Complex dental problems and the contribution of adjunctive orthodontics

By Professor Athanasios E. Aftanasis, DDS, MSc

The goal of contemporary dentistry is the maintenance of natural dentition under biologically, functionally and esthetically optimal conditions, for the longest possible period. An increasing number of adult people present a variety of complex dental problems, which concern more than one clinical discipline or specialty. These include caries, periodontal diseases, dental trauma, edentulous sites, malocclusions, or their combination.

This article outlines existing orthodontic therapeutic possibilities for adjunctive dental work and emphasizes the importance of teamwork among the general dentist, the orthodontic specialist, and other dental specialists.

Principles of treatment planning for complex dental problems

The need to formulate problem-oriented treatment plans, which address patients’ chief complaint for complex cases necessitates consensus among the parties involved namely the general dentist, the specialist and the patient. Diagnosis must utilize patient’s data, derived from records interpreted by the clinician using strict scientific criteria. On the other hand, treatment planning constitutes an intellectual process where subjective elements are often involved. It is the path that the well-educated and experienced clinician follows in order to maximize the benefits for the patient, which must be contrasted to the cost and risk involved when certain procedures are adopted (1). An essential requirement for successful interaction is that both general practitioner and specialist are in agreement regarding the advantages and limitations of the treatment chosen.

Adjunctive orthodontics

Adjunctive orthodontic treatment is tooth movement carried out to facilitate other dental procedures necessary to control disease and to restore function. It may be an alternative adjunct to general dentistry by providing (a) rehabilitation following tooth migration due to pre-existing periodontal disease; (b) pre-prosthetic orthodontics; (c) treatment of periodontal defects; and (d) orthodontics as an alternative to prosthetics (2).

Orthodontics and periodontics

It has been documented that orthodontic treatment in patients with severe periodontal destruction is no longer a contraindication (5). On the contrary such treatment might even enhance the possibilities of saving and restoring a deteriorating dentition. During the orthodontic movement it is the entire periodontal unit (bone, periodontal ligament, and soft tissues), which moves with the tooth (4). This all-embracing movement has been shown to be beneficial when orthodontic uprighting of tipped molars is undertaken since the crestal bone exhibits predictable and considerable changes (5) (Figure 1). Forced eruption has also been reported to decrease the depth of isolated vertical infrabony defects and to expose tooth structure, thus allowing the prosthetic management of subgingival fractures, caries and lateral root perforations (6) (Figure 2).

Orthodontics and missing teeth

In cases where lateral incisors are congenitally missing and other malocclusion co-exist, in most instances the treatment of choice is the orthodontic movement of the canines to...
Oral surgery is an important cornerstone in orthodontic treatment of malocclusions. Tooth movement is only possible to a limited extent and always depends on the normal development of the maxilla and mandible in relation to each other, as well as on deformities of the jaw in relation to the other facial bones.

Anomalies may be congenital or acquired and may affect patients in childhood already. If so, the focus of orthodontic treatment is not primarily on the aesthetic correction, but is guided by functional and prophyactic concerns. Efficient occlusion and restoration of masticatory function are decisive factors for tooth preservation and prevention of secondary disorders (Figs. 1a–c). Without a doubt, aesthetic improvement, as well as the associated self-consciousness, is the main concern of adult patients, which can be pursued through surgical correction.

Causes of malocclusion

Generally, patients visit an orthodontic practice only after symptoms or significant prognoses have already presented. Clinically, this results in late mixed dentition or permanent dentition. This may complicate an accurate mapping of the reasons for this malocclusion. In the literature, the causes of malocclusion and the aetiological structure of the symptoms of malocclusion in orthodontic patients are controversial issues. No explicit information on the percentage of patients with acquired and hereditary malocclusions can be found in a study by Schopf (1991) on the exogenous factors. Therefore, the causes for the development of malocclusion are controversial issues. However, from the assessment of individual patients’ symptoms, all symptoms of malocclusion could be associated with known aetiological factors only in 48% of patients. Brodmann and Sauer (2006) concluded from Schopf’s report that only 20% of the anomalies were hereditary and thus could not be affected by prophyactic interventions. Accordingly, 80% of malocclusions could be resolved through prevention and better oral hygiene. This idea is contrary to the results of the German Oral Health Study. In this study, a decrease in childhood caries was observed. However, clinically these results were not associated with a lower rate of need for orthodontic treatment. The study at the University of Greifswald, Germany, found that 26.5% of the symptoms were hereditary defined. 44.5% were exogenous and 55.5% were not precisely defined. While accepting the assumption that 80% of malocclusions can be resolved by prevention and better oral hygiene is very questionable of unexpected growth pattern or unilateral abnormal hyperplasia and can affect the results of the operation.

Selection of patients

Combined orthodontic-surgical treatment requires not only strong and focused inter-disciplinary collaboration, but also absolute acceptance of the treatment plan by patients and parents. The treatment is time-consuming and post-operative corrections cannot be excluded. A detailed medical preoperative discussion should inform patients about the risks of combined treatment and the consequences of untreated malocclusions. Malocclusions can cause numerous side-effects, such as back pain and chronic headaches (Figs. 4a–c), but also orthodontic correction depends on the degree of displacement of the jaw depend on achievable occlusion. Furthermore, teeth have an influence on access to the surgical field and wisdom teeth must be removed before osteotomy in certain cases. Osteotomy can be done on both jaws or can be limited to the maxilla or mandible. However, in many cases it is functional to perform bimaxillary osteotomy and to shift both jaws. Today, generally the entire tooth-bearing portions of the jaw are shifted. Segmental osteotomy has not been proven to be very successful in the past and corrections of malocclusions are left to the orthodontic treatment partners. In this field of treatment, the Obwegeser-Dal Pont surgical technique is recommended. This procedure describes an intra-orally stepped osteotomy at the mandibular rami (Figs. 7a & b). Since Bell and Enger described the possibility of bimaxillary surgery as the “down fracture”, osteotomy in 1975, it has been popular and today you can find it mostly as a combi...
nation of Obwegeser–Dal Pont and Le Fort I osteotomy. The bimaxillary approach seems reasonable, since the maxilla and mandible influence each other during growth. However, it is frequently only possible to obtain a very good and risk-free result by using Obwegeser–Dal Pont surgery. Fixation in split osteotomy of the mandible is usually realised by using minimally invasive plate osteosynthesis. In modified techniques of Obwegeser–Dal Pont surgery, a displaced ramus is fixed using osteosynthesis screws only (Hochban 1997; Figs. 8a & b). This modification avoids the complicated surgical removal of osteosynthesis plates.

Operation risk

Any surgical procedure can lead to unexpected complications, which must always be considered according to the risk–benefit principle. Today, the need for osteotomy remains controversial because a jaw deformity is not a serious illness like a tumour, abscess or bone fracture, which is necessarily treated by surgery. Since deformities are often aesthetic corrections and can be classified as elective procedures, operation safety is a chief concern. Isolated osteotomies of the mandible, which present a significantly lower surgery risk, should be the first choice for orthodontic–surgical interventions.

The most significant risk of osteotomy of the mandible is a probability of about 5% of damaging the sensory nerve, called the inferior alveolar nerve. This can cause sensibility problems of the lower lip and chin area (Figs. 9a-c). Additional serious risks are not expected using Obwegeser–Dal Pont surgery and post-operative bleeding can be controlled very safely.

Interdisciplinary collaboration

The literature reviews of work done in the 1970s makes clear that today’s conscientious collaboration between surgeons and orthodontists is not a matter of course. Over the years, orthognathic surgery was considered to be the first option for treating orthodontic cases that could not be resolved using standard treatment techniques. Therefore, operations were carried out based on tolerance of dentoalveolar compensation and likely made further corrective surgery more probable. Today, in almost all cases of malocclusion, orthodontic treatment is preceded by surgical treatment. Nowadays, the planning of the operation based on simulated cast surgery and the creation of a splint is a very safe method by which to achieve predictable and stable long-term results (Figs. 8a & b). Individual dentoalveolar discrepancies in occlusion can be corrected preoperatively or post-operatively by orthodontic treatment. Therefore, interdisciplinary collaboration is always a benefit for the patient and treatment team.

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The Middle East region is right up there in terms of Global Orthodontic standards

By Dr. Khaled Abouseada, KSA

It was a pleasure to interview Dr. Nikhilesh Vaid who could be ranked as one of the key doctors to enrich the Middle East region. Dr. Vaid has played a major role in improving the practice in India, targeting unique researches and development efforts as well as leading growth initiatives.

Dr. Khaled Abouseada: Compared to when you started practicing, how has Orthodontics developed through the past years? What are the driving factors behind this development?

Dr. Nikhilesh Vaid: To be very honest I haven’t been an orthodontist for that long, to see a decade-by-decade shift in the practice. I think Global Orthodontics was still in its formative years. In the last 12 years from the time I did start out, the major thrust has been the incorporation of technology in all spheres: Diagnosis, Research, Practice Management and Appliances. A lot of purists feel the skill levels of the contemporary Orthodontist are becoming redundant because of technology; I would like to think otherwise. The skill requirements of chang ing and the only thing constant with any science. Fundamental principles will still govern Orthodontic care delivery, but incorporation of technology has brought about a change in the quality of life of both the orthodontist and the orthodontic patient. Today Micro implants are the mainstay of anchorage control, I only use Self Ligating brackets, because of chair side efficiency. Lingual Orthodontics, Aligners, Stereolithography and Robotics are the mainstay of our teaching and practice protocols. The treadmill of life is an accelerated improved precision in these appliances due to CAD CAM and Robotics.

Back to years of study and residency in India, how can you describe those days?

My residency years in Mysores, India at the JSS Dental College & Hospital were literally, to borrow a line from a famous song, the “best days of my life”. Orthodontic training in India is very regimented and even today the accent is mainly on enhancing dexterity skills, which I think are non negotiable as far as any Orthodontic training is concerned. The first year at JSS was very “cereleral” and “clinical”, in the sense, we were encouraged to think, very often, out of the box. This has influenced us to be receptive to new advances, without the dogma of a particular school of thought. The bonding and the camaraderie amongst colleagues as well as the discipline that kept us on our toes, were actually lessons that have moulded me to assume greater responsibilities in life.

Do any of your teachers stand out who encouraged you to pursue this career? What would you tell them now?

Well the soul of any teaching programme is the Programme Director or a Guide in a Masters Programme, whatever the nomenclature is in any part of the world. The biggest influence in my life has been my Professor, Prof E. T. Roy, who has mentored me as an Orthodontist in my years in my Masters programme. He is a strict disciplinarian, and was responsible for influencing my life beyond Orthodontics as well. Its important to inspire your residents to be complete professionals, Orthodontics is only a part of what we do. The spirit to serve my profession and professional organization is something that he has inculcated in me. Dr Ashok Sinha, Dr Ravi Gupta, Dr Ravi Sahle, Dr Shailesh Deshmukh and Dr Sripad Nagarshekhar have taught me Orthodontics at different stages of my life as an undergraduate and graduate student. My colleagues during my Masters programme, and later, most importantly Dr Meghna Vandanek, Dr Gur keerat Singh and Dr Jacob John have been a driving force for what I am today. I would like to thank each of these individuals for touching my life and promise to make them proud with everything I attempt to do.

What can a you tell us about your experience as the past president of the Indian Orthodontic Society and Editor in Chief of the Asian Pacific Orthodontic Society?

I have just been elected President Elect of the Indian Orthodontic Society, which is amongst the largest Orthodontic Societies globally. We have an obligation to contribute to the knowledge base of global Orthodontics, and encourage scientific content of the highest caliber. I will be President in the next quadrennial (50th Year) of the IOS, which will be a time for us to rejig and commemorate our past, but at the same time, plan to propel ourselves with policies that will enhance our member’s lives with the changing global trends in Orthodontics. I was appointed Editor of the APOS Trends in 2011 and the Chief Editor in 2015. Today the Journal is indexed by multiple indexing agencies. I have an excellent young and enthusiastic team which is committed to the cause of achieving excellence in documentation of scientific data from the Asian Pacific region that is available to orthodontists across the globe at no cost. I have to compliment the previous APOS Presidents Dr Loh Kiat Woh, for his vision, Dr Kazuo Tanne, President APOS and Dr Bryce Lee, Secretary General APOS, for their support as well as American Orthodontics for being the corporate sponsor of this endeavor for 2015-14.

What golden advice could you provide to orthodontic residents to consider in shaping their future careers as Orthodontists?

I don’t know if I’m qualified enough to advice, but I am greatly influenced by a quote of ours, “The difference between the 21st century will not be the ones who cannot read or write, but the ones who cannot unlearn and relearn new things.” Science today is progressing at a pace where the global knowledge bank doubles in just a few years. We have to open minds and the willingness to be students all our lives. If we can attune our minds to this aspect, success in every sphere of life will follow.

As having a lot of scientific publications in the field of orthodontics, can you tell us how can we come to a statistically significant scientific conclusion that needs to be published and the benefit of being published?

I believe documentation of every form of scientific data is paramount. That is creating database, which is critical to any form of research and future reference. As long as any form of information serves to enhance the knowledge bank of orthodontics and follows guideline lines and procedures of research that are contemporary, it needs to be considered for publication. Statistically insignificant information also can give information that is of clinical relevance. It’s important to understand that phenomenon. With respect to the benefits of publication, I would not dwell on the fact that we need it for career enhancement. It is our contribution to our profession. If Andrews did not publish the “Six keys of occlusion”, or Angle, the “classification of malocclusion”, would we have evolved to where we are today?

It is critical to understand that publishing our work is not a formal obligation to our specialty. We cannot do more, we should not dare to do less!

What are your future expectations in Orthodontics?

I envision a tomorrow, where Orthodontic care will be available in every corner of the world, provided by a specialist Orthodontist. From a health care perspective, the scope of orthodontics should also include interdisciplinary and adjunctive therapies. Collaboration with Sleep Medicine, Plastic Surgery, ENT specialists and other Dental Specialists will be the tomorrow of Orthodontics. As Geneticists using CAD CAM and Robotics will be a regular feature of our appliances as well as our Diagnostic and finishing protocols. Diagnostic Aids will become 5 Dimensional for a fact. Research in Genetics, Bone Biology and Molecular Genetics will play a significant role in the way we approach the growing patient in the next decade. It is an exciting time to be an orthodontist in this change in Orthodontics.

Regarding our Middle-East region, as you are an active contributor in many events in the area, what can you say about the Orthodontic market in the area?

I think the Middle East region is right up there in terms of Global Orthodontics, as a fact. I have travelled to lecture in UAE, Jordan, Lebanon and Oman, and have been impressed with the quality of work and enthusiasm in the region.

Conclusion

My main purpose will always revolve around focusing and bringing Professors of the highest level into focus to enhance quality, ensuring this top quality and therefore creating the ultimate satisfaction for our readers. I hope that our crew have gained the trust of our readers by always respecting them, providing the best service possible and improving our material and we are our main components of value. Receiving feedback is always welcome whether positive, negative, thankful or harsh replies, which will always keep us on the right track and guide us to our next steps. Continuous improvement of this section is our goal and the way we monitor our growth is our distinct mission, which we hope would be envisaged to meet your needs.

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Dr. Nikhilesh Vaid

APOS, for their support as well as American Orthodontics for being the corporate sponsor of this endeavor for 2015-14.
Still lots to see and discover at IDEM

By University of Sharjah Dental Students Association

April 9-10, 2014, saw more than 700 students from ten countries gather together at the University of Sharjah College of Dental Medicine for the 2nd International Students’ Dental Conference. The conference was opened by His Highness Crown Prince Sheikh Sultan bin Mohammed bin Sultan Al Qasimi who toured all the exhibits from eight companies such as Listerine/LLC, Crest Oral B and GlaxoSmithKline, asking many questions along the way, before he oversaw the opening ceremonies.

The conference was a huge success for the students of the University of Sharjah Dental Students Association, who created, planned, organized and executed the whole conference of exhibits, poster presentations, oral research presentations and debates. The two debates focusing on the treatment options of endodontics versus implants, and the other debate on where to draw the line between prevention and restorations in cases of incipient caries, drew lots of interest and resulted in lively and sometimes passionate discussion.

Additionally, a number of participation workshops on topics ranging from layering of anterior resin composite, to TMI, lasers, rotary endodontics, implants, veneers and a suturing clinic gave participants some outstanding hands-on experiences.

All-in-all, the conference was a culmination of very hard work from the Executive Committee of the Student Association and the Organizing Committee, Dean of the College, Professor Richard J. Simonsen noted in his strong praise of the students that he has never seen a more active and giving group of young people in his over 40 years in dental education.

“It is quite remarkable that a group of 20-year-old young students (mainly ladies by the way!) could pull this off with such success while still studying hard for upcoming final exams,” said Dean Simonsen.

Faculty support was provided by Dr Karim Samah and Dr Eman Mustafa, and huge support was provided by former USDSA Presidents, Faraj Edher and Hiba Abdulhadi, who were the first to give the credit to the student association leadership, and all the many other students who helped out with the execution of this remarkable conference.

The main organizer, Rawand Najji, the President of the USDSA was very pleased with the program and participation from countries as far afield as Russia and Poland. “Next year we hope to consolidate this conference into a regular annual highlight on the dental calendar and eventually attract many more students from all over the world to the University of Sharjah” said student doctor Rawand.

Social events such as a desert safari, go karting, and a dinner cruise in Dubai were added attractions for the international students which also included large contingents of students from the Kingdom of Saudi Arabia, Sudan and Malaysia as well as students from all the local schools.

The President of the USDSA was also supported by the rest of his Board of student-doctors, Mays Faris, Jumana Lisa Irbaye, Abree Sha’al, Shourouk Mahmoud, Sally Masoud Manla, Sara Anbari, Deema Rashad and Mohammed Hussein Haider, all from the second-year dental program at CoS. “It is quite remarkable that a group of 20-year-old young students (mainly ladies by the way!) could pull this off with such success while still studying hard for upcoming final exams,” said Dean Simonsen.

Attendance figures are also expected to increase by 12 per cent, with many new visitors coming from nearby countries like Cambodia, Myanmar and Taiwan. “Not just a place where East meets West in Singapore is also increasingly being considered a gathering point for different parts of the East to meet one another,” Dreyer said.

New concepts and methods for dental practices will be discussed at the Dental Tribune Study Club Symposium at booth 6F-22, Singapore’s own prosthodontic expert, Dr Stephen Soo of Specialist Dental Group, will provide insight into CAD/CAM and how its use can benefit workflow in dental practices.

Aside from the trade fair hustle, clinical presentations as part of the scientific programme will continue today at Level 4 with lectures and workshop focusing on fields like orthodontics and endodontics. A special presentation by US dentist Dr Barry Freydberg on 05 April 2014 at 4.30 p.m. focused on the detection and prevention of oral cancer, which is among the few types of cancer which are currently on the rise worldwide. At the Dental Tribune Study Club Symposium at booth 6F-22, Singapore’s own prosthodontic expert, Dr Stephen Soo of Specialist Dental Group, will provide insight into CAD/CAM and how its use can benefit workflow in dental practices.

New concepts and methods for dental labs will be discussed at the Dental Technicians Forum, one of the new educational formats specifically targeting other members of the dental profession. In addition to these presentations, lectures for dental hygienists/therapists were also held throughout the days.
Dentistry – your dream profession

At Danube Private University, students undergo a six-year course in dental medicine, and on completion of the course are awarded the internationally recognized degree Dr. med. dent. This elite course of study at the leading edge of medical and dental science, utilising state-of-the-art medical and dental equipment, practical facilities and our in-house clinic, stresses to both challenge and support its students. We want our graduates to be among the acknowledged leaders of their profession. The dental faculty of the University includes many highly respected scientists who take great pleasure in being a part of a new, innovative project in basic dental studies that is of particular benefit to society – led by our Chancellor, Professor Dr. Dr. Dieter Müssig and our Dean, Professor Dr. Dr. h.c. Andrej Kielbassa.

In addition to instruction in medical and dental subjects, the President of the University, Honorary Consul M.B. Wagner-Pischel, is dedicated not only to the achievement of excellence in research, instruction and innovation, but also to the holistic education of the young people, ensuring that they receive a solid grounding in the arts, literature, science journalism and music, as well as training in empathy. The aim is to promote the well-rounded development of the young people, and equip them with positive approaches for their subsequent career that enhance their communicative intelligence. Dental health and personal care and hygiene play a key role in how people are perceived today. Beauty and mindfulness are reflected more than anywhere else in oral and dental health. A good dentist can be compared to an artist, as she requires an exceptional understanding of form and colour as well as spatial visualisation skills. When combined with the state of the art in medical and dental knowledge, the result is uncompromising excellence in patient treatment.

For President Wagner-Pischel, a life spent in the exercise of a profession about which one is passionate is an important and meaningful life commitment as well as a significant contribution to the welfare of society as a whole. “Our students at Danube Private University have excellent life and education opportunities. We offer them a top dentistry course equipped with state of the art technology that focuses on students’ needs and values them above all else, while upholding the finest traditional humanistic values. Danube Private University emphasises not only medical and dental science, but also human interaction among students and instructors as well as responsibility to both patients and society,” explains M.B. Wagner-Pischel, President of Danube Private University.

To date, the student body of Danube Private University is made up mostly of the children of dentists and doctors from German-speaking Europe. Young people from all over the world are interested in studying at Danube Private University. In response, we are offering a preparatory course of study for students outside of German-speaking Europe.

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The second day of the conference will feature the new Dental Hygiene Seminar focused entirely on the Dental Hygienist providing the latest in Periodontal Instrumentation and Oral Prevention and Management of Denine Hypersensitivity.

Additional to the knowledge delegates will exchange, all attendees will benefit from the networking opportunities in the cozy atmosphere provided by Jumeirah Beach Hotel where you can meet your colleagues from across the globe while lunching at Dubai’s best restaurant.

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By Danube Private University

Marga B. Wagner-Pischel

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**References**


**Editorial note:** Full list of references is available from the author.

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**Orthodontics, restorative dentistry and oral health**

When teeth have been lost early, those remaining distal to the edentulous space, usually present with a mesial tipping, displacement and rotation. Individuals with an abnormal mesio-distal inclination or displacement of the posterior teeth were found to have a positive association between mesio-inclination and periodontal destruction. Once periodontal health is established, occlusal forces may be used to reduce mobility, to regain bone lost owing to traumatic occlusal forces, and to treat a variety of clinical problems related to occlusal instability and restorative needs. Failure to provide appropriate treatment of occlusal trauma in patients with chronic periodontitis may result in progressive bone loss, adverse change in prognosis and resulting in tooth loss. Uprighting these teeth by orthodontic means before the conventional restoration of the edentulous areas may corroborate to their periodontal treatment and maintenance in the dental arch. When premolars will be replaced adequate space is necessary not only at the mesio-distal but also at the bucco-lingual direction. Teeth with a negative prognosis can be used to maintain or improve the volume and structure of the alveolar bone at the site where they are located. The forced eruption of a tooth, which is planned to be extracted, altered the architecture of the soft periodontal tissues and improves the quality of the available bone (Figure 4). Therefore, the final prosthetic work is associated with better overall results due to the increase in the gingival height produced by this method.

**Figure 2. Subgingival horizontal fracture of the upper left central incisor (A) was managed by orthodontic forced eruption, which resulted to the exposure of the root (B), thus allowing the prosthetic management (C). (Melton, 1982.)**

**Figure 3. Young adult with lower second premolars congenitally missing (A). Following extraction of lower second deciduous molars orthodontic treatment resulted to the closure of the space (B) and (C).**

**Figure 4. Maxillary incisor with negative prognosis due to significant bone loss (A). Following orthodontic forced eruption of the tooth, which is planned to be extracted, improved the quality of the available bone (B). (Papadopolous, 2011)**

**Figure 5. Adult patient with significant loss of posterior occlusal support, extreme anterior overbite, and direct trauma to the gingiva from the incisal edges of the mandibular incisors (A). Following orthodontic treatment and comprehensive restorative therapy patient’s occlusion and health have been significantly improved (B).**

"Failure to provide appropriate treatment of occlusal trauma in patients with chronic periodontitis may result in progressive bone loss".

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