

An interview with

José Rino Neto

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It is an honor for me to present this interview with Professor José Rino Neto. Famous professor of the University of São Paulo (USP), José Rino Neto has built his academic career founded on solid basis at the University of São Paulo (USP), attending there from dental school (FOB-USP) until his complete training as a professor (MSc, PhD and Full Professor of FOUSP). For this reason, he is a great messenger of the works of memorable professors, such as Sebastião Interlandi and Julio Wilson Vigorito. Besides being a legitimate representative of orthodontic quality in Brazil, our interviewee has particular academic and personal characteristics worth mentioning. His career path has enabled him to create a summarized coherent understanding of “Dentofacial Morphology”, which lead him to be the clinic coordinator of the Orthognathic Surgery graduate program at USP. We are convinced that orthodontics has gone forward under the critical eyes of this young and wise educator, who ponders over the probabilities of science, in order to achieve permanent success and demystify innovations. The intimate coexistence with his mentors has allowed him to become a skillful professor, who knows how to be strict, yet humble, kind and a true perfectionist in science and in the clinic, enabling him to build noble relationships with his students. Professor Rino kindly granted us with the following interview, where he expresses his reflections about orthodontics as one of the most significant professors in Brazil and based on his own clinic and scientific experience.

José Valladares Neto

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

The Department of Orthodontics of the University of São Paulo (FOUSP) has recently published an improved version of the USP Cephalometric Analysis. What are the main improvements of the USP-2 Analysis? (José Valladares Neto)

The USP cephalometric analysis was published in 1968 by Professor Interlandi and comprises the set of cephalometric landmarks originated from the analysis of Downs, Tweed, Steiner, Bjork, Holdaway, Interlandi and Vigorito. According to the author, the main objective of this cephalometric analysis was to assist the orthodontist in diagnosis and treatment planning. The establishment of the USP analysis was an unquestionable milestone in the history of Orthodontics in Brazil, and nowadays it is a key diagnostic tool in orthodontic decisions.

The department of Orthodontics of the University of São Paulo understands that there has been a new diagnostic methodology being shaped in the last few years and the USP-2 analysis was developed to better correlate to this new orthodontic scenario.

The USP-2 cephalometric analysis is divided in three categories (soft tissue, skeletal and dental structures) to simplify the readability and interpretation of the cephalometric measurements. The new cephalometric landmarks are originally from the Ricketts, Jarabak, Jacobson and Epker and Fish Analysis and its main improvements are in the vertical and sagittal soft tissue evaluation, inner relationship of the cranial base anatomic structures and vertical dental relationship assessment (Fig 1).

In surgical cases, what are the indications for occlusal plane change? What reference do you use to determine the inclination of the occlusal plane? (Adilson Ramos)

The changes in inclination of the occlusal plane have been performed routinely as part of the orthodontic-surgical treatment. The decision to change the angle of the occlusal plane cannot be arbitrary and should be made according to esthetic and functional goals.

Increased inclination of the occlusal plane is indicated in Class I cases with dentofacial deformities such as reduced occlusal and mandibular plane; in short faces with Class II, division 2 malocclusion, deep overbite and pronounced chin; and occasionally in the Class III dentofacial deformities. The procedure reduces chin

	Clinical norm	Clinical deviation
SOFT TISSUE EVALUATION		
vertical		
G-Sn : Sn-Me	1:1	--
Sn-Stms : Stmi-Me	1:2	--
Stms-Stmi	0-3 mm	--
Sn-Stms	19-22 mm	--
⊥-Stms	1-3 mm	--
horizontal		
Sn.Perp-Prn	16-20 mm	--
Sn.Perp-UI	2-4 mm	--
Sn.Perp-LI	0-2 mm	--
Sn.Perp-Pg'	0 / -4 mm	--
Sn-Gn' : C-Gn'	1:0.8	--
Nasolabial angle	90-110°	--
H-nose	9-11 mm	--
SKELETAL EVALUATION		
Cranial base		
S-N	75 mm	3
Ba-N.FH	27°	3
Facial type and Growth pattern		
Facial axis	90°	3
FNP	90°	3
FMA	26°	4
Lower facial height	47°	4
Mandibular arch	26°	4
N.S.Ar	123°	5
S.Ar.Go	143°	6
S-N : Go-Me	1:1	--
S-Ar : Ar-Go	3:4	--
Ar.Go.N	52-55%	--
N.Go.Me	70-75%	--
S-Go/N-GMe	60-64%	--
Maxillomandibular relationship		
SNA	82°	2
SNB	80°	2
ANB	2°	2
A-N.Perp	1 mm	--
P-N.Perp	-4 / +2 mm	--
Co-A	-	--
Co-Gn	-	--
ENA-Me	-	--
A point convexity	2.0 mm	2
Wits (AO-BO)	0 mm	--
	-1.0 mm	--
N-ENA : ENA-Me	1:1	--
N.C.F.A	53°	3
DENTAL RELATIONSHIPS		
Sagittal		
⊥1	131°	6
⊥NA	22°	2
⊥-NA	4 mm	--
⊥NB	25°	2
⊥-NB	4 mm	--
IMPA	90°	5
⊥PP	110°	--
Vertical		
⊥-Stms	1-3 mm	--
Overbite	3.0 mm	2
1-Occlusal plane	1.25 mm	2

Figure 1 - USP-2 standard cephalometric analysis.

projection and posterior face height, promotes the advancement of paranasal structures, as well as uprighting upper incisors and flaring the lower incisors.

The reduction of the occlusal plane inclination, i.e., the counterclockwise rotation of the occlusal plane, can be done in two ways. The first consists of the autorotation of the mandible after the superior repositioning of the maxilla that is not surgically manipulated. The autorotation of the mandible is indicated to individuals that have increased lower face height, excessive exposure of the upper front teeth in rest or smiling, increased interlabial distance increased and retrusive chin. The counterclockwise rotation of the maxillomandibular complex should be planned for cases with high occlusal and mandibular planes, anterior excess height and/or posterior deficient height of the maxilla, increased anterior height of the mandible and/or reduced posterior height of the mandible, mandible with deficient chins and in severe cases of obstructive sleep apnea.

As for determinant references for the planning of the occlusal plane inclination change, the assessment of the craniocervical muscle anatomy and physiology, the respiratory function and the esthetic goals for the case should be mentioned. I believe the maxillary occlusal plane positioning is an important step in the planning of occlusal plane manipulation, since this position determines the incisor display in rest position, as well as the gum and incisor display in smile position. Another relevant factor is the chin, since the occlusal plane rotation can increase or reduce its prominence according to the treatment objectives and initial profile convexity.

Regarding the diagnosis and planning of dentofacial deformities, do you prefer to use Frankfort Horizontal Plane (Larry Wolford) or Soft Tissue Cephalometric Analysis (William Arnett)? (Roberto Macoto)

The use of a particular diagnosis and planning method is determined by the orthodontist's preference. The greatness of Dr. Wolford's surgical cases results is unquestionable; his cases are planned based on skeletal and dental cephalometric landmarks, which use the Frankfort Horizontal Plane as the main reference. I have been using a different approach to diagnose and plan Orthognathic Surgery cases since

1998, this approach enhances the importance of face evaluation and cephalometric analysis of the soft tissues, which is assessed when the patient's head is in Natural Position, the facial muscles are relaxed and bite is preferably in centric relation. Therefore, my preference for diagnosing and planning surgical cases is the Soft Tissue Cephalometric Analysis from Arnett. I believe it better correlates facial esthetics and orthodontic and surgical decisions. Moreover, it is based on the Natural Head position, which I consider as the ideal position for facial assessment and determination of cephalometric dentofacial relationships. Furthermore, the evaluation of soft tissues is outlined by extra cranial vertical and horizontal lines, which are ideal references for evaluation of patients with dentofacial deformities, since those patients often have discrepant relationships of internal parts of the cranial base, which may affect the interpretation of cephalometric measurements.

Virtual planning of Orthodontic and Orthognathic surgery cases has become a reality in nowadays practice. What is your opinion on this technology? (Adilson Ramos)

The virtual planning is already a reality for the Orthognathic Surgery patients because it provides the benefits generated by the technology in favor of better treatment outcomes. Considering that dentofacial deformities compromise the relationship of skeletal and dental structures, and soft tissue in the three planes of space, nothing is more appropriate than the use of a technology that can diagnose and plan these cases in three dimensions. The virtual method of orthodontic and surgical treatment planning enables high results accuracy, as well as reliably reproducing the virtual plane at the operating room.

This includes the construction of 3D virtual models generated from cone beam computed tomography, from which it is possible to observe anatomic structures of interest, a dynamic cephalometric diagnosis and planning, surgical movements simulation, construction of surgical guides, size and position of plates and screws for the rigid internal fixation and allows the access and navigation in the database during the surgery.

Among the main benefits of the virtual planning, I highlight the precise assessment of morphological

structures important in defining the treatment goals, osteotomy design and accurate positioning of osteotomized bone segments; furthermore it enables the surgeon to estimate the difficulty level of the surgery before the surgical procedure.

CONE BEAM COMPUTED TOMOGRAPHY

Some scientific publications have questioned the routine use of CBCT scans in orthodontics due to its high ionizing radiation doses, but we know that CBCT scans provide important information when compared conventional orthodontic records. What is your opinion on this matter? Are the risks worth the benefits?

(João Batista de Paiva)

The use of CBCT imaging is already established in orthodontics and its use has been widely accepted. Even though there is not a guideline from orthodontics associative entities in respect to the use of the 3D images generated from the ionizing radiation, it is important to consider some aspects that may allow us to use those examinations in a rational and objective way, and take advantage of its high detail capacity that cannot be found in conventional x-rays.

The request of CBCT scans should be done considering the potential risk of radiation, especially in children and adolescents, and should be based on patient history, clinical examination and the presence of a specific clinical condition that ensures its benefit to the diagnosis and or treatment plan of the patient. At this time, it is important to consider the specific image capture protocol design; which includes Voxel size, field of view size, type of equipment used, and oth-

ers — noting that all these items influence the image quality and radiation dosage. Actions must be taken to minimize radiation dosage to exposed patients following the ALARA principle, “as low as reasonably achievable”. Special care must be devoted to children due to their active growth and development, period which they have a great cell growth, and greater radio-sensitivity than adults. The main indications of CBCT imaging in orthodontics are the diagnosis and treatment planning of the dentofacial deformities, such as morphological evaluation of the airway, TMJ, cortical bone thickness and orthodontic-surgical virtual planning. Furthermore, it is indicated when the patient has supernumerary teeth; internal and external root resorption; impacted teeth, close relationship between molars and the alveolar nerve, TMJ pathologies and size abnormalities; such as abnormal shape and position of skeletal structures, as condylar hyperplasia, hypoplasia or aplasia; degenerative conditions, as rheumatoid arthritis; adaptive abnormal conditions, as condyle reabsorption and remodeling; trauma, as condyle fracture; in addition to allowing the precise location of skeletal anchorage devices (Fig 2).

However, the request for precise examinations such as CBCT images are useless if the professional is not able to interpret it. From a legal standpoint, it is important that these images are read and analyzed by a radiologist so that the responsibilities of incidental findings, which are common, are not the orthodontist’s responsibility. To finalize, I believe the use of 3D images generated from the CBCT scans are worth the risks when used with responsibility and knowledge by the orthodontist.

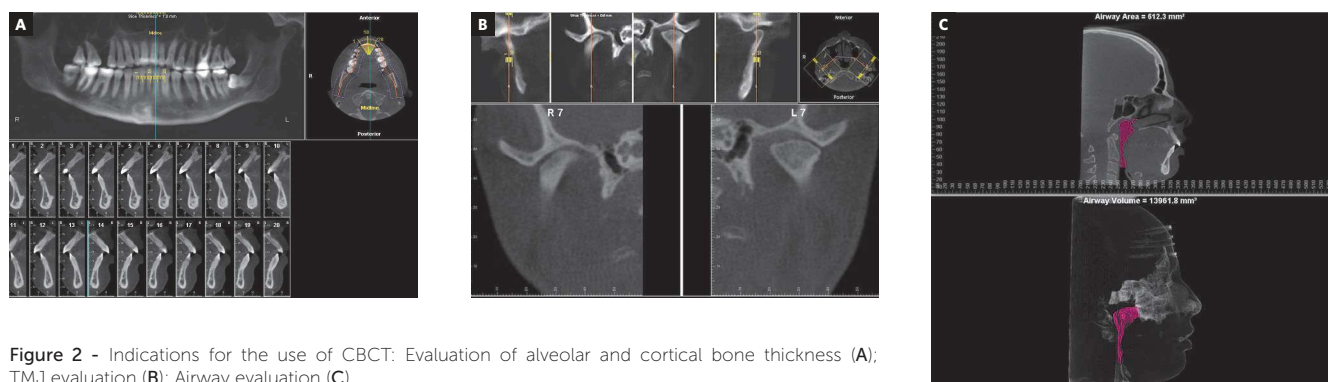


Figure 2 - Indications for the use of CBCT: Evaluation of alveolar and cortical bone thickness (A); TMJ evaluation (B); Airway evaluation (C).

Considering your research and clinical experience with cone beam computed tomography, what changes can we expect in the airways after procedures such as rapid maxillary expansion, surgical maxillary advancement (Pattern III), surgical mandibular advancement (Pattern II), maxillomandibular advancement (Pattern I) or another that you may find relevant to the patients with obstructive problems?

(Adilson Ramos)

In the last two decades, numerous scientific publications have reported changes in airway dimensions after orthognathic surgery and its relation to the treatment of obstructive sleep apnea (OSA). Recent advances in airway observation based on images generated from cone beam computed tomography (CBCT) have helped us in understanding normal and abnormal airways and their changes in response to surgery. The anatomic knowledge of the airway and its characteristics based on preoperative studies allow us to define a precise surgical treatment plan focused on the restriction areas.

After surgically assisted rapid maxillary expansions (SARME), it is possible to observe in the 3D images, a swelling on the lower portion of the nasal cavity, especially where the nasal valve is located, which is the region of greatest constriction. This swelling happens due to the opening of V-shaped sutures, which can be observed in the coronal and axial planes. In the coronal plane, this opening becomes smaller towards the cranium; in the axial plane, the larger opening is anteriorly and progressively decreases posteriorly. These changes produce minimal, yet positive effects on the respiratory parameters during sleep.

The literature does not recognize specific changes in the airway space size due to surgical maxillary advancement only. In most studies, the maxillary advancement was performed in association with mandibular setback for the correction of Class III dentofacial deformity, which is considered the factor that decreases the risk of occurrence of OSA after surgery. An increase in volume of the nasopharynx and oropharynx area can be observed as well, however the long-term benefits is still questionable due to the possibility of adaptive changes in the soft palate morphology after the advancement of the maxilla to keep the oropharyngeal closure.

Patients who have mandibular advancement surgery show an increase in the airway volume space in general, especially in the retroglottal portion of the oropharynx, which extends from the soft palate to the epiglottis. This alteration happens due to the advancement of all the structures that are connected somehow to the mandible (like the hyoid bone, the suprahyoid musculature, the genioglossus and the tendons), which promotes increased muscle tension and generates greater tissue collapse resistance in this region during sleep (Fig 3).

The maxillomandibular advancement is considered the method of choice in orthognathic surgery for the treatment of OSA. The justification for this procedure is based on the fact that the advancement of the maxilla and the repositioning of the mandible enables anterior positioning of the suprahyoid and velopharyngeal muscles, which leads to an anterior movement of the soft palate, tongue and tissues of the anterior wall of the pharynx, resulting in an increase in the size of the nasopharynx, oropharynx and hypopharynx. This significant increase of the anteroposterior and lateral dimensions of the palatine and lingual regions, observed in the CBCT image, associated with increased tension of the walls of the oropharynx, is responsible for the improvement reported by patients as indexes assessed in polysomnography and subjective symptoms postoperatively.

ORTHOGNATHIC SURGERY

The standard orthodontic treatment prior to orthognathic surgery addresses mostly dental corrections. However, the anticipated benefit orthodontic-surgical treatment procedures have been recently introduced to orthodontics

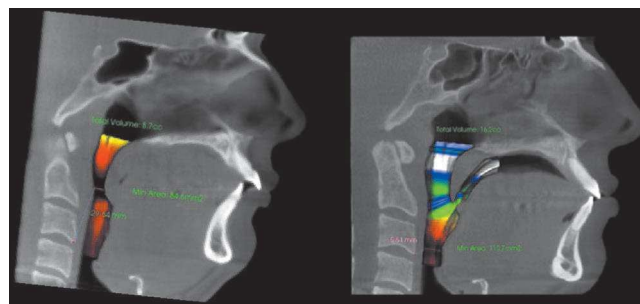


Figure 3 - Improved dimensions of the airway after surgical mandibular advancement.

and it proposes orthognathic surgery before orthodontic treatment. Are there any particular dentofacial deformities to which this technique should be recommended?

(Gilberto Vilanova Queiroz)

Considering the conventional and anticipated benefit technique for the treatment of dentofacial deformities, I believe there are specific circumstances in which one prevails in relation to the other. However, regardless of the approach to be taken, it is essential to achieve balanced facial esthetics, chewing efficiency, longevity of dental and periodontal tissues, correction stability, patient satisfaction, and acceptable respiratory and sleep function. The conventional surgical-orthodontic treatment is indicated for correction of all types of dentofacial deformities; therefore its mechanics is theoretically simpler and within the knowledge of most well prepared professionals. Another advantage is that this method provides greater result prediction, since after the aggravation of the patient's deformity through presurgical orthodontics, the planning of the skeletal and integumentary modifications of the face becomes less complex to be executed (Figs 4 A, B, C). The disadvantage of this therapeutic approach is the possible temporary worsening of facial esthetics prior to surgery.

The anticipated benefit technique is indicated when there is an immediate need for surgery because of functional problems, especially those related to severe obstructive sleep apnea and to treat esthetic problems at the beginning of treatment. In my opinion, the most adequate cases for this procedure are those with well-aligned teeth or light crowding with flat or average Curve of Spee, or well positioned incisors with slight or no transverse discrepancies. The cases where this technique is not indicated are those with severe crowding, asymmetries, differences in the occlusal plane, decreased lower face height or even Class II patients with deep overbite and deep Curve of Spee. As advantages of the anticipated benefit, I mention the treatment duration reduction due to the accelerated dental movement phenomenon. On the other hand, I understand there are many disadvantages in the anticipated benefit method, such as less stability of occlusion immediately after surgery, less predictable results and the need to be performed by highly experienced and trained orthodontists.

When correction of sagittal skeletal discrepancies is performed by orthognathic surgery, what criteria do you use to define the amount of overjet prior to surgery?

(Gilberto Vilanova Queiroz)

The answer to this question is complex and awakens some questions relevant to the topic, such as: What is the impact of this treatment on the patient's face? Is there a need for tooth extractions for decompensation of the buccolingual inclinations of upper and lower incisors? How much orthodontic presurgical preparation will be required? How much movement of the osteotomized bone segments is required for the correction of the skeletal and soft tissue components of the face?

These responses begin to be answered during the interview with the patient, but for this data to be relevant and helpful in the decision-making process, it is important to have specific forms to identify how the deformity impacts the patient's quality of life. These forms allow the patient to self assess his dentofacial esthetics and the correlation between social issues and the deformity. The use of psychometric instruments has as main objective to evaluate quantitatively their self-image and their perception of the deformity in a more elaborate way.

The patient facial esthetics planning is an extreme complex process and its decisions require the orthodontist and oral surgeon to fully comprehend facial harmony and its ethnic characteristics, as well its relationship with functional aspects of craniofacial components. Therefore, this process requires proper records, such as facial and intraoral clinical exam, 2D and 3D images. The face clinical exam allows the orthodontist and oral surgeon to recognize which structures are balanced and which are out of balance, enabling them to determine if the maxilla, the mandible or both caused the deformity.

The intraoral exam is not only important to assess the dental positioning status, but also to evaluate the patient's periodontal status, integrity and structure, since these tissues will have to support the planned dental decompensation caused by orthodontic treatment.

At last, by examining the 2D and 3D images, the information of the facial analysis is confirmed, as well the relationship between the internal craniofacial structures. At this moment, it is essential to plan the final



Figure 4A - Combined orthodontic and surgical treatment: Initial photographs.



Figure 4B - Combined orthodontic and surgical treatment: Presurgical photographs.

position of the upper and lower incisor. This is done through CBCT images observation, specifically by sagittal tomographic cuts on the upper and lower incisor area, which enables the orthodontist to evaluate the alveolar bone limits and to understand possible orthodon-

tic movement limitations, which is important since the impossibility of dental movement to treat a preexisting malocclusion will determine the amount of the presurgical orthodontics needed, the overjet amount and the potential soft tissue relationship (Fig 5A-F).



Figure 4C - Combined orthodontic and surgical treatment: Final photographs.

In short, the amount of presurgical overjet will be determined by considering important factors, such as: 1) the chief complaint of the patient and his dentofacial esthetic concerns, 2) middle and lower face problem severity and its correction options, 3) teeth movement limitations; 4) need for extractions to eliminate preexisting dental compensations, and 5) pathology involving the TMJ and the airways.

In patients with transverse relationship problems and considering the current therapeutic possibilities to treat it, which criteria do you use to choose between: A) Two stage surgical treatment comprising initial Surgically Assisted Rapid Maxillary Expansion and final Sagittal

and Vertical Orthognathic Surgery; B) One stage surgical treatment comprising Surgically Assisted Rapid Maxillary Expansion only; and C) Orthodontic dentoalveolar archwire expansion? (Gilberto Vilanova Queiroz)

Transverse issues deserve our utmost attention during orthodontic and surgical treatment planning, especially because these cases show greater relapse potential. When considering different surgical options, the orthodontist must consider the severity of the deformity, the amount of expansion planned (to obtain ideal upper and lower arch forms and to provide enough space for the accommodation of all teeth, eliminating the need for extractions) and the need for additional orthognathic surgery to correct the vertical and sagittal problems.



Figure 5A - Combined orthodontic and surgical treatment with minimal facial esthetic changes: Initial photographs.



Figure 5B - Combined orthodontic and surgical treatment with minimal facial esthetic changes: Photographs of the presurgical orthodontic preparation.

The two stage surgical treatment, when the SARME and the orthognathic surgery are performed in two separate steps, is indicated for treatment of maxillary narrowing since it allows greater expansion (Fig 6A, B, C), this procedure also shows greater long term stability. It is important to emphasize that with the advent

of bone supported expanders, some limitations of conventional palate expansion, which required SARME, were overcome, such as patients missing multiple teeth and poor periodontal status.

Patients with sagittal and/or vertical skeletal problems and transverse maxillary deficiency may



Figure 5C - Combined orthodontic and surgical treatment with minimal facial esthetic changes: Final photographs.

undergo a single surgical procedure. In such cases, the Le Fort I maxillary osteotomy in two or three pieces is indicated to promote lateral repositioning of palate, which allows the full maxillary narrowing correction in only one surgical procedure. This procedure, however, demands greater experience from the surgeon and proper presurgical orthodontic procedures, such as intentional root divergence to provide access for the osteotomy.

The main advantage of this procedure is that it is done in one single step, where the transverse, sagittal and vertical deformities are corrected simultaneously. However, despite being an excellent problem solving technique, it is only indicated for patients who need mild maxillary expansion, the indication for this

procedure is limited to cases where mild maxillary expansion is needed, due to the minimal elasticity of the palatal mucosa. Furthermore, this procedure presents higher morbidity, increased risk for complications and greater relapse potential.

The orthodontic dentoalveolar archwire expansion is a completely different and controversial subject in contemporary orthodontics. However, I believe this type of expansion can only be performed in cases where the posterior teeth are lingually inclined, otherwise this procedure would have high relapse potential. The posterior teeth inclination should be measured in cast model and confirmed by the evaluation of the posterior cortical bone thickness through tomographic slices.

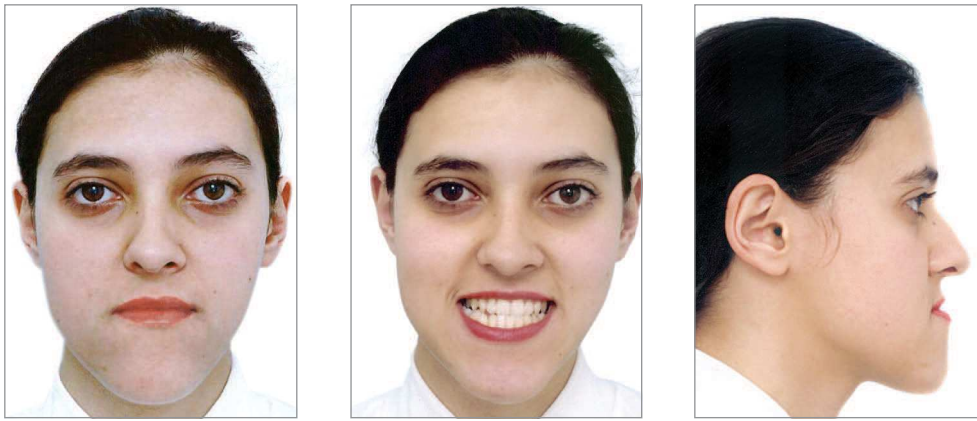


Figure 5D - Combined orthodontic and surgical treatment with significant facial esthetic changes: Initial photographs.

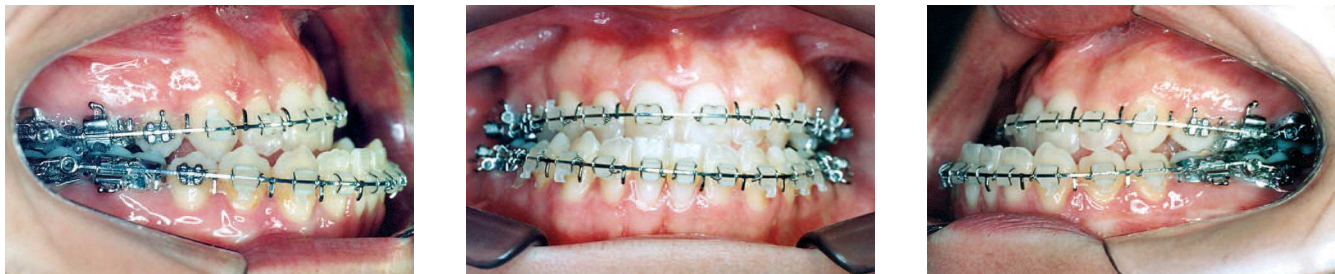


Figure 5E - Combined orthodontic and surgical treatment with significant facial esthetic changes: Presurgical photographs.

In your opinion, what is the role of the orthodontist and the oral surgeon in regards to the diagnosis and treatment of obstructive sleep apnea? (João Batista de Paiva)

Orthodontists and oral surgeons have an important role in both the diagnosis and treatment of obstructive sleep apnea (OSA). Their contribution to therapeutic conduct of OSA begins in the clinical examination of the patients, more specifically in the achievement of the complete medical and sleep history, especially in adult patients. In this stage, subjective

questionnaires can be used, such as the Epworth Sleep Scale, which provides some information on the sleep and waking of the patient. It is essential to also ask questions to the patient's spouse before the completion of the initial exam. The next step is collecting records including 3D images, which allows craniofacial complex analysis in the three planes of space, as well as the nasopharynx, oropharynx and hypopharynx volume and area estimation (Fig 7).

The final diagnosis of OSA is given by the otorhinolaryngologist, who will analyze the clinical data,



Figure 5F - Combined orthodontic and surgical treatment with significant facial esthetic changes: Final photographs.

images and may require more specific tests, such as nasofibrolaryngoscopy and polysomnography, to make a diagnostic conclusion. It's hard to ascertain the best treatment option for this condition, since there are many different severity levels of OSA and the treatment options are also different for each of these levels. In cases of mild to moderate apnea an intraoral device for mandibular advancement during sleep may be indicated, which is a responsibility of the orthodontist and/or oral surgeon. In cases of severe apnea, orthognathic surgery can be indicated, and in those cases both the orthodontist and the oral surgeon are protagonists in the treatment of OSA.

How much should the orthodontist interfere and participate on the surgical planning? (Roberto Macoto)

The treatment planning of orthodontic-surgical cases requires a collaborative knowledge from all the specialties involved. I believe orthodontists and oral surgeons should work together, so that the details pertinent to each specialty can be applied to benefit the patient.

The orthodontist treating a patient planned for orthognathic surgery must have a thorough comprehension of orthodontic diagnosis, including facial soft tissue analysis, interpretation of three-dimensional images and specific presurgical orthodontic mechanics.



Figure 6A - Combined orthodontic and surgical treatment of Class II dentofacial deformity by two separate surgical procedures: Initial photographs.

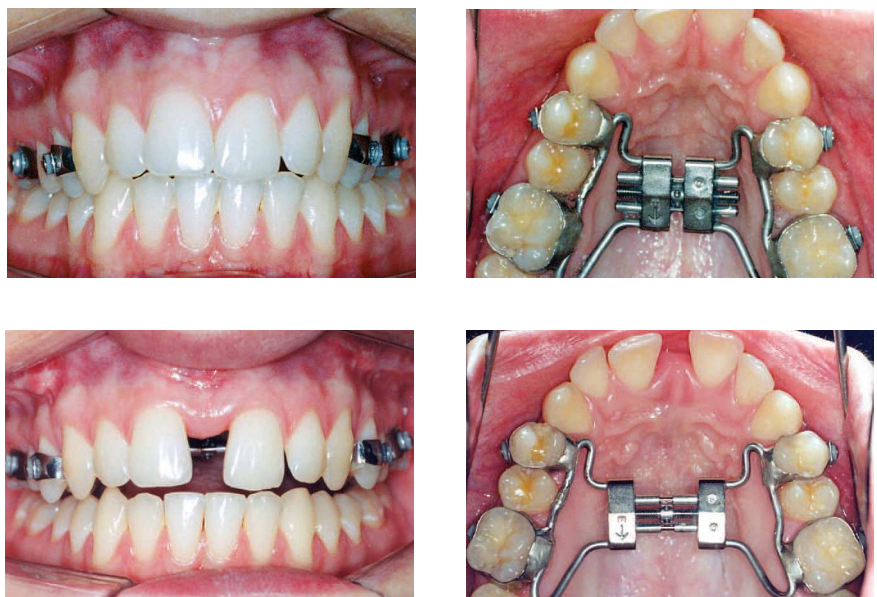


Figure 6B - Combined orthodontic and surgical treatment of Class II dentofacial deformity by two separate surgical procedures: Pre and post-surgically assisted rapid maxillary expansion (SARME).



Figure 6C - Treatment of Class II dentofacial deformity by two separate surgical procedures: Final photographs after mandibular advancement.

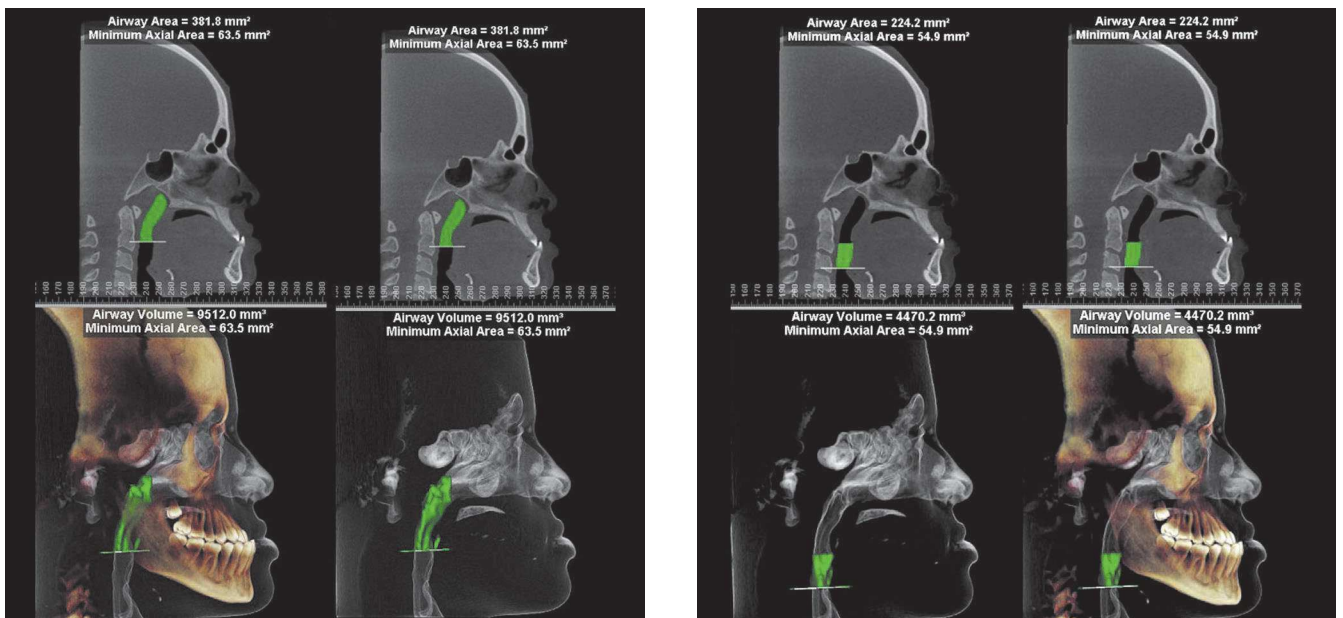


Figure 7 - Evaluation of the nasopharynx and the oropharynx dimensions.

The orthodontist's ability to deal with these and other questions, as well as solving dental and skeletal problems, earns the oral surgeon's respect and trust, facilitating their interaction.

Based on this principle, the orthodontist must participate positively in the treatment planning of orthodontic-surgical cases. For that reason, the orthodontist must fully understand and consider the patient's main concerns, facial harmony and esthetics, orthodontic possibilities, as well as the soft tissues changes caused by orthodontic and surgical procedures. The risks and benefits of the chosen surgical technique to obtain determined results should be also discussed.

TMJ

There is great controversy regarding the surgical management of temporomandibular joint disorders in patients with painful symptoms. From an orthodontic point of view, when do you believe TMD surgical interventions are indicated? Are you favorable to the use of other methods, such as neuromuscular deprogramming plates, arthrocentesis, etc?

(Roberto Macoto)

As an orthodontist who's been involved in multidisciplinary approach for TMD treatment, my actions and recommendations are to always perform accurate differential diagnosis, to identify the causes of the TMD and to treat them as conservatively as possible. In my private practice, I have been using Michigan plates since the early 90s, either on its own or in combination with drug therapy, when acute pain is present. I also recommend physiotherapy, acupuncture, cognitive behavioral psychology, and other recovery and muscle relaxation methods. Other procedures, such as occlusal adjustment, orthodontic treatment, occlusal rehabilitation or even orthognathic surgery may be indicated for TMD treatment.

I have observed a great deal of controversy in the literature regarding the therapeutic approach to temporomandibular joint disorders (TMD) in symptomatic patients, especially regarding issues related to whether therapeutic or surgical treatment should be performed. This controversy has generated mistaken conducts by many professionals, thus negative results can come from a bad indication of such determined surgical procedure. However, we

also can find well-defined TMD clinical and surgical treatment options in the literature.

There are several well-defined clinical situations in which the surgical TMD treatment is unquestionably indicated. These are the cases of ankylosis, fractures, hemifacial microsomia, total idiopathic condylar resorption (due to arthritis or autoimmune disorders), traumatic condylar destruction, malignant and benign tumors and condylar hyperplasia (Figs 8A-E). The purpose of this treatment method is to modify the internal anatomic structure of the TMJ, such as in cases of recurrent mandibular dislodgement and surgical disk recapturing (which is the reattachment of articular displaced discs). The greatest risk of the surgical assessment is in its irreversible character.

Arthrocentesis is a less invasive low morbidity procedure indicated in cases of acute and chronic pain with decreased joint movement range, which provides good results — especially when used as auxiliary therapy in cases of orthognathic surgery with mandibular alterations. This procedure is indicated to reduce the negative pressures that interfere in the mobility of the articulation disk, as well as eliminates chemical mediators that cause pain and inflammation. Most discussions in relation to the indications of this isolated procedure reside in the duration of its benefits.

A very important issue to be considered is related to TMD patients with chronic pain, for those suffering from central nervous system sensitization, the continued stimulation of afferent pathways, associated with changes in descending inhibitory pain system. In these cases, even after surgery, the pain or even the physiological deficiency to inhibit it, may remain or worsen. Therefore, surgical treatment for patients with chronic pain may not be the best treatment option.

In my opinion, there are insufficient longitudinal studies and randomized clinical trials to prove the effectiveness of each surgical method and thus eliminate controversies.

SELF-LIGATING BRACKETS

In your opinion, what has a larger impact on self-ligating systems: the self-ligating brackets or the super elastic archwires? What is your experience in orthodontic treatment of the deformities using self-ligating brackets?

(João Batista de Paiva)



Figure 8A - Combined orthodontic and surgical treatment of a short face patient associated with condylectomy due to active condylar hyperplasia: Initial photographs.

In a self-ligating system, what really makes the difference is exactly the combination of the self-ligating brackets and the super elastic memory archwires. Nowadays, it is the knowledge of the orthodontic community that there is no scientific evidence to prove the clinical superiority of self-ligating when compared to conventional brackets. A real benefit of the use of self-ligating systems is the shorter chair time during patient care and less lower incisor inclination during teeth leveling. However, many in vitro studies have demonstrated the significant friction and binding reduction between self-ligating brackets when compared to conventional bracket systems, which are ligated either by stainless steel or elastic ties.



Figure 8B - Orthodontic-surgical treatment of short face patient associated with condylectomy due to active condylar hyperplasia: panoramic x ray. The abnormal left condyle can be noted.

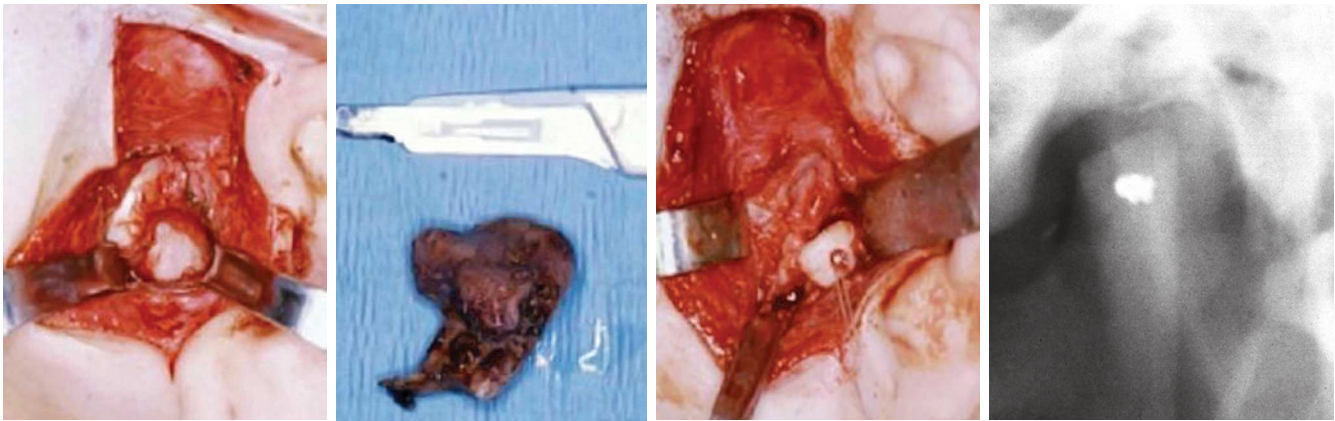


Figure 8C - Combined orthodontic and surgical treatment of short face patient associated with condylectomy due to active condylar hyperplasia: Surgery – condylectomy and disk fixation.



Figure 8D - Combined orthodontic and surgical treatment of short face patient associated with condylectomy due to active condylar hyperplasia: Final photographs.

Despite having similar biological orthodontic force response, in spite of the bracket system, there is an important aspect to be considered is that the combination of self-ligating brackets and superelastic archwires, due to its low friction character, generates lower magnitude forces on the teeth for a longer period of time, which allows an ideal biological response, control of the desired orthodontic and less reported pain by the patients, particularly at early stages of treatment (Fig 9).

Approximately 3 years ago, I started using self-ligating brackets and superelastic archwires in ortho-

dontic preparation cases before orthognathic surgery, it allowed me to complete the presurgical orthodontic phase in less time, hence reducing the total time treatment. In that time, I chose to use active brackets, so I could get the desired clearance in the slot of the bracket during the initial stages of the treatment, and when I needed to control the torque towards the end, I could count on the pressure of the bracket clip on the rectangular steel wire to get the desired effects. However, during this short period of time, mechanic modifications were necessary to achieve the benefits of this system and to reduce the total treatment time (Fig 10).



Figure 8E - Combined orthodontic and surgical treatment of short face patient associated with condylectomy, due to active condylar hyperplasia: 5 years post-treatment.

EDUCATION

How do you see the training of radiographic cephalometry in the current clinical practices? (Neto José Valladares)

Since 1991, when I joined the discipline of orthodontics at FOU SP, I was assigned to teach undergraduate and graduate classes on radiographic cephalometry, so it's been accurately 22 years dedicated to the study and teaching of radiographic cephalometry.

Over the years, many concepts have changed in this field, especially the paradigm shift regarding the importance of soft tissues in the diagnosis and treatment planning. Unquestionably, this new concept has changed significantly the methods for the diagnosis and treatment planning of cases. Another important evolution over the years was the use of computer soft-

ware to perform computerized cephalometric tracings and to predict surgical and orthodontic results.

Currently, we know that the facial soft tissues define the treatment requirements, however the cranial base structures, the maxillomandibular relationship and the teeth positions in relation to its alveolar bone must be analyzed prior to planning for orthodontic, orthopedic or surgical movements, especially when its effects will cause changes on the upper and lower lip positions. Another important aspect to consider is the study of the internal relationship of the cranial base structures, as demonstrated in the cephalometric analysis of Jarabak and Ricketts, not only to answer questions related to the planning and the mechanics to be employed, but also informing the orthodontist about the case prognosis, based on the patient's facial type.

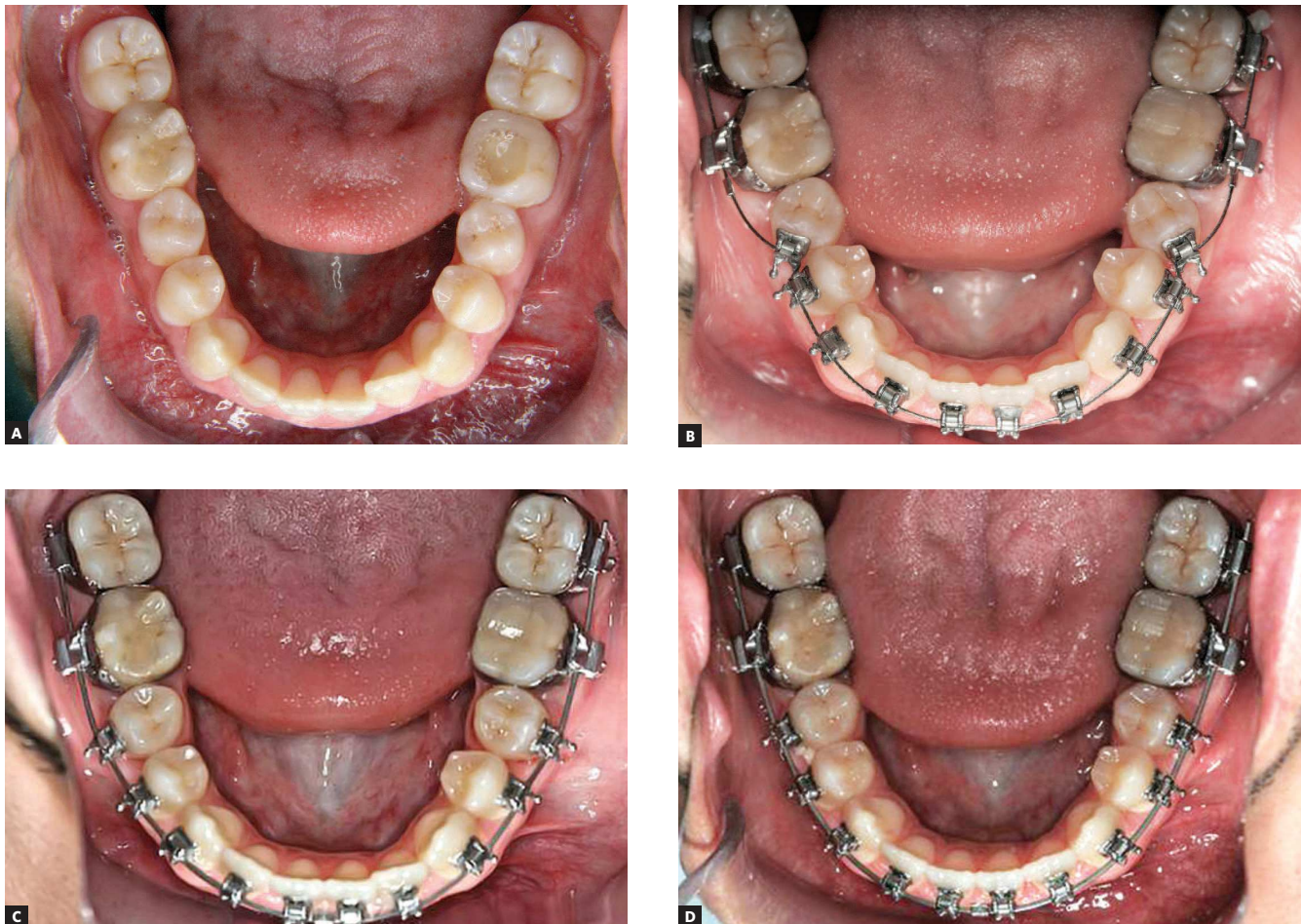


Figure 9 - Self-ligating bracket systems/super elastic memory archwires: A) 0,016-in Power Cable archwire; B) 0,016-in Heat Activated NiTi archwire; C) 0,016 x 0,022-in Heat Activated NiTi archwire; D) 0,019 x 0,025-in Heat Activated NiTi archwire.

Considering the facts and the current stage of radiographic cephalometry, I understand this still constitutes one of the pillars for the understanding of orthodontics as a whole. Therefore, from an academic standpoint, even aware of the limitations of the method, I believe in the importance of teaching radiographic cephalometry, as regard to the knowledge of the anatomic relationship of skull and the face, of the main cephalometric analysis,

and mostly in the dynamic application of these concepts in addition to information obtained from other diagnostic elements. My opinion is supported by the Orthodontic Faculty at FOU SP, so we have published a new cephalometric analysis called USP-2 Standard Analysis, which is already being used by our orthodontic residents and will soon be available for examination and use by the whole orthodontic community.



Figure 10 - Arch leveling with left ligating systems: Active self-ligating brackets + super elastic memory archwires.

The orthodontic training is still deficient regarding the diagnosis and treatment planning of dentofacial deformities. How is this subject taught in the program in which you participate and what's your suggestion to improve this training?

(José Valladares Neto)

I fully agree with your statement about the lack of proper training of Brazilian orthodontists regarding the diagnosis and treatment planning of dentofacial deformities, although this educational deficiency is also present in other countries. On the other hand, there is a clear trend to improve this situation as the most influent orthodontic professors in Brazil have certainly offered the students proper knowledge to diagnose and treat patients with dentofacial deformities.

Orthognathic surgery is a field of orthodontics that fascinates me and attracts considerable interest on my part, both in private practice and in academics. In 1995, I had the opportunity and the incentive to create and be responsible for the treatment of patients with dentofacial deformities who needed orthognathic surgery, at the Dental School of the University of São Paulo. After 18 years, the presurgical orthodontic preparation clinic at FOUSP is a reality and is in full speed, open on a weekly

basis and it has a modern infrastructure and is operated with the help of orthodontic residents, students of Masters Program in Orthodontics and uses all the support from administration officials and lab technicians. We have an institutional affiliation with the University Hospital (HU-USP), which enables us to refer surgery cases to competent oral surgeons, who are assisted by the residents of the HU-USP and by our students.

At our Orthodontic residency program, taught by orthodontic professors from FOUSP in FFO-FUN-DECTO, there is a specific course on Orthognathic Surgery, under my tutoring, in which students receive a very comprehensive theoretical content and perform the clinical care of patients. Besides the emphasis on dentofacial structure relationships, orthodontic diagnosis and treatment planning and the objectives to be achieved pre and post-surgically, students learn about the limits and possibilities of different surgical techniques, such as types and indications of osteotomies, fixation techniques, operating room environment familiarization, surgical stability and control. The goal at the end of the course is to enable students to diagnose, plan and perform integrated orthodontic-surgical treatment in patients with dentofacial deformities.

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