Smoking linked to hypodontia

By DTI

OTAGO, New Zealand: A study conducted by researchers at the University of Otago has found that women who smoke more than ten cigarettes a day while pregnant may negatively impact the development of their children’s teeth. The study looked at 83 children with hypodontia-defined in the study as the developmental absence of up to five permanent teeth—and compared them with 253 children without the condition. The children’s mothers reported their levels of exposure to active and passive smoking during pregnancy, along with their caffeine and alcohol intake.

“Though more research is needed to confirm the association we found between maternal smoking and the condition, a plausible explanation is that smoking causes direct damage to neural crest cells in developing embryos,” he explained.

The findings are in line with a biological gradient effect with tobacco,” said Farella, who is head of orthodontics at the University of Otago’s Faculty of Dentistry. “The more cigarettes a mother reported smoking during pregnancy, the greater the likelihood was of her child having hypodontia.”

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ADX Sydney: New manager

Linda Guast, former CEO of Meetings & Events Australia, has been appointed as the Exhibitions Strategy Manager of the Australian Dental Industry Association. She will first be tasked with making the upcoming ADX18 Sydney, Australia’s largest dental exhibition, an event that captures the interest of the entire dental community.

Aesthetics meeting

The Aesthetic Dentistry Society Singapore has announced the launch of a new event focused on the discipline for the Asia-Pacific region. Making its debut in autumn 2018, the Dental Aesthetics Meeting in Asia will be held on 28 and 29 September and feature a conference with papers by leading international practitioners and researchers, as well as an industry exhibition.

Facial features

Researchers in the US have found that genetics that shape dental and thus facial features might also increase the likelihood of specific handedness. In a recently published study, people with slender faces were found to be predominantly left- rather than right-handed. The findings of the study were based on three national health surveys, with a total of 15,156 participants, that were conducted in the US in the 1960s and 1970s. In a review of these, researchers at the University of Washington School of Dentistry found that bilateral retrognathism—the dental marker for a convex facial profile, slender jaws and overbite—was associated with 25 per cent increased odds for left-handedness in the study population. They further stated that prevalence of bilateral retrognathism in all three surveys was significantly higher among European Americans than African Americans.

Australasiasymposium

MELBOURNE, Australia: For the first time in the Osteology Foundation’s history, Melbourne played host to one of the three Asia Pacific symposiums in 2017. Themed “Strategies for predictable regeneration—Today and tomorrow”, the scientific programme delved intensively into the current status of knowledge and research in oral tissue regeneration, discussing new trends and techniques in the field.

Held on 2 and 3 June at the Arthur Streeton Auditorium in Melbourne, the two-day event was one of four symposiums taking place over the next 12 months. Other host countries are Japan, China and Russia. In addition to such national events, the non-profit organisation holds its international symposium in the Côte d’Azur in Monaco every three years.

More information can be found at www.osteology.org.

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Unique root canal anatomy patterns in Indian population

By DTI

NAVI MUMBAI, India: Provisional findings of an Indian study have suggested that the root canal anatomy of Indians might differ from those of other ethnicities, and hence, they may require adapted care during root canal therapy. The study, which began two years ago, is being jointly conducted by researchers at two local dental colleges, Terna Dental College and the Government Dental College in Mumbai.

Under the supervision of college deans Drs Shishir Singh and Mansingh Pawar, about 20 students involved in the research project have been investigating 5,000 teeth that were provided by dental colleges and hospitals in the region.

The results showed that the anatomy of the mandibular canines and second premolars was more complex than that of teeth from other ethnicities. For example, the investigators found that the extra mesial buccal canal, often seen in European, Thai and Japanese populations was rare in the Indian maxillary molars examined. In addition, Indian teeth showed root canal anatomy patterns that were different from those seen in American and African teeth. Consequently, the researchers concluded that Indians might require special care during dental treatment in order to ensure treatment success.

Explaining the tooth preparation process, Singh said that the teeth are cleaned and disinfected before the root canals are accessed and dye is injected into them. After drying and decalcification, the specimens are dehydrated in ascending concentrations of methanol, Singh told The Times of India. “The students study the specimens under special halogen lighting and the root canal anatomy is classified using internationally accepted classifications,” Singh explained regarding the research method.

The study is ongoing and the researchers hope to make further findings, Singh said.

Neanderthal used natural analgesics, calculus shows

By DTI

ADELAIDE, Australia/LIVERPOOL, UK: Ancient DNA in the calcified dental plaque of Neanderthals—the nearest extinct relative to humans—has provided new insights into their behaviour, diet and evolutionary history. An international team of researchers has analysed 42,000- to 50,000-year-old dental plaque DNA samples from four Neanderthal caves in Belgium and Spain. The findings revealed the complexity of Neanderthal behaviour, including knowledge of plant-based medication and dietary differences.

According to the researchers, DNA preserved in the dental plaque of Neanderthals is a notable source of information about the behaviour and health of ancient hominins specimens. From analysing the dental plaque DNA samples, the researchers learnt that the Neanderthals from the cave sites of Spy in Belgium consumed woolly rhinoceros, European wild sheep and wild mushrooms. In contrast, those from El Sidrón cave in Spain appeared to have a vegetarian diet, including moss, mushrooms, pine nuts and tree bark, but no evidence of meat was found. These findings demonstrate that these two groups had very different diets.

“Dental plaque traps microorganisms that lived in the mouth and pathogens found in the respiratory and gastrointestinal tract, as well as bits of food stuck in the teeth—preserving the DNA for thousands of years,” said lead author Dr Laura Weyrich, Australian Research Council Early Career Research Fellow at the Australian Centre for Ancient DNA (ACAD) of the University of Adelaide.

She added, “One of the most surprising finds, however, was in a Neanderthal from El Sidrón, who suffered from a dental abscess visible on the jawbone. The plaque showed that he also had an intestinal parasite that causes acute diarrhoea, so clearly he was quite sick. He was eating poplar, which contains the pain killer salicylic acid (the active ingredient of aspirin), and we could also detect a natural antibiotic mould (Penicillium) not seen in the other specimens.”

Furthermore, dietary differences were associated with a general shift in the oral microflora, suggesting that meat consumption contributed to substantial variation in this regard. “Not only can we now access direct evidence of what our ancestors were eating, but differences in diet and lifestyle also seem to be reflected in the commensal bacteria that lived in the mouths of both Neanderthals and modern humans,” said co-author Prof Keith Dobney, from the University of Liverpool. “Major changes in what we eat have, however, significantly altered the balance of these microbial communities over thousands of years, which in turn continue to have fundamental consequences for our own health and well being.”

The study, titled “Neanderthal behaviour, diet, and disease inferred from ancient DNA in dental calculus”, was published on 20 April in the Nature journal. It was conducted by ACAD in collaboration with the University of Liverpool in the UK.

Impress
Australia: Royal Flying Doctor Service receives funding boost

By DTI

CAIRNS, Australia: The Royal Flying Doctor Service of Australia (RFDS) has long provided much-needed medical assistance to many of the expansive country’s most remote communities. Dr David Gillespie, Assistant Minister for Health, has announced that the Australian federal government will commit A$11 million in funding to the not-for-profit organisation so that it can continue to offer dental services to these regions.

Established in 1928 by Rev John Flynn, the RFDS utilises its fleet of 66 aircraft to offer both emergency and essential health care to Australian residents who are unable to access these services via more common modes of transport. It is funded through a combination of donations and financial support from the Australian government’s RFDS programme. It holds an important place in Australia’s medical services sector and was described by former Prime Minister Sir Robert Menzies as “perhaps the single greatest contribution to the effective settlement of the far distant country that we have witnessed in our time”.

“The Royal Flying Doctor Service is well-placed to provide these essential mobile outreach dental services in rural and remote Australia,” said Gillespie in a statement. “Today we deliver on our election commitment to ensure people outside our major cities have better access to high-quality dental services.”

Martin Laverty, CEO of RFDS, welcomed the funding and took the opportunity to highlight the disparity in dentist numbers between urban and remote areas.

“There are only one-third the dentists in remote areas, with 72 dentists per 100,000 people in major cities, and less than 23 per 100,000 people in remote areas,” said Laverty. “When people from remote areas visit the dentist, they are more likely to require acute intervention—in 3 had a tooth extraction in a year, compared with less than 1 in 10 in metropolitan areas.”

“This funding from the Federal Government will enable the Flying Doctor to expand its dental outreach programme to start tackling the disparity that exists between city and the bush—and for that we are very, very thankful,” he added.
"The world is becoming a noisier place, so protection and prevention are essential"

An interview with Dr Sam Shamardi, developer of noise reduction dental earplugs

By Kristin Hübner, DTI

Although noise exposure in dentistry may appear to be minimal, the potential for noise-induced hearing loss is an issue in the field. Various studies have shown that a significant number of dental professionals are affected each year. Aiming to address this matter is US dentist Dr Sam Shamardi, who developed noise reduction earplugs especially designed for use in the dental office. He recently introduced the product, first launched in 2014, at Dental Expo South in Christchurch in New Zealand, where the company signed a new distribution deal. Dental Tribune had the opportunity to talk with Shamardi about noise pollution in the dental practice and the unique technology used in the DI-15 earplugs.

Dr Shamardi, what sounds in the dental office are damaging to hearing?

All of them! We as dental professionals are exposed to constant dangerous levels of noise that have a long-term, permanent effect on our hearing. Most usually identify with the high-speed handpiece, but high-speed suction, ultrasonic instruments and cleaners, laboratory machines and model trimmers all cause damage.

Sounds that are 85 dB and above result in hearing damage and are directly related to the duration and frequency of exposure, among other factors. Thus, extreme noise exposure for short periods can be as damaging as mild exposure for prolonged periods. Considering that as dental professionals our average careers are 35 years long and typically 40 hours a week, our exposure time spent in this chronic noise environment is substantial.

The dental literature shows values for dental equipment that clearly exceed 85 dB and in many cases even 100 dB. Noise standards further illustrate that, at these ranges, as little as 15 minutes per 2 hours of exposure daily can lead to permanent damage; thus, it is no surprise that we all know colleagues with hearing issues as a result.

It is important to protect one's ears at all times or just during noisy procedures?

It is always best to protect oneself at all times, do we wear gloves, masks, gowns and loupes during major procedures only or for all examinations and routine treatments?

Certainly, some procedures will have a greater noise output and exposure than others, but a dental office is in a constant state of action and there is always something noisy going on in another room even if one is not involved in a noisy procedure oneself.

You developed the DI-15 earplugs. How do they work?

The DI-15 high-fidelity electronic earplugs are revolutionary and the first of their kind in dentistry. They utilise patented advanced circuitry in a tiny microchip that provides protection against all damaging sounds in the dental environment, as needed, while still allowing for 100 per cent clear hearing. Thus, one's ability to communicate clearly with patients and staff is not compromised, and hearing damage is prevented.

Think of them almost as smart earplugs: damaging sounds are instantaneously identified, isolated and compensated to safe levels, while normal sounds pass through naturally, as if nothing is in one's ears. Imagine the sound of a blasting radio in the car, now picture turning the volume down to a comfortable setting; one still hears everything but without the strain!

What gave you the idea to develop them?

It was not long after starting to practise that I recognised the irritation and additional stress I experienced from the shrill of the handpiece and, even more, the high-pitched shrieks from the suction, it can truly drive one nuts. I also noticed how many of my colleagues complained of tinnitus symptoms and hearing difficulties, and I knew there was a serious problem that was not being recognised.

Once I started looking for solutions, I realised that nothing existed, and the only options, such as foam earplugs, were not practical because sounds were muffled and I could not speak with my patients or staff. Thus, I started looking into technologies that could address this issue and wanted to tailor a product that would focus on the sounds and frequency exposures in dentistry. Fortunately, after much research and testing, I was able to team up with the pioneers of earplug technology to create the DI-15.

Should dentists and their assistants start wearing the earplugs from early on?

Dentistry is known as the field of prevention, yet when it comes to protecting our hearing, we have completely ignored our motto.

It really is not a question of will our ability to hear to be affected through occupational exposure to sound, but more a question of when and to what extent, and the best way of preventing this from occurring is by using hearing protection.

What do users report about the comfort of the earplugs—does one have to get used to them? Our users have had no issues wearing them, and the comfort and function of the DI-15 earned top marks in an extensive two-year American Dental Association Professional Product Review paper.

DI-15 earplugs are extremely comfortable because they come standard with six different pairs of tips and thus can accommodate any ear. In addition, for those with unique canals or who prefer a custom fit, our product can be customised via an ear mould from an audiologist and a custom sleeve made by a laboratory. All requirements are covered!

Getting used to wearing earplugs reminds me of the initial adjustment to wearing loupes; at first, I noticed them and had a brief period of adaptation, but now I do not notice they are there, yet can instantly feel the difference when I am not wearing them. The earplugs are small and fit comfortably within one’s ears, so even my patients do not notice I am wearing anything unless I show them.

Thank you very much for the interview.

Dr Sam Shamardi is a periodontist specialising at Boston Center for Oral Health and a part-time clinical instructor at the Harvard School of Dental Medicine, both in the US.

Editorial note: The DI-15 high-fidelity electronic earplugs can be ordered worldwide at a cost of US$150, including a hard travelling case, all tips and accessories and a pack of ten batteries. More information can be found at www.dentalinnovations.net.
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First Indonesia Dental Exhibition a major platform for dental industry

By DTI

JAKARTA, Indonesia: Being held for the first time this September, the Indonesia Dental Exhibition and Conference (IDEC) is anticipated with great interest from international dental companies and local distributors alike. Featuring regional pavilions from China, Germany, Italy, South Korea and Switzerland, the organisers expect the event to be an important business-to-business platform for the dental industry.

To be held from 15 to 17 September in Jakarta, the dental event is being jointly organised by the Indonesian dental association and trade show organisers Koelnmesse and PT.Traya Eksibisi Internasional. “Local support for IDEC 2017 is strong with key distributors and partners coming in early at the IDEC Traders’ Meeting that was held in January,” said Bambang Setiawan, President Director of PT.Traya Eksibisi Internasional, giving a preview of the industry exhibition.

In anticipation of the event, representatives of attending dental companies expressed their high expectations for IDEC. “Indonesia, being a leading emerging market economy amongst southeast Asian countries, is valued as an important market to GC Asia. Given the expected growth, as well as the number of new graduates per year, GC foresees a huge potential for this blooming market,” said Caroline Smessaert, Marketing Manager for GC South East Asia.

Through its participation in the event, GC South East Asia aims to address the demand and awareness for dental care by supplying high-quality and innovative products to meet everyday challenges, Smessaert further stated.

Equally enthusiastic about the event was Verena Schuettner, Junior Marketing Manager for South East Asia at Dentsply Sirona. “IDEC 2017 gives us the opportunity to not only showcase our latest innovations shortly after IDS [International Dental Show], but enables us to also provide continuing education within the congress programme in Indonesia,” she remarked.

Complementing the industry exhibition will be a conference, with the theme “Modern science and technology for the future of dentistry.” Regarding the scientific programme, Dr. Hananto Seno, President of the Indonesian Dental Association and Chairperson of the organising committee for IDEC 2017, remarked that growing competition in the era of the ASEAN economic community is driving demand for better dental care and devices that facilitate more efficient treatment. “Thus, dental professionals need to constantly upgrade, update and familiarise themselves with technological advances in dentistry,” Dr Seno emphasised.

More information about IDEC 2017, including registration, is available on the event website.

W&H and Planmeca joint branch office opens officially

By DTI

BANGALORE, India: After having announced their joining forces to expand in the Indian dental market last autumn, W&H Managing Director Peter Malata and Planmeca President Heikki Kyöstilä officially opened the new branch office in Bangalore with a celebratory ceremony in April. A highlight of the event, which was attended by 125 invited guests, was the unveiling of the new showroom for live demonstrations and individual customer training.

With the local office in the country, both companies seek to create a direct link to Indian customers to foster good relationships with this client group. “Our aim is to work for the good of the Indian dental community, bringing good quality dental and patient care to the people of the country,” Kyöstilä said. “We strive for a synergistic product offering dedicated to the Indian market demands. By sharing not only facilities but also other practical activities with our partner Planmeca we want to establish professional technical support, professional application support and education,” Malata added.

Addressing the need for safer and high-quality dental services for India’s vast population, the new office includes a 2,800 m2 showroom that is equipped with state-of-the-art technology and offers the ideal space for product presentation, live demonstration and training, according to the companies, the facility places special emphasis on oral surgery and implantology, restorations and prosthetics, sterilisation, hygiene and maintenance, CAD/CAM and radiology.

In the future, comprehensive product training for customers will be an essential part of the joint market activities, the companies’ representatives pointed out. “The new office was especially designed to provide basic product courses for Indian customers followed by advanced courses at respective facilities at the company headquarters in Austria and Finland,” explained Raghavan Radhakrishnan, General Manager of Planmeca India and W&H India.

After the official opening of the new premises, representatives of W&H and Planmeca, as well as the Indian team, further discussed the synergistic product portfolio and future activities of the two companies in a get-together at the Taj Bangalore hotel.
Glidewell expands partnership with Structo

COLOGNE, Germany/CHICO, USA: Glidewell Dental has announced the expansion of its partnership with the Singapore-based 3D-printing solutions provider with an investment in two of the company’s newly launched DentaForm 3-D printers.

“Having one of the leading dental labs in the world place its trust in our technology shows that our solution is addressing a very critical need in digital dentistry,” commented Huub van Esbroeck, co-founder of Structo, on the announcement.

The Structo printers are equipped with MLa (mask stereolithography) technology. Owing to the proprietary technology, the 3-D printers are able to achieve speeds much higher than conventional SLA printers, resulting in higher production throughput and lower costs.

“Structo’s unique MLa technology is just the type of innovation the industry needs,” said David Leeson, Director of Engineering at Glidewell Dental. “We are very excited to continue this partnership with Structo and improve our production efficiency by adopting the newly launched DentaForm 3D printer.” He remarked that the company foresees further expansion, with the acquisition of additional DentaForm printers in the second half of this year. “Operating two of Structo’s new printers is not only sufficient to replace a number of our existing printers, but also allows us to increase capacity overall,” he added.

Despite being halfway across the world, the partnership has been beneficial for both companies, according to van Esbroeck. “David and his team have been providing us with a lot of feedback that has contributed to new features and design elements of the DentaForm printer.”

More information about the DentaForm printer and Structo’s portfolio can be found at www.structo3d.com. In addition to its line of dental 3-D printers, Structo manufactures control systems and software and produces its own photopolymer materials tailored to each use in a range of dental 3-D printing applications.
Ivoclar varnish Cervitec F well-liked, survey indicates

By DTI

SCHAAN, Liechtenstein: In a survey recently conducted by Ivoclar Vivadent on its new protective varnish, Cervitec F, respondents commented favourably on its aesthetics, range of applications, delivery form, fluoride and chlorhexidine concentrations, and taste. Overall, the dentists reported that the significant advantage of the combination product is that it saves time.

The survey invited dental professionals to rate the properties of the varnish, which was launched in all European markets in September 2016 and is now available in Australia and New Zealand. “Their opinion is important to us,” a representative of Ivoclar told Dental Tribune. A total of 279 dentists tested and commented on Cervitec F.

According to Ivoclar, more than 80 per cent of the survey participants were generally satisfied or very satisfied with the results of the varnish system, reporting that they would recommend using the product after professional teeth cleaning. Over half of the surveyed dentists also said that they would recommend using the product during orthodontic treatment for high-risk patients or patients with motor impairments. In addition, respondents indicated that they use Cervitec F for patients with root caries, implants or erupting teeth.

Cervitec F differs owing to its innovative formulation, merging 1,400 ppm fluoride, chlorhexidine and cetylpyridinium chloride, according to the company. This means that fluoride application and bacterial control can now be achieved in one working step, the representative explained.

DGSHAPE 3-D printer

HAMAMATSU, Japan: Roland DG Corporation has announced the release of its first dental 3-D printer, the DWP-80S, to assist in the production of dentures. Launched at the same time, the DWX-52DC is the newest addition to the popular DWX series dental mills and includes several new automated functions for the unattended production of precision dental restorations. With the announcement, the company now offers the dental industry both additive (3-D printing) and subtractive (milling) manufacturing processes to improve the workflow of dental technicians, representatives said.

“The DWP-80S 3-D printer expands the field of digital dentistry with advanced 3-D printing technology, while the DWX-52DC mill introduces a new level of automation for the production of dental restorations,” Kohei Tanabe, Roland DG’s general manager of medical market development, explained.
Promoting early diagnosis
A novel saliva test allows dentists to measure crucial oral health parameters in a matter of minutes

By DTI

KYOTO, Japan: With the launch of its novel saliva-testing device, SPOTCHEM ST ST-4910, Japanese company ARKRAY has introduced a system that measures multiple parameters associated with oral health within 5 minutes. The measuring instrument is complemented by a testing kit, ST Check, and is to be distributed internationally, Aiko Hitomi from the Scien marketing team told Dental Tribune.

Using a small sample of saliva, the device screens parameters such as cariogenic bacteria, salivary acidity, buffer capacity, leucocyte count, traces of blood, protein status and ammonia values applying the dual-wavelength reflectance method, Hitomi explained. The patient’s individual results are visualised in an easy-to-analyse chart that is printed about 5 minutes after the saliva has been applied to the test strip.

Through analysis of the individual parameters, dental professionals may be able to recognise early warning signs of conditions such as caries or periodontal disease, according to the company. For example, studies have shown that gingival inflammation increases leucocytes in the saliva. Therefore, a high leucocyte count may be an indicator of gingivitis even though the patient is not experiencing obvious symptoms of the condition yet.

Since its launch, the palm-sized device has already attracted a great deal of interest in the market. Having promoted it at several dental exhibitions, the company has received positive feedback from regional and foreign dentists, hopefully indicative of the device’s successful distribution worldwide, Hitomi said.

Although there are some competitors in the field, he emphasised that the company’s system is unique in that it can assess seven items at once—more than any other saliva test on the market. Aimed at professional use, the technology is targeted at dentists and dental hygienists, and it is to be used for reference, but not for stand-alone diagnostic purposes, according to Hitomi.

Since saliva screening with devices such as the SPOTCHEM ST ST-4910 system has not been standardised yet, there is no compatibility between the ARKRAY kit and saliva test systems from other companies, Hitomi said. Currently, the device is available in Europe and selected Asian countries.

More information can be found at www.arkraydental.com.

ROOTS SUMMIT 2018: Registration open

By DTI

BERLIN, Germany: Online registration for the next ROOTS SUMMIT, the premier global discussion forum dedicated to endodontic dentistry, is now open. The event, featuring lectures and workshops, will be held at the European School of Management and Technology (ESMT) in Berlin from 28 June to 1 July 2018. Approximately 500 visitors from over 100 countries, the event’s organisers confirmed their participation.

The ROOTS SUMMIT, which started as a mailing list of a large group of endodontic enthusiasts in the 1990s, has grown significantly over the last few years. With currently more than 24,000 members from over 100 countries, the ROOTS SUMMIT evolved into one of the most prominent global learning forums in the dental industry. Previous conferences have been held in Canada, the US, Mexico, Spain, the Netherlands, Brazil and India. The 2016 ROOTS SUMMIT took place in the UAE and was one of the most important events in endodontics, drawing over 300 dental professionals to Dubai.

An early bird discount of 20 per cent is being offered and dental students too will be granted a 20 per cent discount. Additional information and online registration can be found at www.roots-summit.com.

More information can be found at www.roots-summit.com.
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Aesthetics in the anterior maxilla

A team-oriented approach

By Drs Sofie Velghe and Aryan Eghbali, Belgium

Multidisciplinary collaboration plays a significant part in achieving predictable treatment results. This article demonstrates the importance of accurate case analysis and preoperative planning.

This case report describes the reconstruction of two lost central incisors in the anterior maxilla. After tooth #11 had been extracted, measures for preserving the alveolar ridge were performed. After eight weeks, an implant was placed and a screw-retained temporary bridge was fabricated. Prior to inserting the temporary bridge, tooth #21 was extracted and immediately replaced with an implant.

Introduction

The impending loss of a tooth in the aesthetic zone can be a distressing experience for the patient. As the success rates and predictability of dental implants have improved over the years, implant-based treatments have gained in popularity. Osseointegration is no longer the only criterion for successful implant therapy; the aesthetic outcome of the implant reconstruction is also important.

The aesthetic peri-implant tissue should be in harmony with the healthy surrounding dentition in terms of height, volume, shade and contour. The restoration should appear lifelike and imitate the appearance of the missing tooth in terms of shade, shape, structure, size and optical properties. In a multidisciplinary team approach, several treatment modalities, such as minimally invasive methods, ridge preservation protocols, connective tissue grafting, provisionalisation and plastic-aesthetic periodontal surgery, should be considered. In addition, a thorough analysis, for example with digital smile design, is crucial.

Case report

A few years ago, both central incisors of this young male patient were restored with metal-ceramic crowns. From today’s perspective, the restoration would be categorised as an aesthetic failure (Fig. 1). Both teeth showed significant amounts of gingival recession, visible crown margins, and a loss of harmony between the gingival architecture and the restoration. The treatment plan was to replace the two central incisors with two implants with screw-retained monolithic lithium disilicate crowns. In order to create a harmonious aesthetic appearance, the two lateral incisors would be built up with composite material.

Surgical phase

The initial assessment resulted in a treatment plan in which both incisors were to be replaced with implants (NobelActive,
Nobel Biocare. In order to maintain the central papilla between the incisors, a gradual extraction of the two teeth was performed, starting with tooth #11. A few weeks later, tooth #21 was extracted, followed by immediate implant placement. A temporary bridge with an extension as pontic #21 was fabricated in order to contour the soft tissue.

Figures 2 to 5 show the surgical phase aimed at preserving the soft tissue.

Prosthetic phase
Preserving the soft tissue plays an important part in the success of treatment. Transmitting this data to the dental technician presents a challenge. In order to replicate the soft-tissue architecture, a standard impression coping on implant #11 was individualised. Then, an impression was taken of the implants at sites #11 and 21 using an individualised and standard impression coping, respectively (Figs. 6a & b). The resulting plaster model was modified by grinding at site #21. Then, a silicone impression material was used to record the emergence profile of pontic #21 of the temporary bridge (Figs. 7a–c). This information was transferred to a standard impression coping, which resulted in an individualised impression at implant site #21 (Figs. 8a & b). At the next step, the situation was assessed using digital smile design analysis (Figs. 9a & b). The evaluation revealed a disproportionate distribution of volume between the central and lateral incisors. The lateral incisors were too narrow compared with the wide and square shape of the central incisors. In order to enhance the harmony, the volume should be distributed across the four incisors. New screw-retained temporaries were fabricated. Prior to this, a wax model was adapted and tested intra-orally to visualise the outcome. A silicone key was created to first build up the lateral incisors with a temporary composite material.

With the temporary crowns and the composite mock-up of the lateral incisors, the shape of the wax-up could be transferred. This blueprint served to evaluate the new smile intra-orally prior to fabricating the permanent restorations. Shade selection was performed with the help of cross-polarised light. Undesirable reflections were effectively eliminated with a polar eye filter. In order to fabricate the final prosthetic restorations, the temporaries were duplicated and 1:1 copies were made using IPS e.max Press (monolithic lithium disilicate; Ivoclar Vivadent). Screw-retained IPS e.max Press crowns were placed on the implants and the screw openings were filled with PTFE and covered with composite. Once the restorations had been placed, the lateral incisors were built up with IPS Empress Direct composite (Ivoclar Vivadent). A palatal ma-

Figs. 10a–c: Individual stages in the intra-oral fabrication of the composite build-ups on the lateral incisors.—Figs. 11a & b: Result: the shape, shade and size of the anterior teeth created a harmonious appearance.
A natural-looking result was achieved owing to the translucent incisal effect created between the mamelons using IPS Empress Direct Trans Opal. After that, the build-up was covered with a layer of IPS Empress Direct Enamel A2. The morphological structures were contoured and accentuated using fine diamond grinders, Arkansas stones, green grinders and polishing discs. Silicone polishers and diamond paste were used for polishing. The outcome was a harmonious appearance of the maxillary anterior in terms of shape, shade and size (Figs. 11a & b).

Discussion
Although the presence of the papilla may not be the key issue after single implant treatment, preserving the papilla between two implants remains a challenge. The decision in this case was to extract the two teeth in stages and use temporary restorations to preserve the papilla. In addition, connective tissue grafts carried out at various points ensured ideal soft-tissue contours. Although only a few references regarding the predictability of connective tissue grafts can be found in the literature, recent studies have shown promising results.

Since the aim is to establish a harmonious balance between the teeth and ensure appropriate white aesthetics, pre-operative planning and a detailed case analysis are advisable. It is also important to consider carefully which materials to use. In contrast to zirconium dioxide and titanium, monolithic lithium disilicate restorations do not stimulate subgingival attachment to the soft tissue. Therefore, a hybrid abutment including zirconium dioxide or titanium could present an alternative.

Conclusion
A multidisciplinary team approach is essential to achieve a predictable treatment outcome. In addition, a detailed analysis and pre-operative planning procedure play a crucial part. Here, photograph- and video-based evaluations present powerful instruments.

Acknowledgements: All prosthetic procedures were conducted by Dr Sofie Velghe and all restorations were fabricated by dental technician Stephan van der Made. The authors wish to acknowledge the Kwalident dental laboratory and especially Mr van der Made for their contribution.

Editorial note: A list of references is available from the publisher.

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Sagittal First
Using the Carriere Motion appliance to treat Class II and III patients

By Dr Luis Carrière, Spain

When Dr Edward Angle first classified malocclusions for orthodontic treatment, he created the categories of Class I, Class II and Class III, the principal categories by which cases are still identified today. In basing his classification system on this one dimension—the sagittal dimension—Angle confirmed the sagittal relationship as being of primary importance and the one most critical and, indeed, most difficult to correct.

The Carriere Motion appliance (Henry Schein Orthodontics) is a technology that first addresses the patient’s sagittal dimension to establish a Class I platform prior to comprehensive orthodontic treatment. This is accomplished usually within the initial three months of treatment. We call this protocol Sagittal First. Sagittal First eliminates competing force vectors inherent in traditional methodologies when traction is employed concurrent with fixed appliance treatment. After establishing a Class I platform in the buccal segments (intercuspation of the molars, premolars and canines), the clinician finishes therapy with Carriere SLX brackets (Henry Schein Orthodontics) or another finishing appliance of choice, including Invisalign (Align Technology) if appropriate. Employing the Sagittal First approach using the Carriere Motion appliance makes achieving high-quality finishes easier and simpler.

The purpose of this article is to demonstrate application of the Sagittal First concept using the Carriere Motion appliance to treat Class II and III patients. The following two cases offer typical examples of the types of difficult sagittal corrections the appliance can address.

Case 1
Diagnosis and treatment plan

A 23-year-old female patient presented for treatment exhibiting a moderate Class III malocclusion with a negative overjet, proclined lower lip with a flat supramentale, open bite and crowding in the lower arch (Figs. 1a–h). The treatment plan was to distalise the mandibular dentition into a Class I occlusion (Sagittal First) using the Carriere Motion Class III appliance, then generate space to alleviate the lower arch crowding and close the bite, utilising light-force archwires in a passive, self-ligating (PSL) system. While tongue trainers would be bonded in conjunction with the fixed appliances later in treatment, the patient would also engage in tongue training exercises to correct her improper tongue positioning, especially while swallowing. Incorrect tongue positioning can compromise a satisfactory result. Bite closing would be accomplished by action of the archwires in the PSL brackets, not by use of any vertical elastics. Vertical elastics would be employed only during the finishing phase of treatment. In this way, gentle
forces would be acting on the roots, minimising stress to the periodontal ligament.

**Treatment sequence**

**Motion Class III appliance bonded**

Treatment commenced with the Motion Class III appliance bonded directly to the mandibular canines and first molars with 6 oz, ¼ in. intra-oral elastics, engaged for Class III traction to molar tubes bonded to the maxillary second molars (Figs. 2a–c). An Essix 0.014 in. vacuum-formed retainer (DENTSPLY RainTree Essix) was employed in the upper arch for maximum anchorage.

**Three months: Class I platform achieved**

By three months, the sagittal aspect had been corrected to the occlusal lock of the Class I platform (Sagittal First) with the anti-clockwise movement of the mandibular occlusal plane (Figs. 3a–c). The mandibular canines had extruded slightly. Some extrusion of canines is a positive sign of the anti-clockwise rotation of the mandibular posterior occlusal plane that promotes better positioning of the mandible in relation to the maxilla—a direct effect of the appliance. The Motion appliance was removed and tongue trainers were bonded to the lingual aspects of the mandibular incisors to continue to train the tongue to position itself properly in the oral cavity, specifically during swallowing and mastication. Concurrent with the tongue trainers, Carriere SLX 0.022 in. PSL brackets were bonded. Treatment followed the Carriere System archwire sequence. The archwires were all thermally activated wires with lower transformation temperatures chosen as archwire sizes increased to limit forces on the periodontium.

**Wire sequence:**

1. 0.014 in. Cu Nitanium (Henry Schein Orthodontics; 27 °C)
2. 0.014 × 0.025 in. Cu Nitanium (27 °C)
3. 0.019 × 0.025 in. Cu Nitanium (35 °C)
4. 0.019 × 0.025 in. Cu Nitanium (35 °C)

When the upper 0.019 × 0.025 in. archwires were engaged, three links of power chain were run laterally from the second premolar to the first premolar and from the first premolar to a crimpable hook attached to the wire distal to the lateral incisor to retract the anterior segment, bringing it into the final desired position (Figs. 4a–c).

**Fourteen months: Sagittal and fixed appliance treatment complete**

With three months of sagittal treatment and 11 months of fixed appliance treatment, the case was finished to a satisfactory result (Figs. 5a–f). The final cephalometric radiographs and dental panoramic tomograms highlight the positioning and health of the roots, a positive sign that these appliances respect the periodontium.
Figs. 6a–e: Initial situation: lateral facial view of the patient (a), intra-oral views (b–d), cephalometric radiograph (e).—Figs. 7a–c: Situation after one month of correction with the Sagittal first approach. —Figs. 8a–c: Situation after three months of correction: Class I had been achieved.—Figs. 9a–c: Situation after seven months of treatment (0.019 x 0.025 in. archwire was engaged with power chain to retract the anterior segment and bring it into the final desired position).—Figs. 10a–c: Final situation after 11 months of treatment.—Figs. 11a–g: Comparison of pre- and post-treatment situations. Cephalometric radiographs: initial situation (a), after three months of correction—Class I had been achieved (b), final result (c). Lateral facial view of the patient: initial situation (d), post-treatment situation (e). Post-treatment intra-oral situation: buccal view of mandibular forward movement (f), central view of mandibular forward movement (g).
“After treatment, the patient was able to protrude her mandible beyond her maxilla.”

Case 2

Diagnosis and treatment plan

A 27-year-old female patient presented for treatment exhibiting a Class II, Division 1, malocclusion with a severely protrusive maxilla and a severely retrusive mandible. The patient had had previous orthodontic treatment with extraction of the mandibular premolars. In consultation with other orthodontists, orthognathic surgery was recommended, which she wanted to avoid. The treatment plan was to reposition the mandible forward, placing the case into a Class I occlusion (Sagitall First) using the Carriere Motion Clear Class II appliance, then complete treatment utilizing light-force archwires in a PSL system. The Motion Clear appliance is the latest addition to the family of Motion appliances, designed for the patient with high aesthetic demands.

Treatment sequence

Motion Clear Class II appliance bonded

Treatment commenced with the Motion Clear Class II appliance bonded directly to the maxillary canines and first molars with 0.025-in. intra-oral elastics for the first month and 0.019 × 0.025-in. elastics for the second and third months, engaged for Class II traction to molar tubes bonded to the mandibular second molars. An Essix 0.04-in. vacuum-formed retainer was employed in the lower arch for maximum anchorage.

Three months: Class I platform achieved

By the end of the first month of sagittal correction, there was already evidence of some de-repositioning of the maxillary first molars and movement of the buccal segment (molars, premolars, and canines) toward a Class I occlusion (Figs. 7a–c). Space was beginning to open between the maxillary incisors. After three months of sagittal correction, the occlusal lock of the Class I platform had been accomplished (Sagitall First) and the case was ready to progress to the next stage (Figs. 8a–c). The Motion appliance was removed. While it would have been easy to finish this case with Invisalign, the patient chose fixed appliances, so Carriere SLX 0.022-in. PSL brackets were bonded. Treatment followed the wire sequence stated in Case 1.

The first wire, a 0.014-in. round Cu Nitium wire, corrected the rotation of the incisors. With the 0.014 × 0.025-in. Cu Nitium wire, power chain was used to close the spaces between the incisors. After these spaces had been closed, the 0.019 × 0.025-in. Cu Nitium wire began torque control with the final archwire, the 0.019 × 0.025-in. Cu Nitium wire, to finalize the axial angulations of the anterior teeth. When the upper 0.019 × 0.025-in. arch wire was engaged, three links of power chain were run bilaterally from the second premolar to the first premolar and from the first premolar to a crimpable hook attached to the wire distal to the lateral incisor to retract the anterior segment, bringing it into the final desired position (Figs. 9a–c).

Eleven months: Sagittal and fixed appliance treatment complete

With three months of sagittal treatment and eight months of fixed appliance treatment, the case was finished to a harmonious occlusal and facial result (Figs. 10a–c). The result exhibited excellent repositioning of the mandible, held in position by the occlusal lock of the Class I platform (inter-cuspation of the molars, premolars, and canines). The mandibular repositioning was obviously not a result of growth in a 27-year-old woman, but the result of balancing the structures of the temporomandibular joints, repositioning the mandible in the temporomandibular space. Prior to treatment, she could not protrude her mandible even to position her mandibular anterior teeth into the lingual aspect of her maxillary anterior teeth. For this patient, the mandibular repositioning effected a dramatic, positive change in her facial profile to create a beautiful symmetry (Figs. 11a–g). Figures 12 to 14 illustrate this repositioning. An indication of the extent of this movement is the fact that, after treatment, the patient was able to protrude her mandible beyond her maxilla.
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