodontics, Department of orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: This study aimed to evaluate the bond strength of light- and chemical-cure adhesive systems over six months.

Methods & Materials: A total of 144 sound human maxillary first and second premolars were randomly divided into six groups according to the adhesive type (i.e., Transbond XT and Unite) and time of evaluation. The groups were T0 (24-h group without thermocycling), T1 (24-h group with thermocycling), T2 (1-month), T3 (2-month), T4 (4-month), and T5 (6-month). The bond strength was then measured and the data were analyzed in SPSS software (version 23) through independent t-test and one-way ANOVA.

Results: The results of this study showed that the shear bond strength of self-cure orthodontic adhesive (no mix Unite, 15.37 MPa) at all-time points was significantly 1.37 times higher than that of the Transbond XT light cure adhesive (11.15 MPa). Moreover, the shear bond strength of self-cure adhesive (no mix Unite) 1 month after debonding showed a significant difference with the 24-h group without thermocycling (P=0.002), 24-h group with thermocycling (P=0.008), and 6-month group (P=0.016). The highest shear bond strength in both adhesives was observed at 1 month. Furthermore, the shear bond strength of Transbond XT light-cure adhesive 1 month after debonding showed a significant difference with the 24-h group without thermocycling (P=0.000) and 24-h group with thermocycling (P=0.000), as well as 2-month (P=0.008), 4-month (P=0.000), and 6-month groups (P=0.016).

Conclusion: Unite (no mix) self-cure adhesive compared to Transbond XT light-cure adhesive has higher bond strength and is recommended for rebonding brackets in patients with multiple rebonds.
Effect of hemostatic agents on shear bond strength of orthodontic eyelets bonded with conventional and self-etch adhesives

Arian Hesam Arefi¹, Seyed Amir Hossein Mirhashemi², Tabassom Hooshmand³, Mohammad Javad Kharazi Fard⁴, Mohammad Sadegh Ahmad Akhoundi⁵
¹DMD,MScD Orthodontics, Assistant professor, Dental Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
²Associated Professor, Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran
³Associate Professor, Department of Dental Biomaterials, School of Dentistry/Research Center for Science and Technology in Medicine, Tehran University of Medical Sciences, Tehran, Iran
⁴Statistical Advisor, Dental Research Center, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran
⁵Professor, Laser Research Center of Dentistry, Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, Iran.

Introduction: Debonding the orthodontic eyelets due to the risk of blood contamination from the impacted tooth is a clinical problem that orthodontists face routinely. This study aimed to assess the effect of hemostatic agents on shear bond strength (SBS) of orthodontic eyelets bonded with conventional and self-etch adhesives.

Methods & Materials: In this experimental study, eighty-four freshly extracted bovine lower incisors were randomly divided into 7 groups. In the TBXT group, teeth were etched with phosphoric acid gel, and then, the Transbond XT primer was applied and eyelets were bonded with Transbond XT. In the blood group, first, contamination with blood was done followed by the same procedure as TBXT. In other groups, the teeth were etched with phosphoric acid and based on their group allocation, Transbond XT primer (TBXT in groups), GC-G Premio Bond (SEP in groups), ViscoStat Clear gel (VISCO in groups), or Astringedent X (ASTX in groups) were applied. The SBS was measured for each group and the adhesive remnant index (ARI) was determined.

Results: The mean SBS was 20.79 MPa in VISCO + SEP group, 19.2 MPa in the TBXT group, 16.06 MPa in the SEP group, 15.43 MPa in VISCO + TBXT group, 9.39 MPa in ASTX + TBXT group, and 1.62 MPa in the blood group. The SBS of ASTX + SEP, blood, and TBXT + ASTX groups had significant differences from the SBS of the control group (P < 0.05). The ARI score of 0 had the highest frequency in the blood group.

Conclusion: Due to the high coagulative effect of Astringedent X and acceptable SBS of Astringedent X in combination with GC-G Premio bond, this combination can be recommended for exposure of impacted teeth that are at high risk of blood contamination.
Developing a decision support system based on soft tissue analysis for prediction of extraction need in Class I malocclusion treatment

Mahdjoube Goldani Moghadam¹, Esmaeil Hadavandi²
¹Assistant Professor of Orthodontics, Department of Orthodontics, Faculty of Dentistry, Birjand University of Medical Sciences, Birjand, Iran.
²Department of Industrial Engineering, Birjand University of Technology, Birjand, Iran.

Introduction: The aim of this study was to develop a decision support system based on photographic analysis of the soft tissue profile changes of a group of patients with Class I dental and skeletal malocclusion who were treated either with or without extraction.

Methods & Materials: the pre- and post- profile photographs of 116 patients who underwent orthodontic treatment were analyzed by means of 19 variables. The level of significance was set to be P < .05 (significant) and P < .001 (highly significant). We also developed a decision tree-based classifier to model the treatment modality.

Results: there were significant differences between pre- and post- treatment values of Zangle, upper and lower lip projection, G-Sn-Pog, N-Po-Sn, N-Sn-Pog, and N-Sn-B in extraction group. In non-extraction group, significant differences were observed in nose tip angle, nasomental angle, ANB, and measurements related to convexity of the profile. There were no significant differences between the measured variables of extraction and non-extraction groups neither before nor after the treatment except for Sn-Po-Gn and PFH/AFH values. Using a decision tree-based classifier we ranked the most important measurements and the cut off point values of each in a decision tree.

Conclusion: this study showed that extraction treatment for Class I malocclusion patients is mainly associated with upper and lower lip retraction. Both extraction and non-extraction groups in this study showed profile flattening following treatment. We also developed a decision tree-based classifier to help the clinician in treatment planning especially for borderline Class I cases.
Evaluation of the relationship between C422F and P561T polymorphisms in the growth hormone receptor gene (GHR) with craniofacial morphology in east of Iran

Mahdjoube Goldani Moghadam¹, Ebrahim Miri-Moghaddam²

¹Assistant professor, Department of Orthodontics, Faculty of dentistry, Birjand University of Medical sciences, Birjand, Iran.
²Associate Professor, Ph.D in Human Molecular Genetics. Department of Molecular Medicine, Faculty of Medicine, Birjand University of Medical Sciences, Birjand-Iran.

Introduction: Growth hormone affects craniofacial morphology. Genetic variations of growth hormone receptor (GHR) gene have been linked to morphological differences in facial and mandibular dimensions. The aim of this study was to evaluate the association of GHR polymorphisms at P561T and C422F sites with craniofacial morphology in a group of Iranian subjects.

Methods & Materials: A total of 200 subjects participated in the study. DNA was extracted from a whole blood sample and analyzed using PCR- RFLP method to evaluate polymorphisms of P561T and C422F genotypes. data were analyzed using Mann-Whitney U test.

Results: 24 patients showed heterozygous polymorphism for both the P561T (CA) and C422F (GT) genotypes. No homozygous polymorphism was found for these two polymorphic sites. Subjects with genotype CA of polymorphism P561T and genotype GT of polymorphism C422F had significantly larger values of ramal height, mandibular body length, and SNB angle compared to those with CC P561T and GG C422F genotypes.

Conclusion: the heterozygous polymorphism of P561T and C422F GHR gene are associated with ramus height, mandibular body length, and SNB angle in Iranian population.
Concerns and problems of orthodontic patients during the COVID-19 pandemic

Atefe Saffar Shahroudi\textsuperscript{1}, Seyyed morteza samimi\textsuperscript{2}, Ahmad Sodagar\textsuperscript{3}, Ahmadreza Shamshiri\textsuperscript{4}

\textsuperscript{1}Assistant professor, Dental research center, Dentistry research institute, and Department of Orthodontics, Dental school, Tehran University of Medical Sciences, Tehran, Iran
\textsuperscript{2}DDS, Postgraduate Student of Orthodontics, Department of Orthodontics, Faculty of Dentistry, Tehran University of Medical Sciences, Tehran, Iran
\textsuperscript{3}Professor of Department of Orthodontics, Faculty of Dentistry, Tehran University of Medical Sciences and member of Dental research center, Dentistry research institute, Tehran University of Medical Sciences, Tehran, Iran
\textsuperscript{4}Research Center for Caries Prevention, Dentistry Research Institute, Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Introduction: This study aimed to find the main concerns of active orthodontic patients and their problems associated with orthodontic treatment during the coronavirus disease-2019 (COVID-19) pandemic.

Methods & Materials: The study was performed using a researcher-made questionnaire. A total of 181 active orthodontic patients in the orthodontic department of the school of dentistry filled out the questionnaire which addressed several aspects of the effects of COVID-19 pandemic on their treatment including their anxiety, concern, problems, willingness to attend orthodontic appointments and to do other dental procedure. The correlation of gender, age, COVID-19-related anxiety and Orthodontic treatment-related (OTR) anxiety with each other and other parameters was statistically analyzed. The level of patients’ satisfaction with different aspects of the dental clinic’s performance was also assessed.

Results: The participants comprised of 117 female and 64 male patients with a mean age of 19.32 years. The majority of patients (94\%) adhered to the restrictions set during the COVID-19 pandemic. The mean COVID-19-related anxiety level of patients was 51.7\%, and the mean OTR anxiety was 52.7\%, which was slightly greater for females than males. Higher COVID-19-related anxiety was significantly correlated with a higher degree of OTR anxiety (P<0.001). However, there was an inverse correlation between general COVID-19-related anxiety and OTR anxiety and willingness to attend orthodontic appointments (P<0.05). There was a positive correlation between age and willingness to attend orthodontic appointments although this correlation was not significant (P=0.07). The main concern of patients was prolongation of their treatment course, and the most commonly occurred problem was irritation of oral soft tissue by orthodontic appliances. The majority of the participants (65.3\%) were willing to attend their orthodontic appointments. Orthognathic surgery (62\%) had the highest while, dental restorations and radiography had the lowest refusal rate by patients (9.9\%).

Conclusion: The COVID-19 pandemic significantly affected orthodontic treatment. The level of COVID-19-related anxiety was moderately high. Also, patients were concerned about the impact of lockdown on their orthodontic treatment outcome. Young adults demonstrated higher level of stress than other age groups.
Evaluation of the effect of malocclusion on oral health related quality of life (OHRQoL) among 8-11 year old school children of Tabriz in 2020

Mohamadreza Shahamfar¹, Sanaz Alimadadi², Niloufar Azima³
1Department of Orthodontics, Faculty of Dentistry, Tabriz Medical Sciences, Islamic Azad University, Tabriz, Iran
2General dentist, private practice, Tabriz, Iran
3Board certified pedodontist, Tabriz University of Medical Sciences, Tabriz, Iran

Introduction: Oral health Related Quality of Life (OHRQoL) is a multidimensional concept that examines the role of oral health in a person's daily activities, social life, self-confidence, and mental health. Considering the fact that insufficient study has been done on the effect of malocclusion on the quality of life and confidence among Iranian children and the high prevalence of malocclusion in the Iranian population, the purpose of this study was to determine the effect of malocclusion on Oral Health Related Quality of life (OHRQoL) in children aged 8-11 in Tabriz in 2020.

Methods & Materials: Five hundred children aged 8-11 participated in this study. Dental Aesthetic Index (DAI) was used to assess the participants’ malocclusion. Furthermore, the participants answered a standardized questionnaire namely child perception questionnaire to determine their social and emotional well-being in relation to the malocclusion. Clinical examinations were performed by the same researcher. Pearson Correlation Co-Efficient and t-test under SPSS18 software for Windows 10 were utilized for analysis of data.

Results: The study sample consisted of two groups of 216 boys and 284 girls. In general, the results showed that malocclusion had a statistically significant effect on quality of life related to oral health and emotional health of children. It was also shown that malocclusion did not affect the social health of these children.

Conclusion: In the present study, the effect of malocclusion on Oral Health Related Quality of Life (OHRQoL) in children aged 8-11 in Tabriz in 2020 was assessed. The results of this study showed malocclusion and its severity has a significant effect on quality of life. It also had an effect on a person's emotional health, but no significant relationship was found between a person's social health and malocclusion. Therefore, in general, it seems that malocclusion had a significant effect on the quality of life and emotional health of individuals, but the social health of children is not affected by malocclusion.
Persian translation, adaptation, and reliability of the SRBD-PSQ.

Farzaneh Ial alizadeh¹, Farzin heravi², Bahare amirhosseini³, Erfan Bardideh⁴

¹Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
²Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
³Dentist, Tehran, Iran
⁴Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: Sleep-related breathing disorders are a relatively common disease among children. However, it is underestimated due to the difficulty of diagnosis. The Sleep-related breathing disorder subscale from Pediatric Sleep Questionnaire (SRBD-PSQ) is a validated tool for the initial evaluation of children. The aim of this study was to translate and cross-cultural adaptation of the questionnaire into Persian in order to obtain a reliable and valid tool for screening the patients.

Methods & Materials: The SRBD-PSQ was translated into the Persian language in accordance with the stages recommended by the International Guidelines and reviewed by a panel of experts. The parents of 263 children (aged from 2 to 18 years) answered the Persian version of SRBD-PSQ online. The reliability of the translated questionnaire was measured by Cronbach’s alpha, Pearson correlation. The content and face validity of the questionnaire were determined based on the opinion of a panel of experts and laypeople.

Results: All of the questions gained acceptable scores in content and face validity. Reliability analysis determined an overall Cronbach’s alpha of 0.75, confirming the survey’s consistency. The Cronbach’s alpha of the Persian SRBD-PSQ domains ranged between 0.56 and 0.76. Test-retest reliability for all items was robust with a concordance of >95.0% in all items.

Conclusion: The Persian version of SRBD-PSQ is a valid and reliable tool that can be used by dentists and physicians for the initial evaluation and screening of patients.
Comparison the effect of Ibuprofen and curcumin on pain reduction after primary archwire placement in orthodontic patients

Hooman Shafaee
Assistant professor, Department of orthodontics, Mashhad dental School

Introduction: The aim of this study was to evaluate and compare the effect of ibuprofen and curcumin on pain relief after primary archwire placement in orthodontic patients.

Methods & Materials: In this clinical trial, 60 women in the age range of 14 to 30 years without systemic disease, without receiving analgesic drug with a moderate rate of dental crowding were selected to receive orthodontic treatment. Individuals were divided into 4 groups based on a table of random numbers. The first group received 400 mg ibuprofen after the initial Archwire, and this dose was repeated every 6 hours for up to 48 hours if there was pain. In the second group, the patient was given 80 mg of capsule curcumin daily one week before the initial brackets and archwires were placed. In the third group, the patient was given placebo. Patients were asked to report the severity of pain when placing their teeth on a wax block based on the VAS index at 2 hours and 6 hours after Archwire placement during sleep and 2 days later. Data were analyzed after recording and collecting.

Results: In this study, 60 participants in terms of pain variables in the positions of biting with anterior teeth, biting with posterior teeth and placing teeth on top of each other without biting in six times (2 hours, 6 hours, sleep time), 2 days, 3 days and one week after the intervention) and were examined in four groups (placebo of curcumin, curcumin, ibuprofen, placebo). In the case of biting with the anterior teeth, the pain trend was generally increasing until the time of sleep and then decreasing until a week later. Pain from low to high was partially recorded in the curcumin group, curcumin placebo, placebo and ibuprofen, respectively. In the case of biting with the posterior teeth, the pain trend was generally increased until sleep and then decreased until one week later. Pain from low to high at bedtime was recorded to some extent in the curcumin, placebo, placebo curcumin and ibuprofen groups, respectively. Also, the lowest amount of pain was recorded in the curcumin group after sleep. When the teeth were placed on top of each other, the pain trend generally increased until sleep and then decreased until one week later. Pain from low to high was recorded to some extent before bedtime in the curcumin group, curcumin placebo, placebo and ibuprofen, respectively. Also, pain from low to high was recorded to some extent in the post-sleep period in the curcumin, ibuprofen, placebo curcumin and placebo groups, respectively.

Conclusion: Compared to ibuprofen, Curcumin alone had good analgesic effects after initial Archwire placement.
Changes in esthetic standards of famous individuals profile since 1970

Fatemeh Hajizadeh¹, Ghazal Khazaiyan², Morteza Saleki³

¹Assistant Professor, Orthodontic Department, School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
²Dentistry Student, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
³Pediatric Dentistry in Private Practice, Ahvaz, Iran

Introduction: Facial esthetic is one of the most important components in orthodontic diagnosis and treatment planning. Also, research findings confirm that objective esthetic criteria have changed over time. The aim of this study was to investigate differences between the most popular female and male faces, past and present, and to determine whether they had changed during the time and if so, to what extent.

Methods & Materials: Internet film and picture databases were searched for profile photograph of men and women who were considered attractive between 1970 and 2020. Then, thirteen variables were measured on a total of 138 profile photographs (77 females, 61 males; Ages 18-45 years). Measurements were performed on a minimum of 27 images per decade. For statistical evaluation a 1-way analysis of variance was performed, and differences being considered significant if P≤0.05.

Result: during the observation period, a statistically significant differences were not found in facial esthetic standards in men and women who considered attractive.

Conclusion: esthetic standards for the Persian females and males profile changed since 1970 but their differences were not significant.
Cephalometric assessment of upper lip changes following Le Fort I osteotomy

Soodeh Tahmasbi1, Kasra Rahimipour2, Mahshid Namdari3, Reza Tabrizi4, Fatemesadat Seyedzadeghomi5
1DMD, Assistant professor, Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
2DMD, Resident of Dental Research Center, Research Institute of Dental Sciences, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
3Assistant professor, Department of Community Oral Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4Assistant professor, Oral and Maxillofacial Surgery Department, Dental School, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
5Resident of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Introduction: Lips play a fundamental role in facial attractiveness. This study sought to assess the upper lip changes following Le Fort I osteotomy for maxillary advancement and/or impaction.

Methods & Materials: This retrospective, observational study evaluated three groups of patients who underwent Le Fort I osteotomy of the maxilla. Group 1 (n=35) underwent maxillary advancement, group 2 (n=14) underwent maxillary impaction, and group 3 (n=11) underwent both maxillary advancement and impaction. The lip thickness of all patients was measured preoperatively, and the patients in each group were categorized into two groups of thin (<12 mm) or thick (>12 mm) lip type. The primary (before orthodontic treatment and orthognathic surgery) and final (after orthodontic bracket removal) lateral cephalograms of patients were analyzed using Dolphin software. Comparisons were made using paired t-test and linear regression in SPSS version 21.

Results: The upper lip length averagely increased by 1 mm (P=0.012) following maxillary advancement and decreased by 0.43 mm (P=0.24) following maxillary impaction. In the maxillary advancement group, the change in angulation of incisors predicted the incisal show (P=0.03). In the maxillary impaction group, skeletal changes in the vertical dimension predicted the changes in upper lip length (P=0.033).

Conclusion: Le Fort I osteotomy for maxillary advancement significantly increases the upper lip length. Assessment of the lip thickness prior to surgery can help predict the postoperative results.
Association of sella turcica bridging and morphologic characteristics with palatally impacted canine in lateral cephalograms

Azin Nourian¹, Soraya Akhoondi², Zohre Reyhani³, Nima Motamed⁴
¹Assistant Professor, Department of Orthodontics, School of Dentistry, Zanjan University of Medical Sciences, Zanjan, Iran
²Dental Student, School of Dentistry, Zanjan University of Medical Sciences, Zanjan, Iran
³Assistant Professor, Department of Dental Radiology, School of Dentistry, Zanjan University of Medical Sciences, Zanjan, Iran
⁴Associate Professor, Department of Social Medicine, School of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

Introduction: The sella turcica is a significant anatomical feature that might be the first item to alter when a diseased process begins. As a result, we intended to investigate the relationship between the sella turcica bridging and the impacted maxillary canine.

Methods & Materials: Orthodontic records with high-quality lateral cephalometric and panoramic images were chosen. The study comprised 30 patients with impacted canines (17 females and 13 males) and 30 controls with erupted canines (15 males and 15 females). The measurements were performed using the SCANORA 5.2.6 software, and the relevant data was collected and analyzed using SPSS software version 22. Following data validation, descriptive statistical analysis was used to investigate it, with t-tests and chi-square tests used to compare the two groups. The regression test was used to lessen the effects of confounding variables.

Results: In the study group, 16.7 percent of patients had type 3 sella turcica bridging, whereas 6.7 percent of patients in the control group had type 3 sella turcica bridging. This resulted in a statistically significant result. (P value = 0.017) Therefore, Sella turcica bridging was much more frequently in canine impaction patients than in controls. The maxillary impacted canine group’s interclinoid distance was substantially shorter than the control group’s (5.96±1.20 mm vs. 4.86±0.47) (P value = 0.001). In terms of age (P value = 0.400) and gender (P value = 0.605), there was no significant difference between the two groups of patients.

Conclusions: The current study discovered that people with maxillary canine impaction had a higher prevalence of sella turcica bridging than the control group. As a result, canine impaction may be associated to bridging of the sella turcica And this finding can be seen as a critical landmark, and physicians might refer patients to a specialist for more testing based on the patient’s situation.
Comparing streptococcus mutans adhesion by using different orthodontic bracket ligations: An in vitro study

Majid Shalchi¹, Arefeh Hajian-Tilaki², Mehrdad Sadegh Khanjani³, Peyman Sabzgolin⁴, Reihaneh Aghajani Nargesi⁵

¹Department of Orthodontics, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran
²Oral Health Research Center, Health research institute, Babol University of Medical Sciences. Babol, I.R.Iran
³Doctor of Medical Laboratory Science, Reference Lab, Guilan University of Medical Sciences, Rasht, Iran
⁴Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran
⁵Department of Prosthodontics, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran

Introduction: Orthodontic treatments and brackets application with various ligature methods have increased worldwide, but the growth rate and mechanism of microorganism adhesion to these ligatures is not fully discovered. The current study aimed to compare the level of streptococcus mutans adhesion to three different ligation methods.

Methods & Materials: This in vitro study was performed on 30 samples. Three different ligature methods were used and 10 samples were used in each group. In group A, conventional brackets with elastomeric ligature, in group B, conventional brackets with steel wire ligature and in group C, self-ligated brackets were used. Resin composite was condensed on the mesh surface of the brackets and cured for 40 seconds. Then, the coated samples with saliva were put into glass vials, immersed in 2 mL of streptococcus mutans suspension (×10⁹ CFU) and incubated at 37ºC for 24 h. Then, the samples were washed 3 times with normal saline, immersed into 2 mL of normal saline and shaken for 2 min. The obtained suspension was cultured on blood agar incubated at 37ºC for 48 h and the formed colonies counted. In analysis, we performed 1-way analysis of variance with Tukey test with multiple comparison in SPSS version 16.

Results: According to the results, streptococcus mutans growth rate showed statistically significant differences in the three groups. It was minimum in the steel wire (23.80±1.40), and maximum in elastomeric ligatures (38.60±1.84).

Conclusion: Steel wire ligatures had better effect on decreasing bacterial adhesion. The findings high light to decrease the use of elastomeric ligation brackets in patients with poor oral hygiene.
Concepts, protocol, variations and current trends in surgery first orthognathic approach

Ali Tashakor
Resident, Department of Orthodontics, Dental Faculty, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran.

Introduction: Surgery-first approach has been introduced as an alternative for the conventional orthognathic approach in the treatment of patients with dentoskeletal deformities. The advantages of this approach are the reduced overall treatment duration and the early improvement in facial esthetics. In the Surgery-first approach, the absence of a presurgical phase allows surgery to be performed first, followed by comprehensive orthodontic treatment to achieve the desired occlusion. The purpose of this paper was to compare surgery first and conventional orthognathic approaches.

Methods & Materials: Electronic databases including PubMed, Ovid, Embase, and Cochrane Library were searched. Only studies published in English were included. Finally, there were 5 publications eligible for literature review. A descriptive statistical method was used to present data.

Results: A good stability of the jaws was assessed both with the Surgery-first approach (SFA) and conventional orthognathic approach (COA). Less treatment time was reported for SFA than COA. A slightly higher complications rate was recorded with SFA than COA.

Conclusions: Surgery-first approach is an efficient and time-saving technique, but it is limited to patients with minimal arch length discrepancy, normal incisor inclination, and mild-moderate sagittal, vertical, and transverse discrepancies. Hence, patient selection is critical. In addition, passive wire bending is cumbersome and time-consuming. The occlusion cannot be used as a guide and the entire occlusal stability is dependent upon the surgical splint. Large volume, 3D studies, and well-designed RCTs with a long-term follow-up are needed to clarify the findings of this analysis.
Effectiveness of adjunctive interventions on the acceleration of orthodontic tooth movement: A review

Batroolalsadat Mousavi-Fard1, Mehrdad Shahsavari-Pour2
1Assistant Professor; Department of Orthodontics; Dental School; Kerman University Of Medical Sciences; Kerman; Iran
2Assistant professor; Department of Endodontics; Dental School; Kerman University Of Medical Sciences; Kerman; Iran

Introduction: The aim of this study was to evaluate the effectiveness of low-level laser therapy (LLLT) in reducing orthodontic pain after the application of orthodontic force.

Methods & Materials: All RCTs between December 2019 and October 2020 and relating to the subject were electronically searched in PubMed, Embase, Scopus, articles were manually screened. The study included randomized clinical trials (RCT) which analysed the efficiency of LLLT in reducing orthodontic pain assessed at 24 and 72 hrs after the application of orthodontic force.

Results: Out of 100 articles acebo, 15 were included based on inclusion criteria. In the outcome of the score of the most painful day, the comparison of laser versus placebo (pain associated with tooth movement) demonstrated that LLLT reduced the pain score significantly compared with plgroups.

Conclusion: LLLT demonstrated to be effective in reducing pain after the application of orthodontic force; however, Further and more perfect researches should be done in order to recommend LLLT as a routine method for orthodontic pain.
Effect of mandibular asymmetry on facial attractiveness perceived by lay people and specialists

Sepideh Arab¹, Kamyar Tayebi², Allahyar Geramy³, Farnoosh Razmara⁴, Mohammadjavad Kharazifard⁵, Elaheh Kamali⁶
¹ Associated Professor, Tehran University of Medical Sciences, Tehran, Iran
² Dental Student, Tehran University of Medical Sciences, Tehran, Iran
³ Professor, Tehran University of Medical Sciences, Tehran, Iran
⁴ Assistant Professor, Tehran University of Medical Sciences, Tehran, Iran
⁵ Tehran University of Medical Sciences, Tehran, Iran
⁶ Post graduate student, Tehran University of Medical Sciences, Tehran, Iran

Introduction: This study assessed the impact of mandibular asymmetry in the facial esthetics as perceived by lay people, orthodontists and oral and maxillofacial surgeons.

Methods & Materials: In this descriptive cross-sectional study, a 22 year old Iranian man was selected as the model and his photo was captured in the frontal view. The image was symmetrized from the facial midline using Photoshop software. The lower jaw was rotated 1-8 degrees in the constructed images. Images were presented to lay people, orthodontists and oral & maxillofacial surgeons via an online survey. The observers rated the image esthetics by a 0-100 mm visual analogue scale. They also determined treatment needs in the images. The statistical analyses were performed via analysis of variance and regression test.

Results: As expected, the images without any rotations or with 1° rotations received the highest esthetic rates among all 3 groups of observers, while the image with 8° rotation was the least attractive one. The effects of observer group on image esthetic rates was significant in the rotations of 0, 1, 2 and 3° (all: p<0.001). Furthermore, the image esthetic ratings significantly affected its treatment needs. The threshold for treatment need was 5°, 6°, and 7° for surgeons, orthodontists and lay people, respectively. In addition. The threshold for recognizing the asymmetry was 1° for the orthodontists and 3° for surgeons and lay people. There was no statistically difference between male and female raters.

Conclusion: orthodontists were the most sensitive group in recognizing and the surgeons were the most sensitive in treatment need .The esthetics of the images were decreased with the increased mandibular asymmetries
The adjunctive effect of autologous platelet concentrates on orthodontic tooth movement: A systematic review and meta-analysis of current randomized controlled trials

Nima Farshidfar1, 2, Mohammad Amin Amiri2, Parsa Firoozi3, Shahram Hamedani4, Shabnam Ajami1, Lobat Tayebi5
1Orthodontic Research Center, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.
2Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran.
3Department of Oral and Maxillofacial Surgery, School of Dentistry, Zanjan University of Medical Sciences, Zanjan, Iran.
4Oral and Dental Disease Research Center, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.
5Marquette University School of Dentistry, Milwaukee, WI, USA.

Introduction: To evaluate the effectiveness of autologous platelet concentrates (APCs) as adjuncts on accelerating orthodontic tooth movement (OTM) of the human subjects undergoing orthodontic treatment and to critically appraise the available literature.

Methods & Materials: Five electronic databases (PubMed, Scopus, Web of Science, Embase, and Cochrane Central Register of Controlled Trials) were searched from 2000 up to May 2021 to retrieve eligible randomized controlled trials (RCTs) investigating patients who underwent orthodontic treatment that involved OTM of maxillary and mandibular incisors and canines. All the enrolled cases were treated with APCs and had no local or systemic interfering factors. The quality of the included studies was assessed using the modified JADAD scale. The effect sizes were assessed using mean difference (MD). The heterogeneity analysis was conducted using (I²) statistic at α=0.10.

Results: Finally, seven RCTs were included in the qualitative, and two RCTs were included in the quantitative analysis. The meta-analysis was performed regarding the effect of injectable platelet-rich fibrin (I-PRF) on the rate of canine tooth movement in millimeters at different intervals of the 1st, 2nd, and 3rd months. In the 1st month, I-PRF (WMD:0.12mm, CI95% -5.01 to 5.24, I²=90%) did not significantly affect OTM. In the 2nd month, I-PRF (WMD:0.66mm, CI95% 0.60 to 0.73, I²=10%) significantly increased the OTM. However, in the 3rd month, I-PRF did not significantly increase the OTM (WMD:0.54mm, CI95% -1.38 to 2.47, I²=67%).

Conclusion: According to the low certainty of evidence about this topic, providing a definite conclusion is not possible. However, applying I-PRF seems to be efficient in accelerating the OTM of the canines. Further high-quality studies with larger sample sizes will be indispensable to validate this conclusion.
Addition of chitosan and TiO2 nanoparticles into the orthodontic adhesive: Effects on shear bond strength

Abdolrasoul Rangrazi¹, Fahimeh Farzanegan², Hooman Shafaee², Majid Darroudi³
¹Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
²Department of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
³Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: The addition of chitosan NPs and TiO2 NPs into orthodontic adhesives for their synergistic antimicrobial effect can be considered as an effective strategy to overcome WSLs and caries. This study aimed to evaluate the effect of adding different chitosan NPs and TiO2 NPs on SBS of an orthodontic adhesive.

Methods & Materials: 72 extracted human premolars were embedded in acrylic resin and randomly allocated into four groups of 18 specimens. In the group 1 (control), brackets were bonded to the tooth with the Transbond XT orthodontic adhesive. In the groups 2, 3, and 4, 0.5% chitosan NPs and 0.5% TiO2 NPs, 1% chitosan NPs and 1% TiO2 NPs, and 1.5% chitosan NPs and 1.5% TiO2 NPs were added to Transbond XT, respectively. The brackets were bonded by the modified adhesive. The SBS and ARI of each group was assessed.

Results: Results showed no statistically significant difference between the group 1, the group 2, and the group 3, but SBS decreased significantly in the group 4. With increasing the concentration of NPs up to 1% chitosan NPs and 1% TiO2 NPs, SBS did not change significantly. However, in 1.5% chitosan NPs and 1.5% TiO2 NPs, SBS decreased compared to the other three groups. No significant differences were found between the groups in terms of ARI scores.

Conclusion: It is concluded that the orthodontic composite containing 1% chitosan NPs and 1% TiO2 NPs has adequate SBS for use in the clinical setting.
Cephalometric norms in Iranian adults who live in Ahvaz using McNamara analysis 2018-2019

Ehsan Naghdipour 1, Fataneh Ghorbanyjavadpour2

1Student, Faculty of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2Assistant Professor, Department of Orthodontics, Faculty of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Introduction: Today better diagnosis and treatment planning in patients for orthodontic or surgical treatment must be consistent on the same ethnic cephalometric norms. The study aims were to determine the cephalometric norms of the Iranian sample living in Ahvaz by McNamara's analysis and to verify the existence of gender dimorphism and compare it with the standard norms and similar studies.

Methods & Materials: Cephalograms of 79 patients (39 male, 40 female in 19-29 years old) were selected from the Orthodontic department of Ahvaz Dental School archive during 2018-2019. The subjects had a Class 1 molar relationship with a balanced profile, no history of orthodontic or surgical treatment or trauma, and no congenital anomalies. According to the McNamara analysis 8 linear and 4 angular measurements were traced manually and analyzed statistically by Shapiro-Wilk, independent t-test, and Mann-Whitney tests in IBM SPSS, version 22, with a meaningful level of P < 0.05.

Results: According to our findings there were significant differences in the effective length of the maxilla and mandible, Maxillo-mandibular differences, Distance point A and pogonion from N perpendicular line, 1/3 lower face height, but in the upper and lower incisor position and facial axis and mandibular plane angle were not. (p<0.05).

Conclusion: Iranian sample had more retruded Mid-face, mandible, and chin and shorter lower face height. (p<0.05) But upper and lower incisor position, mandibular plane angle, and facial axis were in the line of McNamara norms. Despite existence of differences between Iranian adults and Caucasian norms, McNamara's analysis was applicable in Iranian groups.
A systematic review of methods to determine skeletal maturation based on cervical vertebrae

Arezoo Mahdian¹, Shahab Kavousinejad², Mahmood Dashti³, Mohammad Behnaz⁴, Atiye Yadegari⁵

¹Assistant Professor, Department of Orthodontics, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.
²Orthodontics Resident, Department of Orthodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.
³DDS, Dental Research Center, Research Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
⁴Assistant Professor, Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
⁵Undergraduate Dentistry Student, Student Research Committee, School of Dentistry, Shahid Beheshti University of medical sciences, Tehran, Iran.

Since the determination of skeletal maturation by surveying concavity on lower surface of cervical vertebrae and evaluating shape of vertebrae is a subjective and quantitative study, this systematic review was performed to evaluate new quantitative and objective methods by using cervical vertebrae for determining skeletal maturation. Material and Methods: Related keywords were searched in Pubmed and Cochran database in order to find studies that were published in English from January 2000 to January 2019 and evaluated skeletal maturation based on cervical vertebrae by modern methods. Also, the references of the included studies were search for other related studies. Results: From overall 1371 titles, 27 were selected by initial screening. Evaluation of the full texts resulted in inclusion of 13 articles. Among articles included in this review, three studies used CBCT images and another studies used lateral cephalogram. One study performed evaluation cervical vertebrae in the axial view of CBCT images while another evaluation was on sagittal view. Most of the studies used a regression model in order to determine bone age of vertebrae and then compared it with skeletal age obtained from hand wrist radiography. Conclusion: As the methods and measurements were different in the included studies it was not possible to reach a decisive conclusion regarding method for determining skeletal age based on cervical vertebrae. It is suggested to use a combination of maturation signs along with development stages of cervical vertebrae in order to determine skeletal maturation until a quantitative and valid method is presented.
The effect of adding TiO2 on shear bond strength of orthodontic composite during aging: An in vitro study

Melika Firouzmanesh1, Vahid Mollabashi2, Abbas Farmani3
1Orthodontic resident, Hamedan University of Medical Sciences
2Assistant professor, Hamedan University of Medical Sciences
3Assistant professor, Hamedan University of Medical Sciences

Introduction: Plaque accumulation and bond failure are drawbacks of fixed orthodontic treatment. As the antimicrobial effect of Titanium dioxide (TiO2) nanoparticles have been proven, the aim of this study was to evaluate the mechanical properties of orthodontic composite modified by the addition of 1% wt TiO2 nanoparticles after stimulate one-year clinical operation with 10000 rpm of thermocycling.

Methods: Orthodontics composite containing 1% TiO2 nanoparticles were prepared. For shear bond strength (SBS) test, 50 intact human premolars (which extracted for orthodontic purpose) were divided into two groups. Composites with and without 1% wt TiO2 were used for bonding of bracket. The bracket/tooth SBS was measured by using an universal testing machine before and after 10000 rpm thermocycling.

Results: The average shear strength of the group containing 1% TiO2, which not subjected to thermocycling was 18.3301 MPa and the average shear strength of the group without TiO2, which not subjected to thermocycling was 24.0916 MPa. After 10000 rpm thermocycling, the average shear strength of samples containing 1% TiO2 was 13.4612±5.176 MPa and the average shear strength of samples without TiO2 was 11.4331±5.188 MPa. The difference in shear strength of the two groups after thermocycle is not significant and the shear strength of both groups is in an acceptable range for clinical use.

Conclusions: The mean shear bond of composite containing 1% TiO2 nanoparticles is still in an acceptable range for clinical use.
Ions release evaluation and corrosion of titanium mini-implant surface in response to orthokin, Oral B and Chlorhexidine mouthwashes

Shiva Alavi¹, Atefe Ahmadvand²
¹Department of Orthodontics, Dental Research Center, School of Dentistry, Dental Research Institute, Isfahan University of Medical Sciences,
²Department of Orthodontics, Dental Students’ Research Committee, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran

Introduction: The present study was performed to evaluate the effect of three types of mouthwash (orthokin, oral B and chlorhexidine [CHX]) on releasing of aluminum (Al), Titanium (Ti) and Vanadium (V) ions from titanium mini-implants (TMIs).

Methods & Materials: In this in vitro, experimental study, a total of 40 TMIs were divided equally into four groups (10 TMI in each group) and then were immersed into Orthokin, Oral B, CHX, and artificial saliva, as a control. The experiments were performed for 21 days as following groups 1–7 days, 8–14 days, and 15–21 days. The inductively coupled plasma-optical emission spectrometry method was used to assess releasing metal ions after immersion in the storage media. In addition, before and after each experiment, the corrosion of TMIs was assessed using a scanning electron microscope (SEM). All results were analyzed using Kruskal–Wallis, followed by Bonferroni-adjusted Mann–Whitney U-test at 0.05 level of significance.

Results: Our data showed that the maximum concentration of released Al was in the 1st week of exposure to Orthokin and Oral B (202.3 ± 68.5 and 72.3 ± 15.2 µg/L, respectively). Oral B exposure of TMI also caused to releasing of Ti to 128.1 ± 42.5, 54 ± 19.4 and 22 ± 6 µg/L for 1–7 days and 8–14 days and 15–21 days, respectively. Orthokin and CHX also induced the release of Ti more than artificial saliva (P < 0.05). In addition, there was no significant statistical difference between any types of mouthwashes and artificial saliva in releasing V. The results of SEM images also confirmed the corrosion effects of mouthwashes.

Conclusion: The factors of exposure time and mouthwash type influenced the pattern of releasing Al and Ti as well as corrosion level.
Root resorption during orthodontic treatment

Masomeh esmaily
Assistant professor, department of orthodontic dentistry, school of dentistry, Alborz university of medical sciences, Karaj, Iran

Currently, orthodontic treatment requires an average duration of 2–3 years. The lengthy treatment poses higher risks of numerous side effects to patients, among which external apical root resorption (EARR) has been frequently reported. The exact mechanism of the EARR development is still unclear, but it is generally accepted the root resorption is positively associated with force magnitudes and apical movement distance. Literature has identified a number of risk factors, which predispose a patient to root resorption once subjected to orthodontic mechanics. These can be categorized as general (Age at start of treatment, Gender, Ethnicity, Systemic diseases and medications and the genetic link revisited or local factors) or local factors (Tooth shape and position). Positive correlation exists between root length and resorption, as well as abnormal root shapes observed in pre-treatment diagnostic records should be considered with caution and carefully monitored throughout treatment for the development of iatrogenic damage. In addition, the relationship between the length of treatment time and type and magnitude of force and root resorption has been positively correlated by almost all studies. Also, the type of force applied, whether continuous or interrupted, on the pattern of resorption showed that less severe apical blunting and smaller resorption affected areas when the applied force was intermittent. When diagnosing root resorption, it is recommended that orthodontic mechanics be discontinued for at least 6 months. During this rest period, it is anticipated that root resorption craters will be repaired. Eventually, A proper medical history, an assessment of predisposing factors, a radiographic evaluation for alterations in root morphology and careful planning and execution of orthodontic mechanics may reduce the incidence of root resorption to an extent.
Adhesion of orthodontic brackets on ceramic surfaces

Manijeh Mohammadian
Assistant Professor, Department of Dental Biomaterials, School of Dentistry, Alborz University of Medical Sciences, Karaj, Iran

Ceramic materials have a special place in dentistry due to their aesthetics and are constantly evolving. Attaching orthodontic brackets to teeth is important for effective and efficient treatment with fixed devices. However, in orthodontic treatments, attachment to ceramic surfaces may be challenging due to the high toxicity and risk of surface damage. In this review, we have tried to examine the important factors in the bond strength of ceramic materials, the best adhesive for fixing orthodontic brackets, and the function of connecting orthodontic brackets to these material surfaces. This review was investigated the published articles up to 2021 in Pubmed, Medline, and Scopus related to bonding orthodontic fittings to ceramic surfaces. The metal brackets for adhesion to ceramic surfaces, ceramic brackets for adhesion to ceramic surfaces, and adhesion to new types of ceramics, such as zirconia, lithium disilicate, various photopolymerization devices used for adhesion to ceramics were investigated. The results showed that some adhesives may have good bond strength on ceramic surfaces. Ceramic brackets show better adhesion to ceramic surfaces than metal and the same adhesion protocol can be used. Ceramic surface preparation is done similarly with sandblasting or hydrofluoric acid (HF acid). It was recommended 60s application and 9.6% solution for use of HF acid. The effect of the type of photopolymerization device on the higher bond strength was not found in the studies.
Orthodontic-Surgical treatment in a patient with anterior skeletal open bite and myotonic dystrophy

By Mostafa Shahabi¹, Abdolrasoul Rangrazi², Alireza Chamani³, Adel Sharifi Rayeni⁴, Alireza Shirzadeh⁵

¹DDS, MS, Department of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran.
²PhD, Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
³DDS, MS, Assistant Professor of Orthodontics, Department of Orthodontics, School of Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran
⁴DDS, MS, Department of Oral and Maxillofacial Surgery, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran.
⁵DDS, MS, Department of Oral and Maxillofacial Surgery, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran.

Treating patients with muscle dystrophy, such as myotonic dystrophy, is difficult because of muscle dysfunction symptoms. Anterior open bite is a common symptom in these patients. The co-existence of muscle atrophy and anterior open bite makes the treatment of these patients very challenging for clinicians. We report the case of a 21-year-old adult patient with myotonic dystrophy and skeletal anterior open bite who was successfully treated using orthognathic surgery. The patient had severe anterior open bite and an increased facial height. Initially we expanded the maxilla with Hyrax and after leveling and aligning, orthognathic surgery was done. During surgery, the surgeons performed differential impaction of the maxilla and BSSO and genioplasty. After debonding of braces, two mini screws were inserted into the maxilla and another two into the mandible to use intermaxillary elastics for retention. The post-treatment facial photographs showed an improvement in overall facial balanced. Acceptable occlusion was achieved, and overbite improved to 1 mm.
Comparison of esthetic perception and satisfaction of profile among male adolescents and adults with different profiles

Neda Eslami¹, Maryam Omidkhoda², Mostafa Mozhdehifard³
¹Associate Professor of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
²Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
³Associate Professor of Orthodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: The present study aimed to evaluate esthetics perception and satisfaction of profile among Iranian male adolescents and adults.

Methods & Materials: In this cross-sectional study, male subjects referred to Orthodontic Department of Mashhad Dental School (Iran) were enrolled. Patients were divided into two groups: adolescents (n=39), and adults (n=45). Also, they were assigned to straight, convex, or concave profile groups based on the Jacobson’s soft tissue analysis. Initially, one ideal silhouette was designed in Photoshop CS2 software. Then, 8 other silhouettes representing different relations of maxilla and mandible were constructed. Patients were asked to use numbers 1 to 10 to rank the profiles in the order of the attractiveness, and to choose a silhouette that best closely resembled their own profile. Moreover, a questionnaire was filled by patients to assess their satisfaction with their own profile.

Results: Adult and adolescent subjects with straight and concave profile showed the greatest and the least satisfaction with their own profile, respectively. Both adult and adolescent group selected “retrognathic maxilla, prognathic mandible” as the least attractive profile. “Straight” and “Bimaxillarydentoalveolarretrusion” were chosen as the most attractive silhouettes in adolescent and adults, respectively. Only 42.9% of adolescents and 22% of adults were able to correctly diagnose their own profiles.

Conclusion: Most of the male adolescents and especially adults have an incorrect perception of their own profile. Therefore, it is essential that orthodontists consult their patients in this regard at the time of treatment planning at the start of treatment to prevent unsatisfactory results.
Association between malocclusion, happiness and oral health related QoL in children, 2018-2019

Nosratabadi Reyhaneh¹,², Sargeran Katayoun³, Razeghi Samaneh³
¹Dentist, School of Dentistry, Tehran University of Medical Sciences
²Resident of Orthodontics, Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences
³Associate professor, Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences

Introduction: Happiness is one of the most complex needs of people, so it has a hidden effect on different aspects of their life, including aesthetic and quality of life. The present study aimed to explore the association between malocclusion, happiness and oral health related quality of life in children aged 11-14 attending the dental school of Tehran University of Medical Sciences, 2018-2019.

Methods & Materials: In this cross sectional study two questionnaires were used: 1- Child Perception Questionnaire (CPQ) to assess quality of life and 2- Oxford questionnaire for the assessment of child happiness. Children's occlusal status was categorised according to IOTN index. Linear regression model was used to evaluate the associations. SPSS-25 software was utilized for statistical analysis.

Results: The mean age of participants was 12.42 (±1.13) years. According to IOTN classification 10.5% of the participants were class I, 49.7% class II, 35% class III and 4.9% class IV. The average score of QoL was 1.85 (±0.39). In boys, there was a significant and direct relationship between CPQ and malocclusion (p=0.000). In girls, there is a significant and direct relationship between CPQ and malocclusion (p=0.016). In both gender, an inverse relationship between happiness and CPQ scores was observed (p<0.05).
Special considerations in orthodontic treatments of atypical facial growth – A clinical review of Cases

Alireza Jafari-Naeimi  
Assistant Professor, Dept. of Orthodontics, School of Dentistry, Tehran Medical Sciences, Islamic Azad University, Tehran, IRAN.

The development of the face is a completely controlled biological process. Normal growth involves constant bone regeneration and displacement. Atypical growth begins when this biological balance is upset. Many practitioners find the complexity of facial growth overwhelming and thus merely observe and accept the clinical features of atypical growth and do not comprehend the long-term consequences. However, with the understanding of these processes, clinicians can adequately assess patients and determine the causes of these atypical facial growth patterns and design effective orthodontic treatment plans. Interactions between different parts of the dentofacial complex play an important role in causing malocclusion or developmental problems but are not yet well understood and have been the focal point of studies of vertebrate biology for over two centuries. For example, there is a general rule which states that for facial growth, whether normal or atypical, to occur, a collective functional and structural balance will always occur. These growth compensations will always make the learning of growth and development confusing and difficult to comprehend. Identification of atypical growth, is a major step in evaluation of its role in success and failure of orthodontic treatments. And many a times, an individualized treatment plan should be considered for such atypical facial growths. Therefore, in this presentation, special considerations in orthodontic treatments of atypical facial growth will be presented. And a series of clinical cases will be reviewed. It will be shown that, by understanding these processes, clinicians can appropriately assess any atypical facial growth patterns, and design effective treatments according to the ultimate goal of structural balance, functional efficacy and aesthetic harmony.
Clinical application of nanomaterials in orthodontics; A review of literature

Elahe Soltan Mohammadi¹, Kimia nokar²
¹Assistant Professor, Department of Orthodontics, Qom University of Medical Sciences
²Student, faculty of dentistry, Tehran university of medical sciences

Introduction: Nanomaterials have various applications in modern dentistry. They are mainly used in orthodontics, endodontics, restorative dentistry and dental implants. Nanomaterials are bioactive due to their greater surface-to-volume ratio. They can reduce friction forces due to the presence of weak Van der Waals forces between their layers. This review aims to summarize the clinical application of nanomaterials in orthodontics.

Methods & Materials: A search of electronic databases was undertaken in MEDLINE and Web of science. Studies from 2016 until 2021 were included. The keywords nanomaterials and orthodontics were used. These searches were limited to English articles.

Results: Of the 223 studies initially identified, 29 were extracted based on title and abstract. Finally, 13 articles were read in full text.

Conclusion: Nanomaterials have exceptional mechanical and anti-bacterial properties, they can deliver drugs and reduce friction. Coating archwires and brackets with nanoparticles can improve anchorage control and reduce plaque retention which are two main concerns of Fixed orthodontics treatment. Nanoparticles antibacterial and anti-cariogenic properties can advantage us in many ways when incorporated into an elastomeric ligature, aligners, band, cement, and composite adhesives. The use of nanoparticles in mini-screws can improve wettability, osseointegration, and healing which leads to better anchorage and shorter treatment time. Shape-memory polymers, self-healing materials, self-cleaning materials, biometric adhesives, tooth movement using nanorobots are all possibilities for the future of nanotechnology in orthodontics. However, there are still concerns regarding the safety of prolonged treatments; further studies are needed. Further studies are needed.
Smile arc influence on smile attractiveness in different gingival displays; An esthetic perception study in Iranian population

Majid Mahmoudzadeh¹, Maryam Salehzadeh²

¹DDs, MSc, associate professor, department of orthodontics, Hamadan university of medical sciences
²DDs, postgraduate student of orthodontics, Hamadan university of medical sciences

Introduction: The effect of several variables on smile attractiveness have been studied. Smile arc and gingival display have been shown to affect smile esthetics separately, However, there seems to be controversy in literature which may be rooted in cultural and ethnic diversity. The purpose of this study was to evaluate and compare Iranian’s perception on this topic.

Methods & Materials: 2 sets of digitally altered images of a female and male model were presented to groups of orthodontists and laypeople. 16 images consisting of 4 different smile arcs (reverse, flat, consonant and exaggerated) in combination with four gingival displays (-4mm to +2mm) were displayed in each set, sorted by gingival display. respondents were asked to rank the smile arcs from the most attractive (4) to least attractive (1) in each gingival show. Kruskal-Wallis H and Mann-Whitney U tests were employed to reveal the statistical relation of gingival display to the preferred smile arc.

Results: layperson preferred flat smile arcs and orthodontists believed flat and consonant arcs to be most attractive in all gingival displays for female and male smiles. Reverse arcs were mostly disliked in lower amounts of gingival display and excessive arcs were mostly disregarded in upper amounts of gingival display.

Conclusion: A wise and concerned orthodontist should consider evidence-based trends in esthetic concepts and customize this according to the patient’s personal interests.
Comparison of the postgraduate orthodontics curriculum in Mashhad dental school with the top ten dental schools in the world

Mostafa Abtahi 1, Negin Azizzadeh 2, Hossein Bagheri 3, Alireza Ghasemzadeh 4
1Orthodontic Department, Dental Materials Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2DDs, Private Practice, Mashhad University of Medical Sciences, Mashhad, Iran
3Dental Materials Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4Orthodontic Department, Mashhad University of Medical Sciences, Mashhad, Iran

Introduction: Recognizing and reviewing the educational curricula of the specialized fields of dentistry and comparing it with the curricula of the top universities in the world will help to provide the necessary changes and corrections in postgraduate dental education, leading to more skilled specialists. The aim of this study was to compare the orthodontics postgraduate curriculum of Mashhad dental school with the top 10 international dental schools.

Methods & Materials: Twenty-two of the world’s top universities (10 main and 12 reserve) that offer orthodontics postgraduate programs were selected. A checklist including eight key factors and some secondary variables was prepared. These factors were classified as quantitative and qualitative. The checklist was filled with information provided by university websites and contacting program directors using email. A sample t-test and descriptive-analytic approach were respectively used to analyze the quantitative and qualitative data.

Results: Among the quantitative factors that were evaluated, only the “percentage of completely treated patients” was significantly lower in Mashhad dental school compared with that of the top 10 international dental schools. There was no significant difference regarding the length of study, the number of professors, and the number of patients visited by each resident. Among the qualitative factors, the most diversity was seen in certificates awarded to graduates.

Conclusions: No significant difference was observed in didactic education, clinical training, and research project conduction between the orthodontics postgraduate program of Mashhad dental school and top-tier international universities.
Artificial intelligence and machine learning applications in orthodontics

Pouyan Razavi  
Student Research Committee, Dental Faculty, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran

Introduction: This study seeks to give an overview of the available information on the use of artificial intelligence (AI) and machine learning (ML) in orthodontics, how it has been translated into clinical practice, and what restrictions have prevented their implementation.

Methods & Materials: A review of the literature, using PubMed, was carried out until July 2020.

Results: Sixty-two articles fulfilled the inclusion criteria. A total of 43 out of the 62 studies (69.35%) were published this last decade. The majority of these studies were from the USA (11), followed by South Korea (9) and China (7). The number of studies published in non-orthodontic journals (36) was more extensive than in orthodontic journals (26). Artificial Neural Networks (ANNs) were found to be the most commonly utilized AI/ML algorithm (13 studies), followed by Convolutional Neural Networks (CNNs), Support Vector Machine (SVM) (9 studies each), and regression (8 studies). The most commonly studied domains were diagnosis and treatment planning—either broad-based or specific (33), automated anatomic landmark detection and/or analyses (19), assessment of growth and development (4), and evaluation of treatment outcomes (2). The different characteristics and distribution of these studies have been displayed and elucidated upon therein.

Conclusion: According to this study, the number of studies involving diverse orthodontic applications of AI and ML has increased exponentially. Diagnostic and treatment planning, automated anatomic landmark identification and/or analysis, and growth and development evaluation were the most typically explored fields.

Malocclusion is associated with happiness and quality of life in children aged 11-14 years. Due to the importance of social relationships in this age group, dental professionals should be aware of these factors when they are dealing with the treatment of malocclusions in children.
New surface modification to reduce bacterial adhesion of elastomeric ligatures

Soodeh Tahmasbi1, Zahra Tehrani2, Gity Mir Mohammad Sadeghi3, Shadi Khamani4, Mehdi Shokri5

1Associate Professor, Department of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2Orthodontist, Private Practice, Tehran, Iran
3Polymer Faculty, Department of Polymer Engineering & Color Technology, Amirkabir University of Technology, Tehran, Iran
4Faculty of Polymer Engineering, Sahand University of Technology, Tabriz, Iran.
5Department of Dental Biomaterials, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Introduction: Despite numerous advantages, elastomeric ligatures have some disadvantages such as high water absorption, high accumulation of microbial plaques and reduction of mechanical properties over time. In this study, surface modification was performed by making the ligature’s surface hydrophobic in order to investigate its effect on the mechanical properties and microbial adhesion.

Methods & Materials: First, elastomeric ligatures were coated by polydimethylsiloxane (PDMS) in two phases by using dip coating method. Mechanical properties (tensile strength and force decay) and hydrophobicity of the surface of sixty coated and sixty non-coated ligatures were investigated by the Instron testing machine at specified intervals (0, 1, 14 and 28 days). Afterwards, the adhesion of Streptococcus mutans in both groups was evaluated by the colony count method (CFU/ml).

Results: Coating the specimen with PDMS increased their contact angle up to 19° and turned the surface into hydrophobic surface. In coated ligatures, force decay showed lower reduction in specific intervals compared to the non-coated group. Although coating of specimens reduced their tensile strength (P-value <0.05), the variations of the tensile strength were less in the coated group. Furthermore, in the coated group, the bacterial adhesion was significantly reduced by 10 times (P-value =0.036).

Conclusion: Coating the ligatures by PDMS increased surface hydrophobicity; therefore, the adhesion of Streptococcus mutans to the ligatures was reduced. This also caused lower force decay, although attenuation of the tensile strength of the coated ligatures.