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Group Managing Editor

Siobhan Hiscott siobhan.hiscott@fmc.co.uk

Tel: 01923 851758

Content Director

Guy Hiscott guy.hiscott@fmc.co.uk

Tel: 01923 851754

Designer

Glenn Baxter glenn.baxter@fmc.co.uk

Head of Production

Laurent Cabache laurent.cabache@fmc.co.uk

Production Manager

K-Marcelyne McCalla k-marcelyne.mccalla@fmc.co.uk

Chief Commercial Officer

Tim Molony tim.molony@fmc.co.uk

Tel: 01923 851733

Classified advertising

Nick Caruana nick.caruana@fmc.co.uk

Tel: 01923 851732

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ISSN: 2752-3969

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CELEBRATING IN STYLE



Welcome to the August issue of *Clinical Dentistry*.

It's a cliché, I know, but time really does fly when you're having fun (and very busy!). Both are true for the team here, and last few months have gone by in a blur as a result.

From events outside the surgery – such as a new UK government being voted in and a certain European football tournament – to more dentally-related news like greater powers for dental hygienists and dental therapists, there's been plenty to report on and discuss.

The exemptions legislation will enable appropriately trained dental hygienists and therapists across the UK to legally supply and administer specific prescription-only medicines under an exemptions mechanism, without the need for a dentist's prescription, a patient-specific direction or a patient group direction.

This result is no mean feat. It's taken dedication, passion and sheer hard work from the BSDHT and BADT over the last 10 years to get this legislation over the line. I'm thrilled for what this will mean – and not just for dental hygienists and therapists but also for the profession at large.

Something I'm just as excited about is this year's Clinical Dentistry Awards ceremony. Plans are well underway for the evening event, which takes place on Friday 11 October at the Royal Garden Hotel in London – and judging by the number of entries we've received, the 2024 Clinical Dentistry Awards is going to be the best one yet!

We're delighted to announce the 2024 finalists in this issue – turn to page 10 to find out who made the list.

With the shortlist revealed, the next stage in the rigorous judging process is to bring together our expert judging panel to review all the shortlisted entries. And with the standard of entries getting increasingly higher each year, the judges have an extremely tricky task on their hands. So, if you're lucky enough to walk away with a Clinical Dentistry Award in 2024, know that you're practising at the top of your game, for these awards have been designed to acknowledge clinical excellence in practice.

Before you know it, we'll be talking about plans for 2025, so for now, let's revel in the moment. I hope to celebrate with you in October!



Siobhan Hiscott
Group Managing Editor
siobhan.hiscott@fmc.co.uk



CONTACT

PHONE +44 (0) 1923 851777

EMAIL hello@clinicaldentistry.co.uk

WEB www.fmc.co.uk



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BDS MJDF (RCS Eng) MClintDent MPerio (RCS Ed) FHEA
Specialist in periodontics and associate specialist at King's College Hospital.



Julian Webber

BDS MSc DGDPUK
Specialist in endodontics and visiting professor at the University of Belgrade, Serbia and Montenegro.



Moira Wong

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Introducing some of the people who have shared their expertise in this issue of *Clinical Dentistry*



DR PIRTA LILJEKVIST

From avoiding certain foods to the importance of hydration, Pirta Liljekvist shares her top tips for fellow dental professionals looking to assist their patients in maintaining fresh breath on page 54.

Pirta graduated from the University of Helsinki, Finland, in 2000. The Finnish dentist practises at Oral Hammaslääkärit in Espoo, Finland, where she currently provides orthodontic aligner treatment.

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CLINICAL DENTISTRY AWARDS

The Clinical Dentistry Awards aim to acknowledge clinical excellence in practice. This year's ceremony takes place at Royal Garden Hotel in London on Friday 11 October.

Turn to page 10 for the Clinical Dentistry Awards 2024 shortlist. For more details, and to secure your tickets, visit dentistry.co.uk/clinical-awards or scan the QR code.



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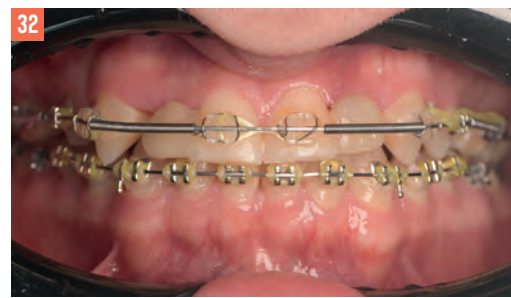
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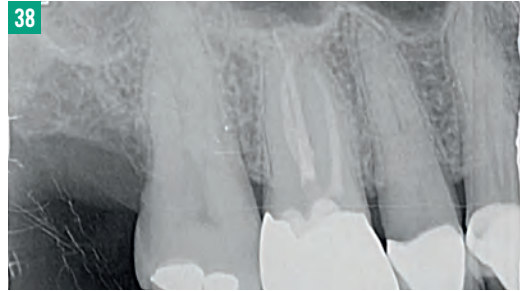
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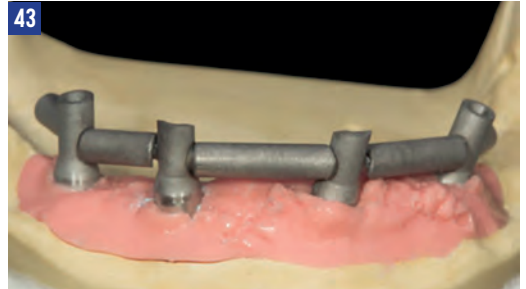
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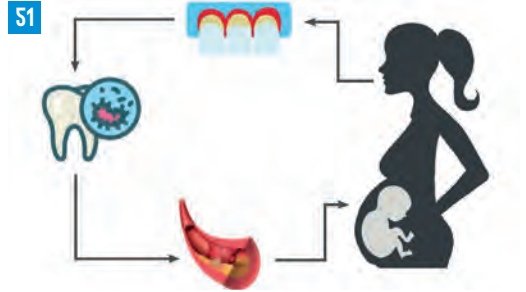
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Mariam Khalil Al-Ani
Poppy Irvine
Sakina Syed
Sarah Hardie
Sejal Patel
Victoria Louise Corner

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Bethan Taylor
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Kendra Smith
Kirsty Gilhooly
Leah Robson
Michaela Robinson
Preetha Chandran Sakunthala
Sarah Wallace
Stacie Chanel de Klerk
Tracy Tang

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Harsha Mane
Hassan Kanani
Janine Sohota
Jonathan Fitzpatrick
Marco Gaias
Matthieu Dash
Paavan Chouhan
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Dentistry on the Square
Inspired Dental Care
Start Smiling

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John Paul Delaney
Russell Hashemi
Viraj Patel

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 Andrew Farr
 Clifton Wan
 Gayathiri Balasubramaniam
 Imran Nasser
 Jiten Vaghela
 Pratik Patel
 Suki Murbay
 Thomas Sealey
 Tomas Perez Lorenzo
 Viraj Patel

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 Andre Faro Leite
 Andrew Farr
 Fayaz Ladak and Andreas Tsoutsos
 Gayathiri Balasubramaniam
 Imran Nasser
 Mario Veltri
 Sanaa Kader
 Suki Murbay
 Tomas Perez Lorenzo
 Vishal Patel

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 Ciara Ennis
 Jana Denzel
 Parm Dhillon

ORTHODONTIC THERAPIST

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 Rachael Hartley
 Sarah Macdonald

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 Bright Orthodontics Ormskirk
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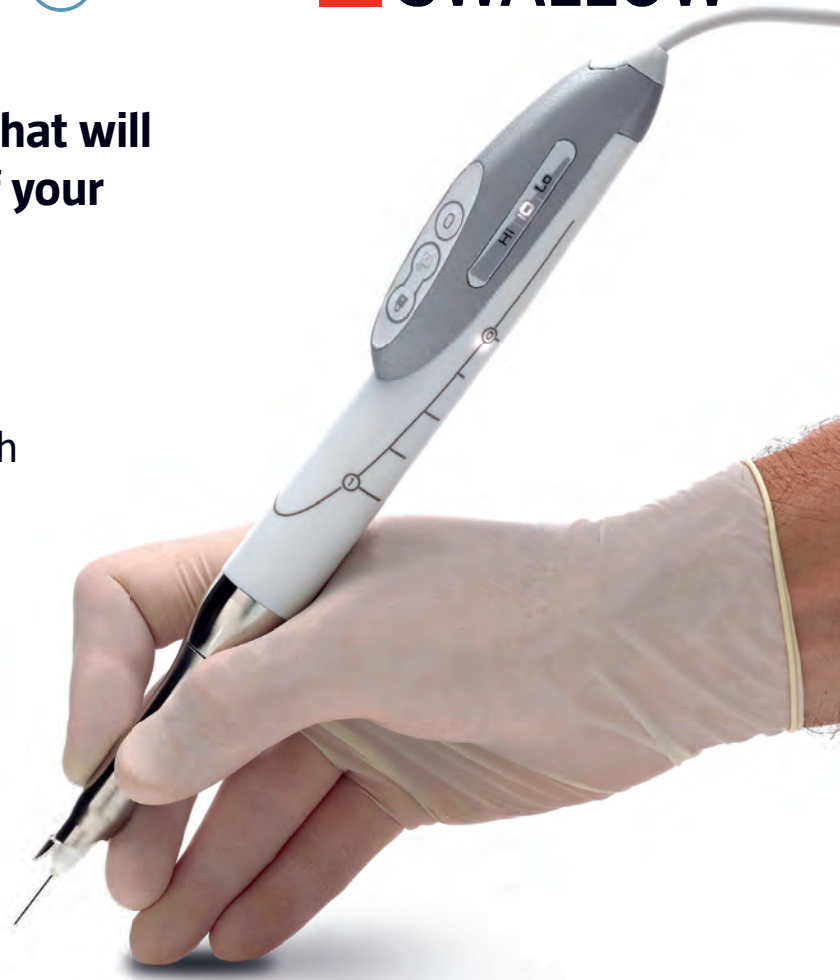
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GENERAL DENTISTRY

LISA CURRIE

Snoring and mild sleep apnoea:
management

14



MAHESH KOTLI

Intravenous sedation and
nervous patients

18



The role of dentists in the treatment of OSA is increasing, given their ideal position to undertake MAA therapy. This relatively simple device can give dentists an opportunity to significantly improve the quality of life of these patients as well as their partners - Lisa Currie, p14

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LISA CURRIE

Lisa is clinical director and consultant orthodontist at The Orthodontic Clinic.

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: General dentistry

Educational aims and objectives:

To discuss snoring and obstructive sleep apnoea and the role the dentist plays in managing the condition.

This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



During sleep, when the throat muscles relax, the airway can narrow or collapse, interfering with breathing. This can occur at various levels of the airway, resulting in either snoring, where noise is generated by soft tissue vibration (soft palate, uvula, tongue, airway walls), or obstructive sleep apnoea (OSA), characterised by repeated collapse of the pharyngeal airway during sleep (Malhotra, White, 2002; Norton, Dunn, 1985).

Snoring is generally considered a social nuisance and an annoying habit for sleeping partners. It is a major factor in sleep disturbance and can result in stress, lack of energy, poor concentration, mood swings, and irritability (Malhotra and White, 2002; Norton and Dunn, 1985).

In the long term, snoring can also lead to high blood pressure and heart problems (Norton and Dunn, 1985; Lindberg et al, 1998).

Those suffering from OSA experience multiple partial or complete obstructions of the airway during sleep, termed hypopnoeas and apnoeas, which lead to either a reduced amount, or total cessation of respiratory airflow during sleep. This results in severe oxygen depletion, leading to serious medical problems.

SYMPTOMS

OSA symptoms are excessive daytime sleepiness and dysfunction as a result of non-refreshing fragmented sleep. Untreated OSA is associated with adverse health outcomes, particularly in terms of impairment of daytime functioning and subsequently, quality of life. OSA is linked to long-term cardiovascular morbidity (Dong, Zhang and Qin, 2013; Saunamäki and Jehkonen, 2007), including hypertension, myocardial infarction, and stroke, and increased risk of motor vehicle accidents (Moyer et al, 2001).

The sleeping partners of OSA sufferers will report witnessed episodes of cessation of breathing during sleep despite ongoing efforts, as well as loud snoring, choking or gasping, making it difficult to sleep together.

RISK FACTORS

OSA affects around twice as many males as females. Age and obesity are the most significant risk factors for OSA. OSA is most common in the 50- to 60-year-old age group and an increased BMI increases the risk of developing the condition (Greenstone and Hack, 2014).

During sleep in a supine position, the tongue and soft palate falls backwards, causing obstruction of the upper airway (Figures 1a and 1b), worsened if the pharyngeal space is reduced either anatomically or functionally. This could be caused by:

- A large tongue (macroglossia)
- Small mandible (retrognathia)
- Excessive fat in palate (and/or the neck area)
- Large tonsils (tonsillar hypertrophy).

Other factors might include a family history of sleep apnoea and a deviated septum.

TREATMENT

Behavioural changes should be encouraged – weight loss, smoking and alcohol cessation (especially late in the day and evening) and modification of the sleeping position from supine to side sleeping.

Continuous positive airway pressure (CPAP) therapy is the first-line treatment for OSA, and evidence suggests that CPAP can reduce breathing disturbances and daytime sleepiness and improve sleep quality, quality of life, and blood pressure (Antic et al, 2011; Barbé et al, 2010).

A continuous pressure of warm, moistened air is delivered through a nasal or oro-nasal mask,

Lisa Currie explores snoring and obstructive sleep apnoea and the role the dentist plays in managing the condition

Snoring and mild sleep apnoea: management

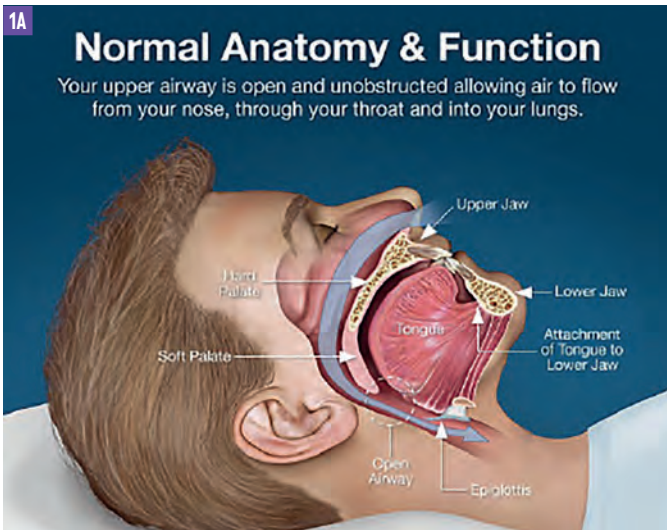


FIGURE 1A: Normal function with open airway

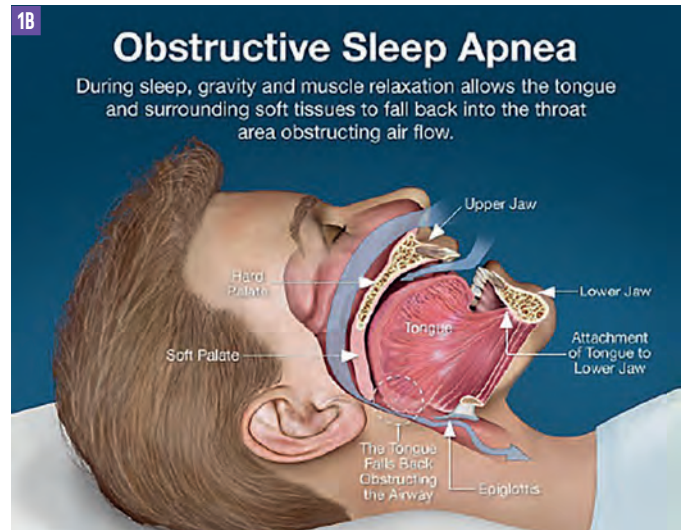


FIGURE 1B: Obstruction of airway in OSA

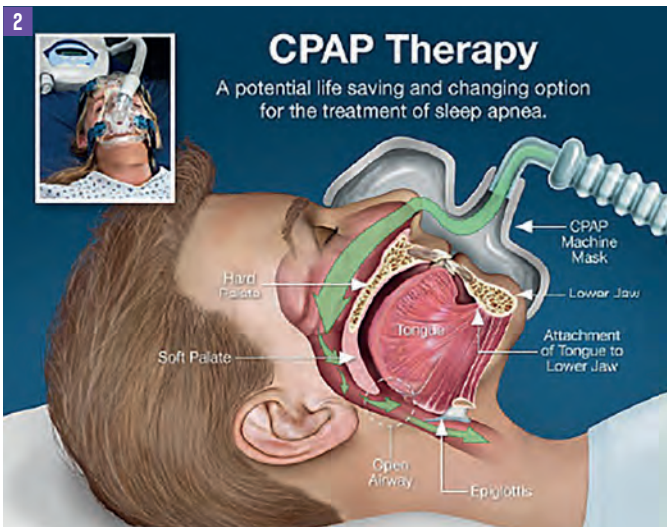


FIGURE 2: CPAP therapy

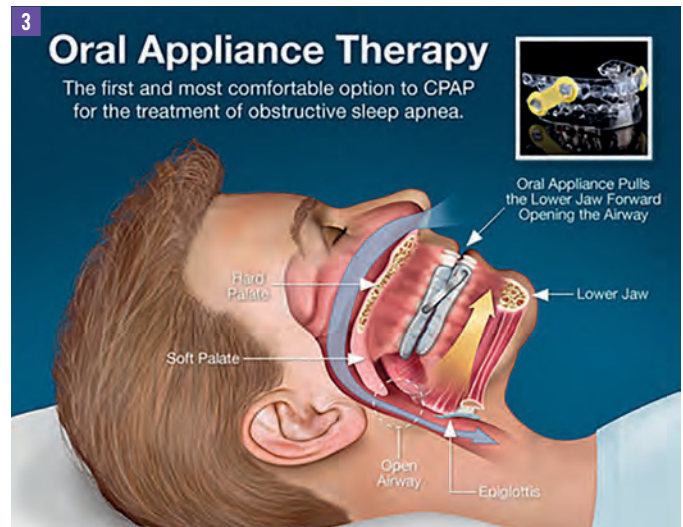


FIGURE 3: Action of the MAA – mandibular protrusion

preventing airway collapse (Figure 2). Adherence to treatment is critical for achieving optimal therapeutic benefit, but this can be problematic for individuals undergoing CPAP (Weaver and Grunstein, 2008). The CPAP equipment is difficult to tolerate – it is noisy, cumbersome and anti-social, often causing discomfort and airway dryness.

Alternative treatment options, including oral appliances and upper airway surgery, are available for whom CPAP therapy is not well tolerated, who are unresponsive to CPAP, or who are not appropriate candidates for CPAP.

DIAGNOSIS

The patient should complete an Epworth Sleepiness Scale (ESS). This is a subjective questionnaire that measures daytime sleepiness by asking patients how likely they are to fall

asleep during certain situations. Scores on the ESS range from 0 to 30. The higher the score, the more severe the level of increased daytime sleepiness. Subjects scoring 10 or higher are considered hypersomnolent and should be referred to their general medical practitioner.

The ESS helps differentiate between simple snorers and OSA; however, it is not diagnostic when used on its own. To definitively diagnose OSA, an overnight sleep study is required, which involves pulse oximetry and polysomnography. This is an objective method of diagnosis and can analyse breathing patterns, blood oxygenation and arousals from sleep (British Lung Foundation, 2015).

The data from the study will give an apnoea hypopnoea index (AHI) score, measuring the number of apnoeas and hypopnoeas per hour of sleep, which determines the severity of OSA.

Five episodes of apnoea or hypopnoea an hour is diagnostic for OSA, while a score of greater than 30 is diagnostic of severe OSA (Greenstone and Hack, 2014).

ORAL APPLIANCES — MANDIBULAR ADVANCEMENT APPLIANCES

Dentists are optimally placed to screen for the presence of signs and symptoms of snoring and OSA in their patients.

Once identified, an assessment can be made as to whether an oral appliance is indicated (ideally in snorers and those with mild OSA) and the patient then referred to their GMP to help establish a diagnosis. From there, the GMP can refer for an overnight sleep study if OSA is suspected.

Although CPAP is considered the gold standard, compliance is less than optimal.





FIGURE 4: Sleepwell (MDSA) customised mandibular advancement appliance

Oral appliances provide effective treatment but are far more tolerable and are the first-choice management option for snorers, mild and moderate OSA cases, or when patients with more severe apnoea cannot tolerate CPAP. They are simple to make, non-invasive and cost-effective. They have advantages over CPAP in that they are unobtrusive, make no noise and do not need a power source.

Mandibular advancement appliances (MAAs) significantly increase oxygen saturation and reduce AHI scores (although not as much as CPAP) and improve the symptoms of snoring and daytime sleepiness.

There are many such types of appliances, with the most common being tongue retaining devices and MAAs (American Sleep Disorders Association and Sleep Research Society, 1995).

MAAs hold the mandible in a protruded position, which opens and expands the posterior airway behind the tongue and the soft palate (Figure 3). This advances the soft palate and increases its tension, making it less likely to collapse or vibrate.

Many MAAs can be purchased ‘off the shelf’ but the best results are achieved using a custom, lab-made adjustable device. These offer a level of incremental, titratable advancement with an excellent fit, so are more easily tolerated (Johal, 2008).

Figures 4 to 7 illustrate examples of titratable MAAs.

The patient should have a good dentition to allow for adequate retention and reasonable occlusal coverage. Poor oral health is a contraindication, particularly as the appliance could exacerbate periodontal disease, leading to increased mobility and accelerated tooth loss.

The appliance should have minimal vertical opening to aid comfort – this does not affect the efficacy of the MAA. If there is excessive vertical opening, the mandible will be allowed to rotate downwards and backwards, which will narrow the airway.

COMPLICATIONS AND COMMON SIDE EFFECTS

Careful diagnosis and examination will reduce potential problems with MAAs. Most commonly



FIGURE 5: Somnodent customised mandibular advancement appliance

reported side effects include increased salivation and an ‘altered bite’ in the morning after wearing the appliance overnight. These side effects are usually short-lived and the patient tends to adapt to these.

There can be some initial discomfort while getting used to the appliance and the protrusive position. Titratable MAAs allow for incremental forward positioning and can reduce this discomfort as the protrusion takes place more gradually.

For those patients who display temporomandibular joint dysfunction syndrome (TMJDS), a worsening of their symptoms may occur due to forward posturing of the mandible – this requires careful monitoring (Almeida et al, 2006; Doff et al, 2010).

Longer term, as a result of mandibular protrusion, there is a risk of unwanted tooth movement and a change in the occlusion, namely, retroclination of the upper incisors and proclination of the lower incisors. These changes can be seen within the first year of wearing of the appliance and may persist but this can vary (Almeida et al, 2006; Doff et al, 2010). Further research is still required as to the long-term dental effects of MAAs.

FOLLOW-UP

Patients should be reviewed one to three months after commencing MAA treatment to check their efficacy. This can be assessed through direct questions and can include the experience of the sleeping partner.

ESS should be repeated to see if symptoms have improved.

For those patients who suffer from moderate to severe OSA, the GMP can refer for a repeat sleep study. This highlights the need for multidisciplinary care in these patients, involving the dentist, the GMP and a medical team, usually involving a sleep and/or respiratory physician.

DENTISTS’ RESPONSIBILITIES

Dentists should have undertaken documented training in the provision of MAAs and the appropriate screening for OSA (Dental Protection, 2019).



FIGURE 6: Narval customised mandibular advancement appliance



FIGURE 7: MSI (mandibular snoring inhibitor) customised mandibular advancement appliance

The patient needs to be assessed for the signs and symptoms of OSA and if suspected, be referred for medical assessment for diagnosis. The referral should be made before making an oral appliance and if a MAA is provided, this should only be done as part of an integrated treatment plan.

It should be kept in mind that MAA therapy may mask a more severe problem and could lead to a delay in making this diagnosis.

Patients should be advised of the risks and benefits of MAAs, including any potential impact on the occlusion and the TMJ. The consent process should be clear and well documented.

CONCLUSION

The role of dentists in the treatment of OSA is increasing, given their ideal position to undertake MAA therapy. This relatively simple device can give dentists an opportunity to significantly improve the quality of life of these patients as well as their partners.

To provide this type of care, dentists need to undergo training in oral appliance therapy and have knowledge of sleep-related breathing disorders, with treatment protocols to work as part of a multidisciplinary team (Ramar, Dort and Katz, 2015). [CD](#)

PRODUCTS USED

- Somnodent Somnosed
- Narval Resmed
- Sleepwell S4S Dental
- Mandibular snoring inhibitor DB Orthodontics



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Among the several schools located in the heart of the Aurina Valley and conceived by the creative mind of Enrico Steger, the Military School is undoubtedly the most traditional training offered to the young.

Specifically conceived for willing and adventurous boys and girls, this short yet intense training welcomes every year students from all over the world to improve one's skills in a multicultural environment.

Over the five-day training, the young participants will face several dental technical and personal challenges, turning the school experience into a true adventure immersed in the alpine landscape.



FIGURE 1: Zirkonzahn Military School, based on the fundamental values of discipline and loyalty, brings the young participants face to face with dental technical and personal challenges, helping them overcome their limits and enhancing their personal skills



FIGURE 2: Resoluteness, alertness, willing to defend values, absolute humbleness before nature and unflagging contribution to one's goal: these are Rangers!

THE VALUE OF DISCIPLINE

The concept of discipline is the cornerstone of the Zirkonzahn Military School and the only reason why the training is characterised by a military orientation.

Its aim is to discern the non-aggressive and unwarlike aspects of the military life, which are the virtues, to use them as a basis for structuring one's work, one's 'personal army'.

Discipline is the first value that participants will master during the school, by getting up early, doing morning exercises and working following a strict and well-planned schedule with a diligent attitude.

The most ambitious objectives can be reached only with enhanced diligence!

Each working step is repeated many times until it becomes engraved into the mind.


In the evening, after work is done, there is still no time for rest: adventurous challenges are still waiting...

CLIMB THE MOUNTAIN

For young people, Zirkonzahn also opened the doors of the Ranger School.

Driven by great motivation, in a period of three to six months, enthusiastic, committed and ambitious technicians can take part in a challenging school programme that will pave their way towards future success.

In an international atmosphere, Zirkonzahn's experts fully transmit their knowledge to the Ranger School participants, covering a wide variety of disciplines and field that span from the latest dental technologies and workflows to aesthetic design, professional writing, marketing and photography.

But the Ranger School is not only homework and workshops: alongside the strict schedule, adventurous and cultural activities await the students, bringing the Rangers face to face with their own limits, giving them the chance to grow up not only professionally but also personally. Hence, 'Climb the mountain' is the Ranger School's motto! 

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Intravenous sedation and nervous patients

Mahesh Kotli discusses the synergy of intravenous sedation and The Wand technology for enhancing dental care at Olive Tree Dental

Intravenous sedation (IVS) is a type of conscious sedation widely used in dental and oral surgical procedures. This technique helps patients remain relaxed and comfortable while staying awake and responsive to instructions from the dentist or surgeon.

IVS is particularly beneficial for complex procedures such as tooth extractions, dental implant placements and root canal treatments, especially for patients who experience significant anxiety or dental phobia.

MECHANISM AND MEDICATION

During IVS, patients receive medication, most commonly midazolam, administered intravenously to induce relaxation and reduce anxiety. The primary goal is to provide a pain-free and stress-free experience.

Patients remain conscious but have a decreased awareness of their surroundings and, in some cases, may experience amnesia regarding the procedure details.

STAGES OF INTRAVENOUS SEDATION

Preoperative stage

- Patient selection and assessment: ideal candidates for IVS are those with minimal or well-controlled medical issues. A comprehensive medical and dental examination should be performed, with clear and concise explanations provided to the patient to avoid overwhelming them with clinical information
- Consent and preparation: patients,

particularly women of childbearing age, should be asked about pregnancy or breastfeeding. They must provide consent for the procedure and are advised to bring a chaperone. Patients should be informed about the need to avoid alcohol for 24 hours before and after the procedure, and in some cases, follow a nil-by-mouth protocol for six hours before surgery

- Vital signs recording: preoperative assessment should include recording the patient's vital signs, including blood pressure, pulse, and oxygen saturation.

Perioperative stage

- Day of treatment: on the day of the procedure, clinical staff should ensure the patient is accompanied by a responsible adult. The treatment plan should be reviewed, and an additional consent form completed to ensure all information is clear
- Medication administration: a cannula is inserted into the patient's hand or arm for IV medication administration. Continuous monitoring of vital signs, including blood pressure, heart rate, and oxygen saturation, is essential throughout the procedure, with all observations documented in the patient's records.

Postoperative stage

- Recovery monitoring: after the procedure, patients should be closely monitored until they fully recover, which includes ensuring they are alert and oriented. Recovery times may vary among patients

- Discharge instructions: patients may feel drowsy or groggy post-procedure. They should be accompanied home and monitored for a few hours. Driving is not permitted for 24 hours, and patients are advised against online shopping or social media use immediately after treatment due to potential medication influence
- Cannula removal: the cannula is removed by a clinician or sedation-trained dental nurse. Postoperative instructions should be given to the patient's escort in both written and verbal forms.



DR MAHESH KOTLI
Mahesh is a dentist with a special interest in oral surgery.



FIGURE 1: The Wand STA



FIGURE 2: *The Wand in action*

INTEGRATING THE WAND TECHNOLOGY

Combining IVS with The Wand technology can significantly enhance the dental experience, particularly for nervous patients, those with dental phobia, or a fear of needles.

The Wand technology, a computer-controlled local anaesthesia delivery system, modifies how injections are performed, minimising pain and anxiety.

By reducing the discomfort associated with injections and keeping anxiety levels low, patients can feel more confident and relaxed during their visits. This combination not only improves patient comfort but also helps in creating an innovative, high-tech image for the practice, promoting a more pleasant patient experience for all, including younger and nervous patients.

ADDRESSING NERVOUS PATIENT HISTORIES

Understanding the specific anxieties and triggers of patients with dental phobia is crucial for providing tailored care.

Encouraging patients to communicate their fears through a detailed form can offer invaluable insights. This proactive approach allows dental professionals to prepare thoroughly for appointments, ensuring a smoother and more comfortable patient journey.

BENEFITS OF THE COMBINED APPROACH

The synergy of IVS and The Wand technology offers a significant advantage in treating patients with dental anxiety. It creates a more pleasant and comfortable environment, enabling dentists and oral surgeons to deliver optimal care without the added stress and anxiety typically experienced by nervous patients.

CONCLUSION

The combination of intravenous sedation and The Wand technology represents a significant advancement in clinical dentistry. By addressing both pain and anxiety, this approach enhances patient comfort, supports innovative practice, and ensures a high-quality dental experience for all patients, especially those who are anxious or phobic about dental visits. [📄](#)

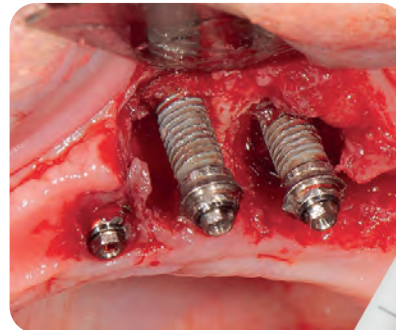
PRODUCTS USED

The Wand STA Milestone Scientific



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*Author: Dr Patrick
Palacci, Marseille,
France*

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[1] Gianasmidis A, DZW 2016 (39), p. 18-19, additional data on file.

AESTHETIC DENTISTRY

KEVIN HUYNH

Single anterior tooth restoration

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ALI SALEHI

Tooth whitening: protocols

26



Tooth whitening is the application of a chemical agent (hydrogen or carbamide peroxide) directly to the tooth surface to increase its colour value. It can be an in-office treatment or performed at home by the patient. Each technique has its pros and cons – Ali Salehi, p26

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SCAN ME

**DR KEVIN HUYNH**

Kevin graduated from King's College London Dental Institute and has completed a postgraduate certificate in primary dental care. He has a passion for providing comprehensive and high-quality general dentistry, and takes pride in his holistic approach to patient care. Kevin takes a keen interest in highly aesthetic and functional dentistry, whether that's a single tooth all the way up to a full mouth reconstruction.

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: Aesthetic dentistry

Educational aims and objectives:

To present a case detailing restoration of a broken upper right central incisor. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



The patient previously attended regularly with a colleague who has now retired, and I saw him for the first time as an emergency appointment. He presented with a broken upper right central incisor; he couldn't remember how it broke, but his records showed that the tooth was last restored in 2015.

Overall, his oral health was adequate, with a mildly restored dentition, notable attrition, and mild anterior crowding (Figures 1 to 3).

ASSESSMENT AND DIAGNOSIS

The occlusion was checked, and it was noted that the UR1 was slightly palatally tilted and, in protrusive and lateral excursions, there was sufficient space to place a direct composite restoration to recreate the correct height and bring the facial surface into alignment with the UL1.

A simple visual assessment of the tooth made it clear that the previous restoration had only been bonded to the incisal edge, as there was no evidence of bevelling or bonding on the facial surface.

Vitality testing was completed and the UR1 was consistently positive to Endo-Frost (Coltene), with no pocketing or tenderness.

TREATMENT PLANNING

Several treatment options – from very simple to more complex – were discussed. These included a single tooth restoration, which would be challenging to match perfectly to the neighbouring tooth, as well as orthodontic treatment to address the anterior crowding followed by aesthetic composite restorations to restore the worn anterior teeth.

The patient was not interested in anything beyond a single tooth repair, so a composite restoration was agreed.

The patient also expressed that he was keen to have the facial surface brought into alignment and, since this would also increase the restoration's overall strength, I was happy to oblige.



FIGURE 1: Before – contrasitor



FIGURE 2: Before – front



FIGURE 3: Before – right-hand side



FIGURE 4: Composite for palatal shell – putty index

Kevin Huynh describes the restoration of a broken upper right central incisor

Single anterior tooth restoration



TREATMENT PROVISION

The tooth was isolated using Hysolate rubber dam (Coltene), extending to the premolars to ensure there was sufficient space to reach the UR1 unimpeded (Figure 5). Excellent retraction and moisture control was achieved thanks to the heavy latex Hysolate dam.

The enamel was bevelled for the sake of aesthetic blending, air abrasion was carried out with a micro-etcher to remove any biofilm (neighbouring teeth were protected with mylar strips), and etched for 30 seconds with 37% orthophosphoric acid (Figure 6).

The tooth was then rinsed for more than 60 seconds to ensure the clearance of any precipitates for the etching process.

Less is clearly more when using tints, and practice makes perfect

One Coat 7 Universal Bond (Coltene) was applied to the tooth, scrubbed for 20 seconds, and gently air dried until evenly thinned out, and light-cured for 30 seconds.

Brilliant Everglow (Coltene) in shade BL Trans was used to build up the palatal shell in the stent made using a mock-up prior to treatment (Figure 7).

The shell was kept reasonably thin, and stabilised with Brilliant Everglow flowable composite (Coltene) in shade A2/B2. At this stage, it was noted that the palatal shell was too long, so this was taken into account in the following steps:

- Proximal walls were built up with Brilliant Everglow in shade BL Trans using mylar strips and the ‘pull-through’ technique (Figure 8)
- Body shade Brilliant Everglow A2/B2 was placed (Figure 9), leaving space for blue tints to run along the incisal edge and up the inside of the proximal walls
- Miris 2 blue tint (Coltene) was applied to the incisal edge and the inner aspect of the proximal walls to mimic the translucency in the neighbouring tooth (Figure 10)
- A final layer of Brilliant Everglow in shade BL Trans was then applied, blended, and cured (Figure 11)
- The restoration was trimmed using polishing burs and discs (Figure 12). The occlusion and excursions were checked, and then polished to near high-gloss using Diatech Shapeguard polishers (Coltene).



FIGURE 5: The teeth were isolated using Coltene Hysolate rubber dam



FIGURE 6: Air abrasion and acid etching were carried out



FIGURE 7: Palatal shell – BL Trans



FIGURE 8: Proximal walls – BL Trans



FIGURE 9: Body shade – mask the join



FIGURE 10: Blue Miris tint – diffuse layer



FIGURE 11: Enamel layer – BL Trans



FIGURE 12: Trim, polish



FIGURE 13: Immediate postoperative – contrastor



FIGURE 14: Immediate postoperative – front



FIGURE 15: Immediate postoperative – right-hand side



FIGURE 16: Two-week review – contrastor



FIGURE 17: Two-week review – front

FINAL RESULT

The patient was very happy with the immediate result (Figures 13 to 15), but we agreed that he would return after two weeks to see how the restoration had blended.

The neighbouring teeth were dehydrated following treatment, making the restoration appear too dark immediately afterwards.

At the two-week review, it was noted that the colour had blended well as the neighbouring teeth had rehydrated. A final polish was completed using Diatech Shapeguard polishers to achieve a high lustre (Figures 16 and 17).

The handling properties of Brilliant Everglow products, and the variety of shades and opacities available, make achieving an aesthetic outcome easier. The Diatech Shapeguard polishers also make it very straightforward to achieve a high lustre when finishing.

CASE REFLECTION

The patient was very happy with the result, and felt it was an improvement when compared to the previous restoration on the same tooth. We agreed that the colours had blended well and that, in his everyday life, the restoration looked just like a natural tooth.

In hindsight, I wish I had spent an extra minute making sure that the composite mock-up was as accurate as possible because the process would have been easier had the palatal shell been the correct height to begin with.

Additionally, on reflection, I could have been less heavy-handed with the Miris 2 blue tint, specifically around the incisal area. The proximal areas look great, but I feel that the incisal area is a little too blue. Less is clearly more when using tints, and practice makes perfect. [CD](#)

PRODUCTS USED

Hysolate, One Coat 7 Universal Bond, Brilliant Everglow, Miris 2, Diatech Shapeguard Coltene



Tooth whitening: protocols

Ali Salehi explains how maximising the aesthetic result of tooth whitening can be achieved by answering three questions

When it comes to dental aesthetics, tooth colour is an important consideration. It is well understood that tooth colouration can be caused by intrinsic and/or extrinsic staining. The success of tooth whitening, whether in-office or at-home, is directly related to two important parameters:

- Proper case selection
- Precision in executing the whitening protocol.

Maximising the aesthetic result of tooth whitening can be achieved by answering three questions:

1. Who is a good candidate for tooth whitening?
2. In-office or at-home, what is the better option?
3. What protocol to maximise my result?

WHO IS A GOOD CANDIDATE FOR TOOTH WHITENING?

Many cases of intrinsic staining can be addressed combining tooth whitening procedures with other types of treatment (Figure 1). However, patients that would benefit firsthand from this conservative aesthetic treatment are those having extrinsic staining issues going deep into enamel.

As such, we should first consider tooth colourations related to food (red fruits, tomato sauce, colourful spices such as curry or paprika etc), drink (tea, coffee, wine etc), tobacco or marijuana use, excessive use of certain mouth rinses (chlorhexidine) and the activity of certain chromogenic bacteria.

In these cases, the staining would concern more or less the whole tooth

and the deposits, that would first induce a superficial discolouration, would with time affect deeper aspects of the tooth structure. In such cases, neither simple oral hygiene techniques nor in-office polishing measures would be enough to remove the staining.

In these examples, the chromophores that are responsible for the colour change can easily be oxidated by hydrogen peroxide within the tooth. This oxidation associated with an opacification of enamel, that also comes with tooth whitening, will significantly enhance the aesthetic outcome.

Natural loss of brightness due to normal tooth ageing also gives interesting results but one has to remember that the brightness of a tooth surface is directly related to enamel,



FIGURE 1: Aesthetic improvement of a fluorosis case using a combination of at-home whitening treatment (Polanight 10% carbamide peroxide, SDI), micro-abrasion and erosion infiltration (Icon, DMG)

such that the thicker the enamel, the brighter the tooth (Figure 2).

This explains why teeth look whiter at a younger age. It also explains why tooth whitening procedures could be less successful with older patients and/or young patients with a thinner enamel.

WHAT IS THE BETTER OPTION – IN-OFFICE OR AT-HOME?

Tooth whitening is the application of a chemical agent (hydrogen or carbamide peroxide) directly to the tooth surface to increase its colour value. It can be an in-office treatment or performed at home by the patient. Each technique has its pros and cons.

Because the product is used at high concentration, in-office results are more impressive as they are acquired faster.

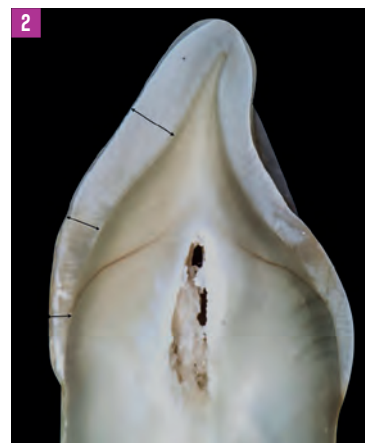


FIGURE 2: Dental structure thickness. The value (brightness) of a tooth is correlated to the thickness of the enamel. Thicker enamel means a brighter tooth



DR ALI SALEHI

Ali graduated in 2008 with a bachelor of dental surgery from the Faculty of Dental Medicine of the Strasbourg University (France). In 2007, he got a master of biological and medical sciences from the University of Strasbourg Medical School. From 2008 until 2015, he worked as a clinical faculty at the Department of Prosthodontics of the University of Strasbourg. Since 2023, Ali has been in the process of getting his DDS as an advanced standing student at NYU College of Dentistry.



FIGURES 3A and 3B: Using lower concentration hydrogen peroxide products for at-home whitening for two to three weeks produces similar colour changes to the higher concentration products used for in-office whitening in one session

However, these results are less stable with a faster relapse, an unpleasant patient experience and the need to block the dental chair and dental staff when other types of treatment could be performed.

At-home tooth whitening uses low concentration hydrogen peroxide, which means a longer treatment time to acquire a nice result and the need for the patient to be compliant when performing the procedure.

However, the advantages of at-home whitening are a more stable result that lasts longer and a much more pleasant patient experience. The dental chair would be just used for quick follow-ups to make sure everything is fine.

WHAT PROTOCOL TO MAXIMISE MY RESULT?

The results of tooth whitening are directly related

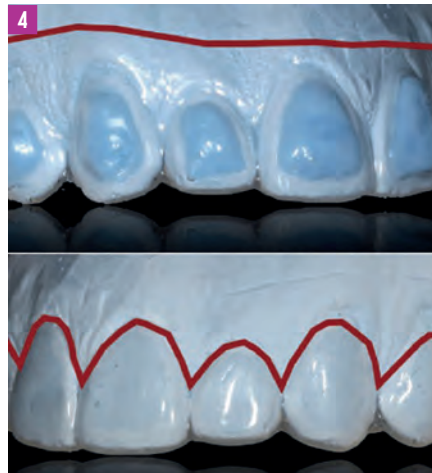


FIGURE 4: To prevent gingival irritation due to hydrogen peroxide, the tray needs to be trimmed appropriately with a line of cut that will depend on whether reservoirs have been placed or not (images courtesy of Dr François Reitzer)

to the concentration of hydrogen peroxide and its application time. As such, it is considered that the use of lower concentration hydrogen peroxide products for at-home whitening for two to three weeks produces similar colour changes to that of higher concentration products used for in-office whitening in one session (Figure 3).

Considering the advantages of at-home whitening (stability of the result over time and patient experience), we prefer to guide our patients towards this type of treatment. However, to maximise the result, it is mandatory to properly follow the procedure.

Prior to tooth whitening, important steps include:

- Full dental check-up prior to any whitening procedure to make sure there are no contraindications such as cavities, gingival inflammation, ill-fitting old restorations etc
 - Professional adult prophylaxis and polishing of the teeth to remove any residual dental plaque and superficial discolourations
 - Impressions for working casts on which customised nightguard trays will be made (Figure 4).
- Here's the procedure for at-home whitening:
- Place a small drop of gel into every compartment of the tray for the teeth undergoing treatment
 - Seat the tray, with the gel around the teeth
 - Wipe away excess gel in mouth with a tissue or dry soft brush
 - After treatment, remove tray
 - Rinse tray and mouth
 - Brush teeth.

For effective results, it is important to tell




FIGURE 5: Before and after result obtained with Polanight 10% carbamide peroxide two to three hours per night for three weeks

the patient not to eat, drink nor smoke during the treatment. Also, smoking immediately after treatment should be avoided (wait for at least two hours). In addition, foods and drinks containing strong colours should be avoided for at least 48 hours after the treatment period or consumed in moderation. The last point to mention is to use gel at room temperature.

The treatment guidelines regarding the seating time (correlated to concentration) given by the manufacturer should be precisely followed and this treatment should be prescribed for at least two weeks and up to three weeks to ensure an ideal result (Figure 5). Literature indicates that in more extreme cases, like grade one or two tetracycline discolouration, this treatment could go as far as six months.

A major element of whitening treatments is documentation. It is mandatory to make sure to take before and after pictures and regularly check in with the patient during the treatment period to improve the patient experience and be able to objectively monitor and assess the result.

Respecting all these points is what makes the difference between a home professional whitening treatment and a home OTC whitening treatment.

This will set a secure and efficient environment for patients to properly address some of their unaesthetic discolouration issues. 

PRODUCTS USED

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DIGITAL DENTISTRY

NICK FAHEY

A guided surgery workflow

32



Guided surgery supports implant outcomes and provides an extra layer of protection for clinicians. It forces practitioners to look at the three-dimensional anatomy, including the volume, character, and nature of the bone, the thickness of the soft tissue, and the distances available for implant placement – Nick Fahey, p32

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**DR NICK FAHEY**

BDS MCLINDENT (PROS) MRD RCS(ED)
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Nick is a specialist in prosthodontics and is the principal dentist of Woodborough House Dental Practice in Berkshire. His professional interests include all aspects of dentistry related to dental implants and fixed and removable prosthodontics. He has authored a textbook called *Guided Surgery. Making Implant Placement Simpler*, and is also a co-director of the Fitz Fahey Academy.

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: Digital dentistry

Educational aims and objectives:

To explore utilising a guided implant approach for reproducible results. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



We're living in a highly litigious world today. Therefore, when clinicians move into more complex treatments – like dental implants – they need to be confident in their skills.

Only with adequate training and experience will they be able to justify the treatment they deliver, should they end up in front of the regulator.

Guided surgery supports implant outcomes and provides an extra layer of protection for clinicians. It forces practitioners to look at the three-dimensional anatomy, including the volume, character, and nature of the bone, the thickness of the soft tissue, and the distances available for implant placement.

If an anatomically correct diagnostic wax-up is used for the planning, the ideal implant position can be identified. In my opinion, the ideal depth of placement is an element of planning that is poorly understood.

Guided surgery, a technique that has never been more accessible, is now supported by virtually every implant company through partnered software. This widespread availability makes it easier than ever for clinicians to adopt a guided approach.

For those new to the field, it's crucial to find high-quality training that will offer a strong foundation of knowledge and skills.

The following case report demonstrates the type of patient you can expect to treat after completing the 'Level up in guided surgery level one' course with Biohorizons Camlog, further highlighting the accessibility and benefits of guided surgery.

CASE PRESENTATION

A young male patient presented with hypodontia and a number of missing permanent teeth.

He was relatively unconcerned about his appearance and was driven more by his parents to seek treatment. As such, the patient was unsure about what he wanted from treatment and hesitant to undergo more than he absolutely needed to.

CLINICAL ASSESSMENT

Upon assessment, it became clear that the patient's tooth spacing was not ideal, and realignment would be necessary to create space for the lateral incisors. The patient had already been referred to me, and the option of no treatment had been discussed and ruled out.

I presented the patient with two treatment options:

- Maryland bridges
- A combination of orthodontics and implant placement.

The latter was my professional recommendation, and the patient provided informed consent to proceed, providing a clear understanding of his condition and the treatment options considered.

TREATMENT DELIVERY

The patient visited the orthodontist for the first phase of treatment (Figures 1 and 2). Before the appliance was removed, I confirmed that the desired tooth positions had been achieved to ensure adequate spaces for implant placement.



FIGURES 1 and 2: Mid-orthodontic correction

Nick Fahey discusses utilising a guided dental implant approach for reproducible results

A guided surgery workflow



FIGURES 3 and 4: Post-orthodontics, pre-treatment



FIGURE 6: Lab-made provisional implant crowns on model

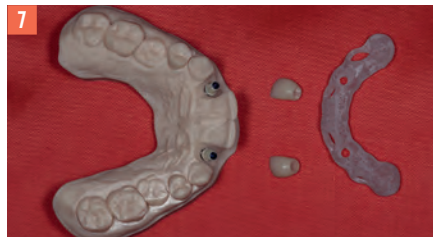


FIGURE 7: Lab-made provisional implant crowns with jig

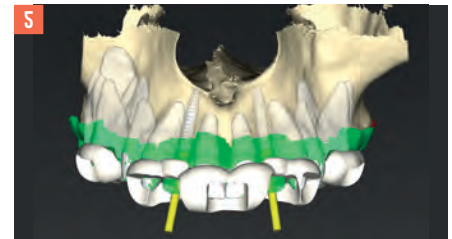


FIGURE 5: Codiagnostix 3D



FIGURE 8: Surgical guide checking fit prior to implant surgery



FIGURES 9A and 9B: Surgical guide upper occlusal checking fit prior to implant surgery



FIGURE 10: Implants installed through guide



FIGURE 11: Soft tissue grafting and tension-free closure



FIGURE 12: UR2, one-week postop X-ray



FIGURE 13: UL2, one-week postop X-ray

A CBCT scan was taken using a Morita Veraview X800. This dataset was imported into the planning software, where it was merged with the STLs of the anatomically correct diagnostic digital wax-up and modules (Figure 5).

With the anatomically correct diagnostic wax-up, there was no ambiguity regarding planning the implant position, angle and depth with precision.

I typically like to plan these types of cases myself, but it is possible to outsource the planning stage for clinicians who are new to the process and looking to increase their workflow efficiency.

For this case, I wanted to build up the gingival thickness in order to improve the papillae around the implant sites. The surgical plan, therefore, included soft tissue grafting.

On the day of surgery, a split-thickness envelope flap was raised. Two Conelog Progressive-Line implants were placed through the surgical guide in the pre-determined lateral incisor positions (Figure 10).

Soft tissue augmentation was performed simultaneously with the implant placement, and the site was sutured and closed without tension (Figure 11). The implants were immediately loaded using provisional crowns that were prefabricated in the lab.

The Conelog implants were selected because they provide a very stable connection and feature a geometry that facilitates high primary stability, which is important when placing immediate implants.

They also integrate very successfully – we have had good results with these implants. In addition, I appreciate the simplicity of the keyless guided surgery kit.





FIGURE 14: One-week postop review



FIGURE 15: Scan bodies



FIGURE 16: Itero scan



FIGURE 17: Final review



FIGURE 18: Final review, occlusal



FIGURE 19: UR2, final X-ray



FIGURE 20: UL2, final X-ray

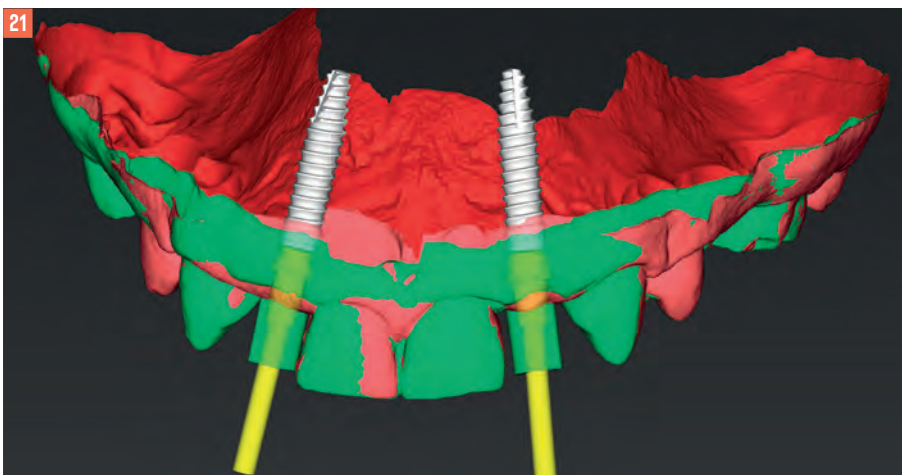


FIGURE 21: Overlay of final position of the implants with the treatment scan

CASE OUTCOME

Both the patient and I were very happy with the outcome in this case.

Given the patient's reluctance towards excessive treatment, he was not willing to undergo any further procedures such as composite edge bonding or veneers, which could have enhanced the aesthetic result. However, he was more than satisfied with the replacement of his missing lateral incisors, and while he understands that more implants will be needed in the future when the remaining deciduous teeth are lost, he was happy to postpone that treatment for now.

This case shows a real-life result of the kind of treatment we deliver every day in our clinic. It also demonstrates how a guided workflow allows us to place implants exactly as planned, making the process easier and more efficient.

DISCUSSION

Planning using a guided surgery workflow makes it possible to carry out a virtual surgery on a patient. It does require some training and experience to achieve reproducible results, but a guided approach removes a lot of the ambiguity that implant cases can present.

Once you get your head around the workflow, you won't want to place implants any other way – and your patients won't want it done any other way either. When upskilling in order to move into guided surgery, it's important to take baby steps – don't go straight to complex cases, build up to them gradually. It is necessary to learn the materials and techniques first.

Finding a good mentor is also beneficial, as you have someone to share cases with and ask questions of. Once you and your team are familiar with materials and workflow, this makes it much easier to achieve consistently good results. [CD](#)

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ENDODONTICS

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SAMUEL JOHNSON
A challenging case

38



Specialised endodontic tips (not to be confused with their more widely used periodontal counterparts) are useful for two reasons. Firstly, they only remove small amounts of dentine at a time, meaning a cavity floor can be investigated more safely. Secondly, they offer better visibility compared to that of a fast handpiece, increasing safety and reducing the likelihood of perforations – Samuel Johnson, p38

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DR SAMUEL JOHNSON

Sam is a dentist with a special interest in endodontics at Ruabon Road Dental Practice, Wrexham. In November 2023, Sam was awarded the General Dental Practitioner Prize by the British Endodontic Society. He has a passion for education, using his Youtube channel to educate GDPs about common endodontic problems.

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: Endodontics

Educational aims and objectives:

To present a challenging endodontic case managing a perforation and the location of a missing canal orifice. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



In March 2022, a patient was referred to me internally by another practitioner at Ruabon Road Dental Practice. The patient reported that he had recently been on holiday to Portugal and had suffered with toothache.

Prior to visiting me, the patient saw an emergency dentist who accessed the tooth (UR6) in question. However, they could only find two canals. The tooth was dressed, and symptoms subsided – but not completely, and the patient suffered from occasional episodes of pain. Overall, the patient was healthy, and a good candidate for root canal therapy.

ASSESSMENT AND DIAGNOSIS

Pulpal diagnosis was straightforward in this case and, in line with the American Association of Endodontists diagnostic terminology, was classified as previously initiated therapy. In this case, the tests carried out were minimal, the referral included a periapical radiograph (Figure 1).

TREATMENT PLANNING

During the assessment, there was a suggestion a perforation had occurred on the distal aspect of the tooth due to the radiolucency seen distally on tooth UR6. (Figure 2). This would be consistent with the history of the difficulties identifying all canals.

The patient was informed that the tooth would need to be investigated prior to commencing root canal therapy to assess restorability of any perforation.

Furthermore, there was no obvious canal space seen on the radiograph – which may have indicated either a complex anatomy, or sclerosed/calcified canals. A CBCT was considered here, however one was not taken.

TREATMENT PROVISION

Treatment was carried out over two appointments. The initial appointment was to assess whether the tooth was restorable or not; and to see if all the canals could be found.

In the first instance, it was found that the perforation could be easily repaired and was done so with a composite restoration – without the need for a bioceramic material (Figure 3) (Clauder, 2022).

Because only two canal orifices were seen on initial access, the second challenge was to find the third canal (Vertucci, 2005). However, due to the inaccurate access cavity created by the emergency dentist, the exact identification of these orifices was confusing.

To help distinguish these orifices, two size 10 K-Files were placed in each of the canals, and a periapical radiograph was taken (Figure 4). This confirmed the location of the palatal and distobuccal canals. It follows, then, that given the orientation of the two canals, the mesiobuccal canal was the one yet to be identified.

When assessing the original access cavity, coupled with the confirmation of known canal orifices, a revised ‘ideal’ access cavity can be visualised (Figure 5). This can then aid in determining the area in which the mesiobuccal

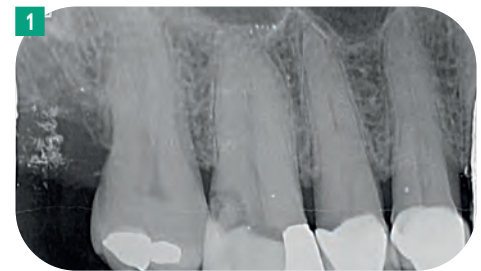


FIGURE 1: Preoperative radiograph (March 2022)

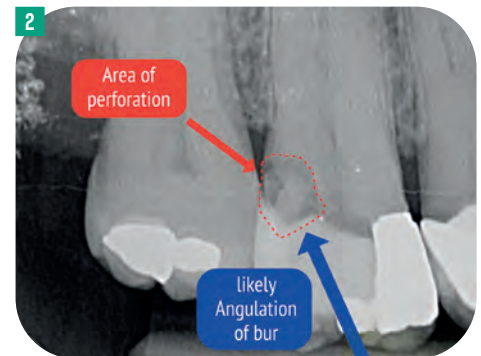


FIGURE 2: Likely angulation of bur (blue arrow), and the area of perforation (red dotted line)

Samuel Johnson presents a case report managing a perforation and the location of a missing canal orifice

A challenging case

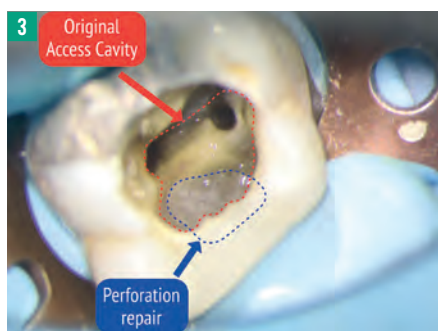


FIGURE 3: Location of perforation repair (blue dotted line)

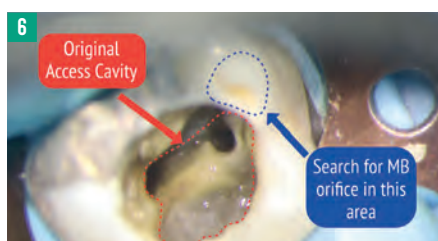


FIGURE 6: Blue area showing likely location of the MB canal



FIGURE 9A: One-year postoperative intraoral exam, no obvious signs of pathology



FIGURE 10: US tips from Endosuccess set. ETBD (upper) and ET18D (lower)

canal can be searched for (Figure 6). Safe and careful use of ultrasonic tips, rather than a fast handpiece, was used to open this space and the mesiobuccal canal was successfully found.

All three canals were then shaped successfully with Waveone Gold Medium (35/06) and disinfected with sodium hypochlorite mixed with HEDP (Dual Rinse). This mixture provides a weak continuous dentine chelating effect, reducing the build-up of dentine debris throughout the appointment. It negates the need to give a final wash at the end of the shaping protocol with 17% EDTA, providing a single, simplified

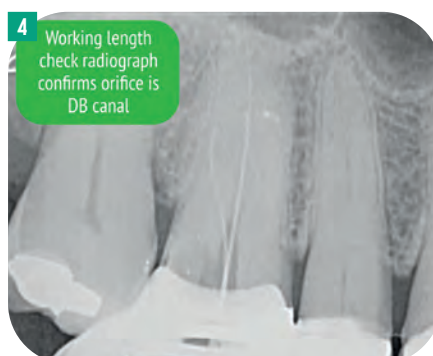


FIGURE 4: Working length radiograph

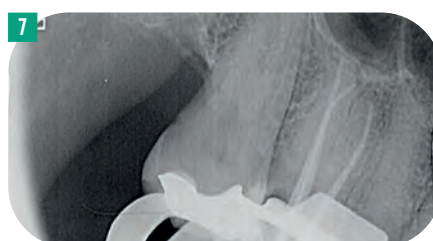


FIGURE 7: Cone fit radiograph prior to obturation



FIGURE 9B: One-year postoperative radiograph, no obvious signs of pathology



FIGURE 11: The difference in visual field of a pulp chamber when using a US tip (left) and an air turbine (right)

irrigant protocol (Arias-Moliz et al, 2016). A cone fit radiograph (Figure 7) was taken and demonstrated an appropriate fit, and obturation was completed.

The tooth was obturated with Waveone Gold matched GP points and AH plus resin sealer. A core of composite resin was placed prior to sending the patient back to the referring dentist, who subsequently placed a full-coverage crown on the tooth.

The radiograph (Figure 8) shows the completed root canal immediately postoperatively.

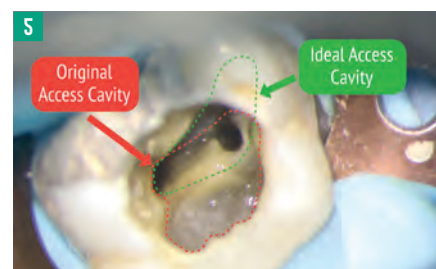


FIGURE 5: Comparison between the ideal access cavity line (in green), and the one that had originally been cut (in red)



FIGURE 8: Immediate postoperative radiograph (March 2022)

TREATMENT OUTCOME

The patient attended 12 months after treatment for review and stated that they were happy with the result. The crown had an excellent seal, and there were no signs or symptoms of pathology.

A review radiograph found an intact periodontal ligament (Figures 9a and 9b). A favourable outcome was determined.

LEARNING POINTS

Selecting the correct equipment is essential for difficult cases such as these. An operating microscope is a must for finding sclerosed canals; but more specifically in this case the use of ultrasonic tips (Figure 10).

These specialised endodontic tips (not to be confused with their more widely used periodontal counterparts) are useful for two reasons. Firstly, they only remove small amounts of dentine at a time, meaning a cavity floor can be investigated more safely. Secondly, they offer better visibility compared to that of a fast handpiece (Figure 11), increasing safety and reducing the likelihood of perforations. [📄](#)

REFERENCES

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IMPLANT DENTISTRY

EDUARDO ANITUA

Biomechanical behaviour of articulated bars

43

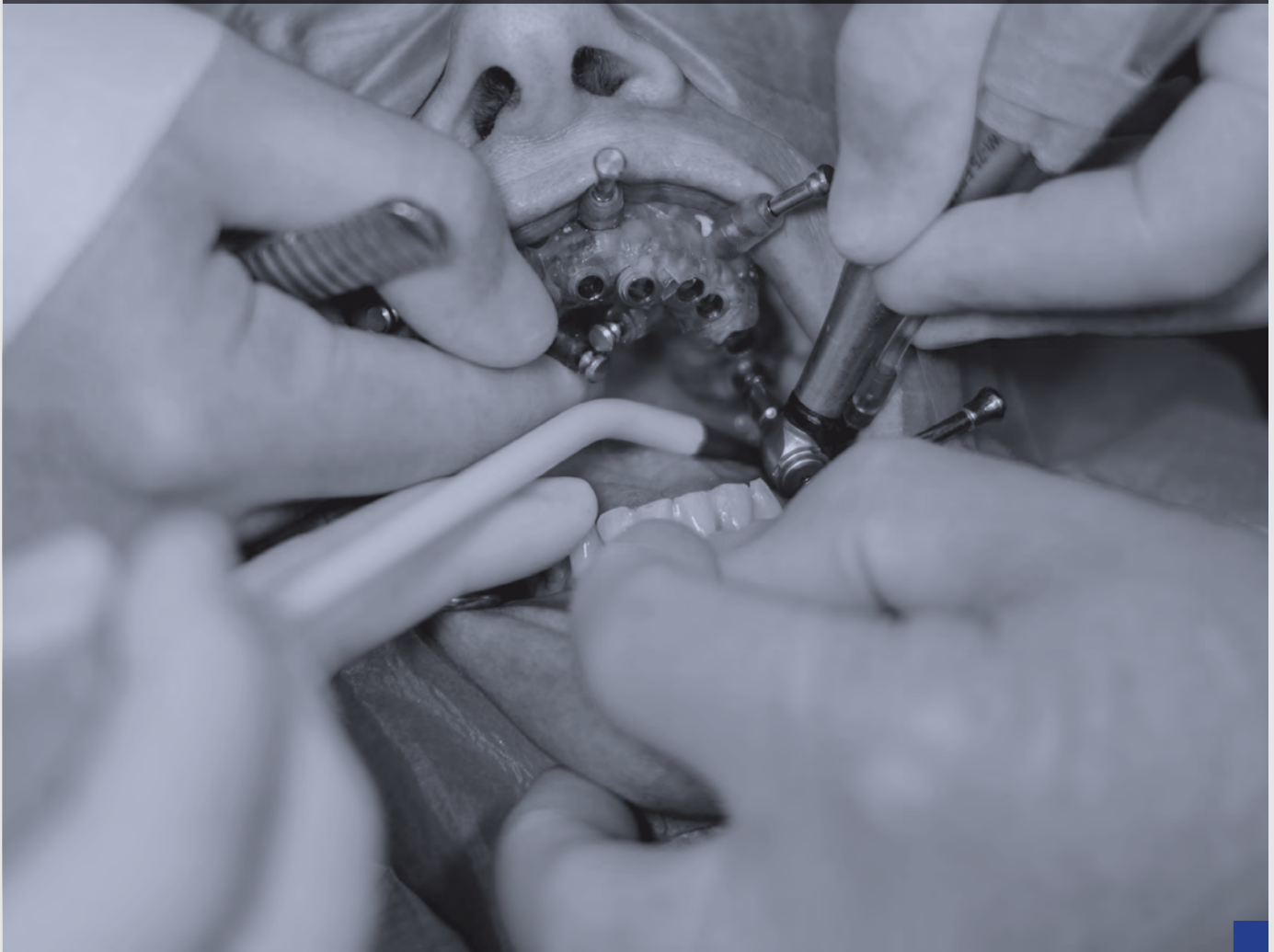


Preformed bars are an excellent way to generate temporaries with a correct load transmission and transepithelial sealing. It's very useful to be able to place the prosthesis a few hours after surgery – Eduardo Anitua, p43

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EDUARDO ANITUA

DDS MD PHD

Eduardo is in private practice at Eduardo Anitua Institute in Spain. He is also the director of the University Institute of Regenerative Medicine and Oral Implantology of the University of the Basque Country, and scientific director of BTI Biotechnology Institute. He is the president of the Eduardo Anitua Foundation for Biomedical Research.

Osseointegration can be defined as the stable contact between viable and remodelled bone with the surface of a dental implant, without the interposition of connective tissue or other types of tissue other than bone (Zerón, 2006).

For this to happen, there must be proper primary stability (physical bond between the implant and the receiving bed) and no micro-movements between the implant and the surrounding bone at the stage when osseointegration is occurring (Davies, 1998; Pilliar, 1991). Immediate loading marks the start of a new era in implant dentistry, as it is accepted that slight micro-movements with the correct orientation (with a range between 50 and 150 micrometres) could be well tolerated by the bone, generating the integration of the implant in the same way as if these micro-movements did not exist (Akagawa et al, 1986; Galindo-Moreno et al, 2012; Brunski, 1999; Szmukler-Moncler et al, 2000).

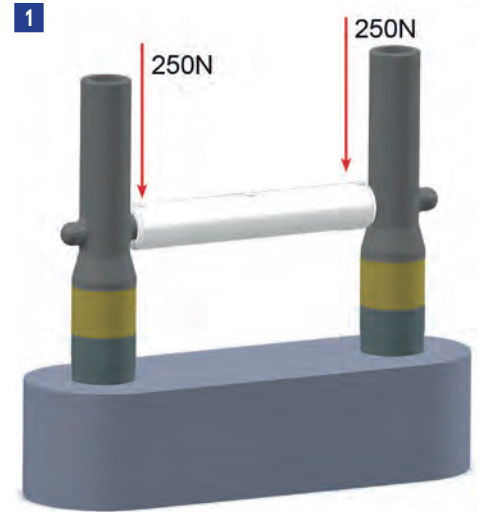


FIGURE 1: Load on the ends of the bar of 250N at each end

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: Implant dentistry

Educational aims and objectives:

To explore the biomechanical behaviour of articulated bars for the fabrication of immediately loaded provisional prosthetic frameworks. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



Load at ends of the bar (250N)					
Length of the articulated bar (mm)	Maximum load (Mpa)				
	End of the articulated bar	Centre of the articulated bar	Bar post ball	Implant	Structure resin
5	812	9.52	871	131	25.5
7	808	51.4	855	142	25.2
9	794	61.3	890	134	24.6
11	822	63	888	140	25
13	827	62.3	887	127	23.8
15	828	61.1	915	151	24
17	794	59.9	910	146	25.3

TABLE 1: Maximum stresses in Mpa recorded with the load at the bar ends (250N at each end)

Eduardo Anitua discusses the biomechanical behaviour of articulated bars for the fabrication of immediately loaded provisional prosthetic frameworks

Biomechanical behaviour of articulated bars



Nowadays, it is therefore known that micro-movement not exceeding 150 micrometres can be tolerated and immediate loading makes sense in implant dentistry, but only if the implants have a high insertion torque (30-45Ncm for single prostheses and 20Ncm for multiple prostheses) and the prosthesis to be placed on them maintains adequate bone tension in the axis and accumulation of stresses while not generating torsion or bending during mastication, which would result in micromovement.

The main challenges in immediate load implant dentistry are:

- The manufacture of prostheses in a short time (less than 72 hours) with a correct passive fit and hermetic seal at the implant-prosthesis junction
- Ensuring a correct transmission of stresses to the recently inserted implant and to the prosthesis as a whole
- Avoiding areas of maximum load that could result in fractures or cracks in the prostheses
- Having to be replaced at times when the implant is at a point of bone remodelling that could damage the integration.

For this reason, the use of preformed structures that allow for a correct, fast and efficient assembly that is also resistant and with a correct transmission of load to the bone and the implant is an advantage in the manufacture of this type of prosthesis. If these structures are also worked through an intermediate piece (transepithelial), as in the case of the Multi-Im, the passive fit and airtightness is improved, generating a watertight and passive union at the level of the implant-prosthesis for immediate loading.

In this article we present structures composed of articulated bars that allow us to make prostheses in a short period of time, without welding,

which reduces the incidence of errors and has advantages when it comes to achieving a passive fit of the structure (Mehl et al, 2015; Kim et al, 2011).

The article has also analysed the biomechanical behaviour of the structures made by this method by means of finite elements, thus finding out whether the structures are sufficiently resistant to withstand the necessary period in which they must be in the mouth, while the accumulation and dispersion of stresses in the structures and in the integrated assembly (implant-bone) can be visualised.

MATERIAL AND METHODS

To analyse, from a biomechanical point of view, the behaviour of immediately loaded prostheses made with articulated bars in different prosthetic situations, we chose various scenarios that can be adapted to those most commonly used in the clinic.

To this end, finite element tests have been carried out on sections of articulated bar on two implants, varying the length of the bar and the area where the tension is applied.

This has resulted in a series of tests in which the length of the bar has been modified to 5mm, 7mm, 9mm, 11mm, 13mm, 15mm and 17mm (with central tension in the bar and at the ends of the bar).

After the simulation with the bar length and the selection of the load application point, the maximum stress in megapascals (Mpa) received by the end of the bar, the centre of the bar, the ball of the post, the implant and the resin material for the fabrication of the provisional prosthesis was measured.

The measurement in Mpa is defined as the pressure exerted by a force of one newton on a surface of one square metre normal to it.

All tests were carried out with BTI implants, splinted by the bar and attached to the prosthesis by Multi-Im transepithelials.

The loads applied to the assembly were 250N at the ends of the bar (250N at each end), in simultaneous loading, and 500N in the central area of the bar (single load) (Figures 1 and 2).

Once the data were obtained, descriptive statistics were performed for all the assumptions and a T-student with paired samples was used to analyse the differences between the stresses recorded at each of the measurement points. The normal distribution of the data was analysed using the Shapiro-Wilk test. All analyses were performed with SPSS v15.0 (SPSS Inc) and the significance level was set at 5% (p<0.05).

RESULTS

Loading at the bar ends (250N at each end)

When applying the load at both ends of the bar, the maximum stress received in the area corresponding to the end of the bar has little variation for the lengths from 5mm to 17mm, with a range of 828Mpa for the case of maximum stress, corresponding to the 15mm measurement, and 794mm for the 9mm bar length. The difference between the maximum and minimum is therefore 34Mpa and the mean is 812.14 (+/-14.40).

The measurements recorded for the centre of the bar undergo greater variation with a measurement of 952Mpa for the 5mm bar length and 514Mpa for the most favourable case, which in this case is the 7mm bar length. The average stress recorded at the centre of the bar for all bar lengths is 567.85Mpa (+/- 262.44).

The maximum stress recorded in the ball area has a minimal variation from 855Mpa for the 7mm bar length to 915Mpa for the 15mm bar, with an average stress of 888Mpa (+/- 20.80). The stress received in the implant also suffers little variation, with a minimum of 124Mpa for the 9mm bar length and a maximum of 151Mpa for the 15mm bar, with an average stress received of 137.28Mpa (+/- 10.12).

The resin structure that is placed on the bar to make the provisional prosthesis is the one that receives the least maximum load in all the

Centred load (500N)					
Length of the articulated bar (mm)	Maximum load (Mpa)				
	End of the articulated bar	Centre of the articulated bar	Bar post ball	Implant	Structure resin
5	391	800	884	131	25.7
7	341	1301	945	123	26.3
9	264	1061	1029	124	25.2
11	182	1247	1143	122	27.3
13	128	1418	1320	134	29.5
15	158	1652	1513	158	32.4
17	235	1599	1803	164	36.4

TABLE 2: Maximum stresses in Mpa recorded with the load at the centre of the bar 500N

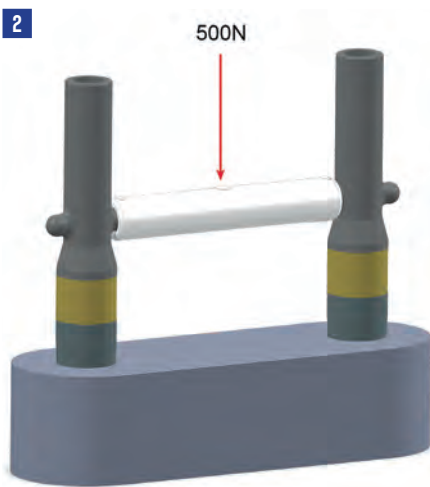


FIGURE 2: Load in the central area of the bar of 500N vertically, parallel to the axis of the implants

assumptions of the bar, the differences for the different bar sizes being practically insignificant (maximum 25.9Mpa for the 17mm size and minimum 23.8Mpa for the 13mm size, with an average of 24.85Mpa (+/- 0.77).

The total stresses received for each of the tests are shown in Table 1.

Load in the centre of the bar (500N in the centre)

When the load is applied in the central area of the bar (parallel to the implants), the maximum stress received in the area corresponding to the end of the bar undergoes significant variations, from 128Mpa in the 13mm length to a maximum of 391Mpa in the 5mm length, the average maximum stress for all the measurements being 242Mpa (+/-96.76).

The stress experienced at the centre of the bar with this test is much higher, as expected, with figures of 1652Mpa for the 15mm length and

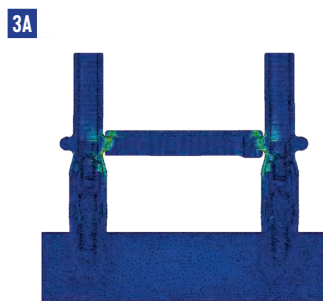


FIGURE 3A: Stresses in different sections of the bar with the load at the ends of the bar (250N). Bar length 5mm

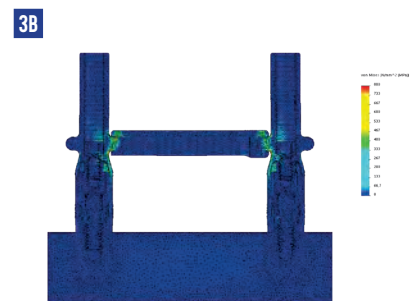


FIGURE 3B: Stresses in different sections of the bar with the load at the ends of the bar (250N). Bar length 17mm

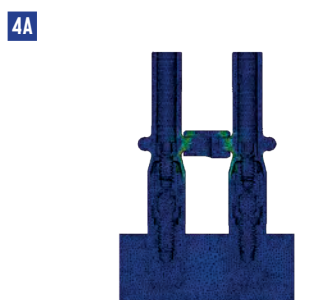


FIGURE 4A: Stresses in different sections of the bar with load in the centre of the bar. Bar length 5mm

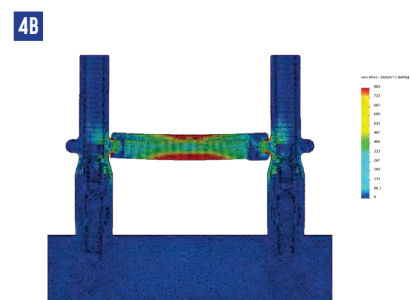


FIGURE 4B: Stresses in different sections of the bar with load in the centre of the bar. Bar length 17mm

800Mpa for the 5mm length with an average of 1296Mpa (+/- 299.19).

Similarly, the maximum stresses recorded in the ball of the post in this case are higher: 1808Mpa for the 17mm length and 884Mpa for the 5mm length with an average of 1234.57Mpa (+/-334.42).

The stress recorded for the implant and for the resin structure is, on the other hand, practically the same as for the 250N assumption at each end, the average for the implant being 136.57Mpa (+/-17.33) and for the resin structure 28.97Mpa (+/- 4.12). The total stresses received for each of the tests are shown in Table 2.

Comparison between the load 500N in the centre and 250N at the ends

On analysing the difference between the load received at the different points measured in the analyses, a statistically significant difference is obtained between the maximum stress received at the end of the bar (250N at each end) and the central area (500N) p=0.000 and in the maximum stress received in the centre of the bar for the same assumptions p= 0.006.

No statistically significant differences are obtained for the maximum stress received in the ball of the post, in the implant or in the resin (Figures 3 and 4).

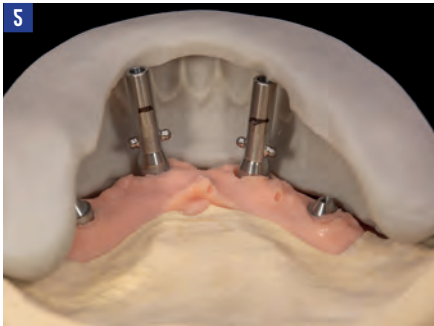


FIGURE 5: Adaptation of the bars to the silicone obtained from the diagnostic wax-up



FIGURE 6: Cutting and assembly of the horizontal sectors of the bar

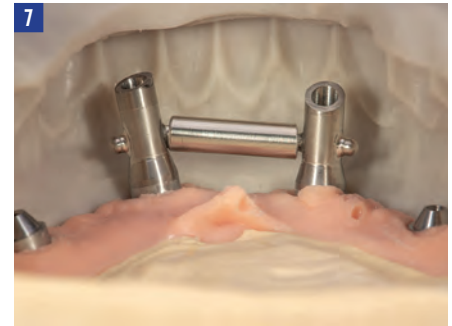


FIGURE 7: New test with the silicone from the wax-up

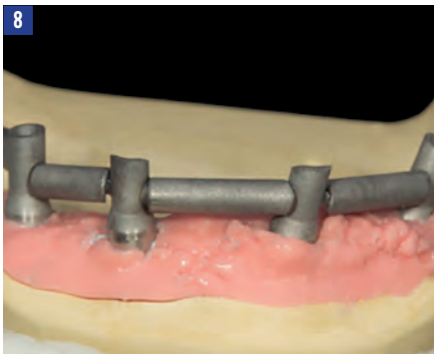


FIGURE 8: Finished and fixed structure



FIGURE 9: Application of opaquer to achieve better aesthetics and positioning of the teeth



FIGURES 10 and 11: Finished prosthesis



Figures 5 to 10 show how to adapt the bars in a real case for the fabrication of an immediately loaded prosthesis with the structure made with articulated bars.

DISCUSSION

The manufacture of an immediately loaded prosthesis in a time of no more than 72 hours is a challenge for any clinician and laboratory wishing to perform this type of procedure.

Having attachments that guarantee a correct fit and a good biomechanical behaviour of the assembly from a biomechanical point of view can make the difference in the success of our treatments.

The use of articulated elements that make the use of welding unnecessary (they are simply joined by chemical bonding using adhesive or the resin itself) reduces the risks involved in

introducing welding or casting into the algorithm of prosthesis construction (Mehl et al, 2015; Kim et al, 2011).

With regard to stress distribution, especially at the implant level, a critical point when it comes to immediate loading, the bars shown in this work generate minimal stress at this level. The loads used in the assumptions of the study carried out exceed those reported for conventional occlusal loads, which for bar sections in complete prostheses are between 166 and 420N (Fontijn-Tekamp et al, 1998; Suzuki et al, 1997; Tanaka et al, 2004; Deslis et al, 2012), and even so, there is no significant repercussion on localised stress at implant level.

It should be borne in mind that we cannot state whether this stress is sufficient to minimise bone loss, although the direction of the load with these elements (articulated bars) is exerted

axially to the implant and with a not very high value, as we have mentioned.

This fact points to a good functioning of the assembly, but other clinical factors such as bone density, the number of implants involved in the prosthesis, the diameter and length of the inserted implant and, in immediate loading, the insertion torque of the implant to be rehabilitated (Sahin, Cehreli and Yalçin, 2002) must be considered to assess whether it may be harmful to the surrounding bone.

The distance between the implants and therefore between the segments of the bar has no repercussion on the assembly when it comes to loading at the ends of the bar, with a greater relationship being found when it comes to vertical loading (500N) in the centre of the assembly, in which case a greater increase in tension is seen with statistically significant differences for tension in the centre of the bar and at the ends ($p < .05$).

In tests carried out on overdenture bars with two implants, differences have also been observed between the stress received by the central area of the bar and the lateral areas when applying stress, with the highest values being recorded in these two areas, as in our study (Deslis et al, 2012).

CONCLUSION

Preformed bars are an excellent way to generate temporaries with a correct load transmission and transepithelial sealing. It's very useful to be able to place the prosthesis a few hours after surgery. [📄](#)

REFERENCES

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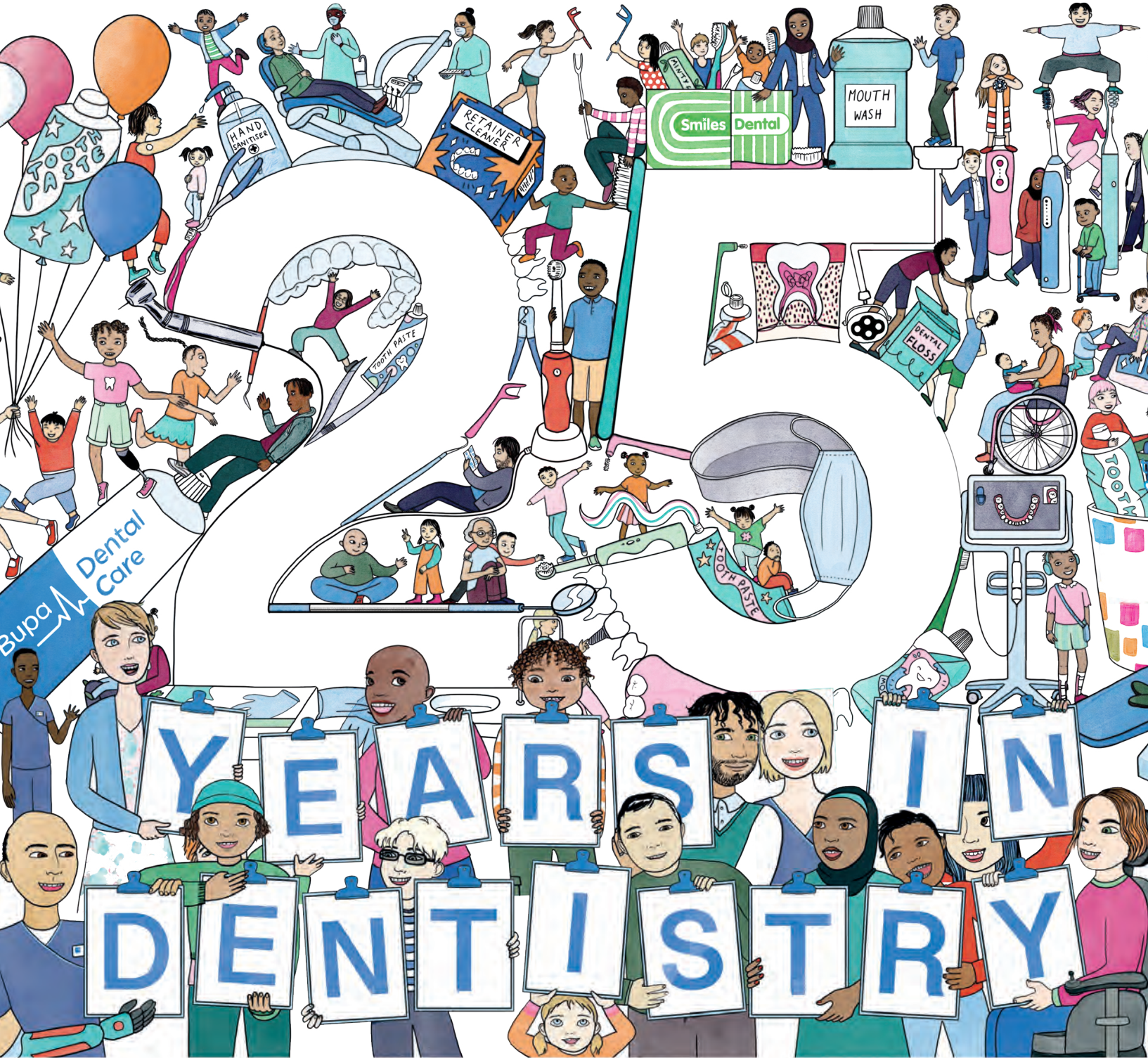
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Periodontal disease and pregnancy

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PIRTA LILJEKVIST

Top tips: halitosis

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Dental professionals play a crucial role in promoting maternal and infant health during pregnancy through comprehensive periodontal assessment, patient education and timely intervention – Neesha Patel, p51

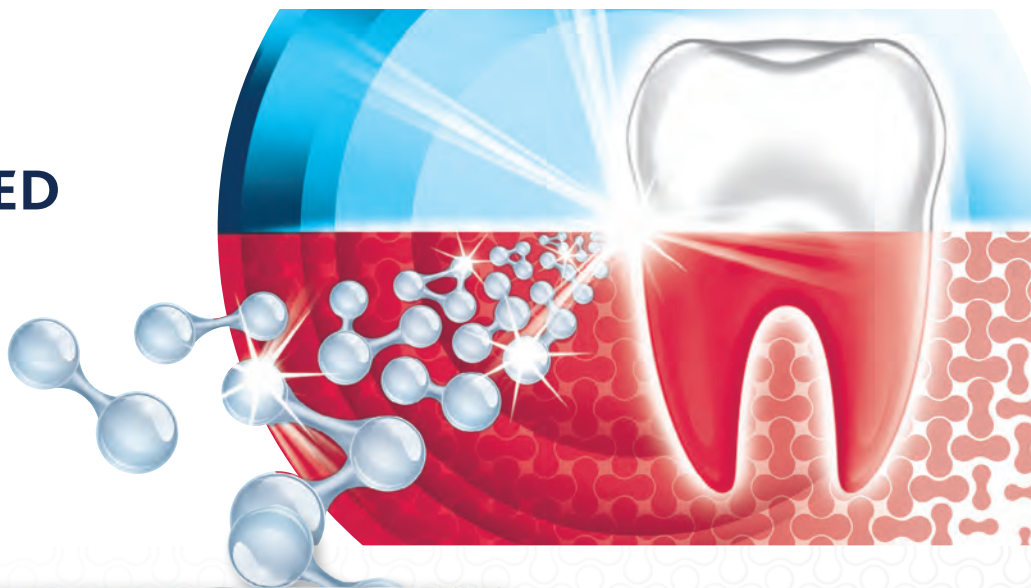
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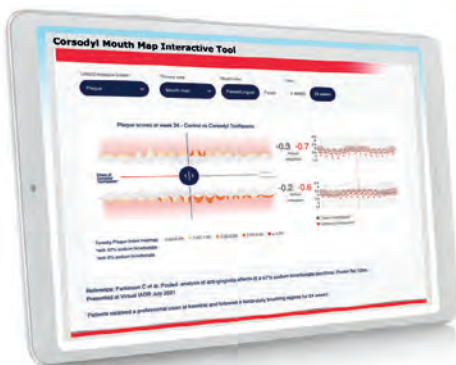
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1. Jose et al. J Clin Dent 2018;29:33-39. 2. Pratten J et al. Int J Dent Hygiene. 2016;14:209-214.

3. Akwagyriam I et al. Oral Health Prev Dent. 2018;16(5):401-407.

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**NEESHA PATEL**

Neesha is a specialist periodontist, and clinical director at Pure Periodontics.

Pregnancy is a remarkable journey marked by numerous physiological changes in a woman's body. However, it is also a period of heightened vulnerability to various health risks, both for the mother and the developing foetus.

Over the past few decades, research has increasingly focused on the association between maternal oral health and adverse pregnancy outcomes. Among the oral conditions investigated, periodontal disease has emerged as a potential risk factor for complications during pregnancy.

PERIODONTAL DISEASE

Periodontal disease, characterised by inflammation and destruction of the supporting tissues surrounding the teeth, affects a significant proportion of the global population. While its local effects on oral health are well-documented, growing evidence suggests that periodontal disease may exert systemic effects, including implications for pregnancy outcomes (Figure 1).

Understanding the relationship between periodontal disease and adverse pregnancy outcomes is crucial for healthcare providers, including dental professionals and obstetricians, to implement effective preventive measures and interventions.

In this article, we will delve into the existing literature to explore the impact of periodontal disease on adverse pregnancy outcomes, including preterm birth, low birth weight, and preeclampsia.

We will discuss the potential mechanisms underlying this association and highlight the importance of oral health promotion and preventive strategies in maternal and infant care.

PRETERM BIRTH

Preterm birth, defined as delivery before 37 weeks of gestation, is a significant public health concern worldwide due to its association with neonatal mortality and long-term health complications. Numerous studies have investigated the potential

link between periodontal disease and preterm birth, with findings suggesting a modest yet significant association.

A meta-analysis conducted by Xiong et al (2020) pooled data from 59 studies and reported a 1.24-fold increased risk of preterm birth among women with periodontal disease compared to those without.

The proposed mechanisms linking periodontal disease to preterm birth involve the systemic dissemination of periodontal pathogens and inflammatory mediators, triggering an inflammatory response that may contribute to the onset of preterm labour.

Additionally, periodontal inflammation may lead to the production of prostaglandins and matrix metalloproteinases, which can disrupt the integrity of the foetal membranes and promote preterm birth.

LOW BIRTH WEIGHT

Low birth weight, defined as a birth weight below 2,500 grams, is another critical indicator of perinatal health associated with adverse outcomes, including

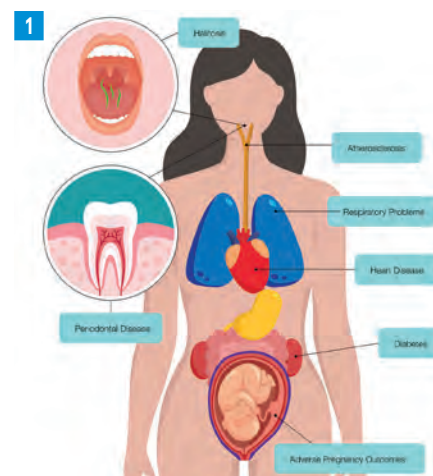


FIGURE 1: Periodontal diseases may exert systemic effects, including implications for pregnancy outcomes

ENHANCED CPD

GDC anticipated outcome: C

CPD hours: one

Topic: Oral health

Educational aims and objectives:

To provide a comprehensive review of the current evidence regarding the effects of periodontal disease on pregnancy outcomes. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



Neesha Patel provides a comprehensive review on the impact of periodontal disease on adverse pregnancy outcomes

Periodontal disease and pregnancy



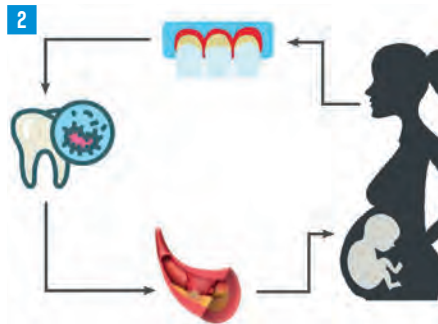


FIGURE 2: The impact of periodontal disease on adverse pregnancy outcomes

neonatal morbidity and developmental delays.

While the aetiology of low birth weight is multifactorial, emerging evidence suggests that maternal periodontal disease may be a modifiable risk factor.

A systematic review and meta-analysis by Vergnes et al (2017) found a significant association between periodontal disease and low birth weight, with an odds ratio of 1.65 (95% CI: 1.39–1.96).

The proposed mechanisms linking periodontal disease to low birth weight include placental insufficiency due to systemic inflammation, altered maternal-foetal nutrient exchange, and the potential translocation of periodontal pathogens across the placenta.

Additionally, periodontal disease-induced maternal inflammation may trigger the release of cytokines and other inflammatory mediators, contributing to intrauterine growth restriction and low birth weight.

PREECLAMPSIA

Preeclampsia, characterised by new-onset hypertension and proteinuria after 20 weeks of gestation, is a leading cause of maternal and perinatal morbidity and mortality worldwide.

While the precise aetiology of preeclampsia remains elusive, emerging evidence suggests that maternal periodontal disease may contribute to its pathogenesis through shared inflammatory pathways and endothelial dysfunction.

A systematic review and meta-analysis by Wei et al (2013) demonstrated a significant association between periodontal disease and preeclampsia, with an overall odds ratio of 2.79, (95% confidence interval CI, 2.01-3.01, P<0.0001).

The proposed mechanisms linking periodontal disease to preeclampsia involve systemic inflammation, oxidative stress, and endothelial dysfunction, which may exacerbate the maternal vascular changes characteristic of preeclampsia.

Periodontal pathogens and their byproducts, such as lipopolysaccharides and virulence factors, may also directly or indirectly contribute

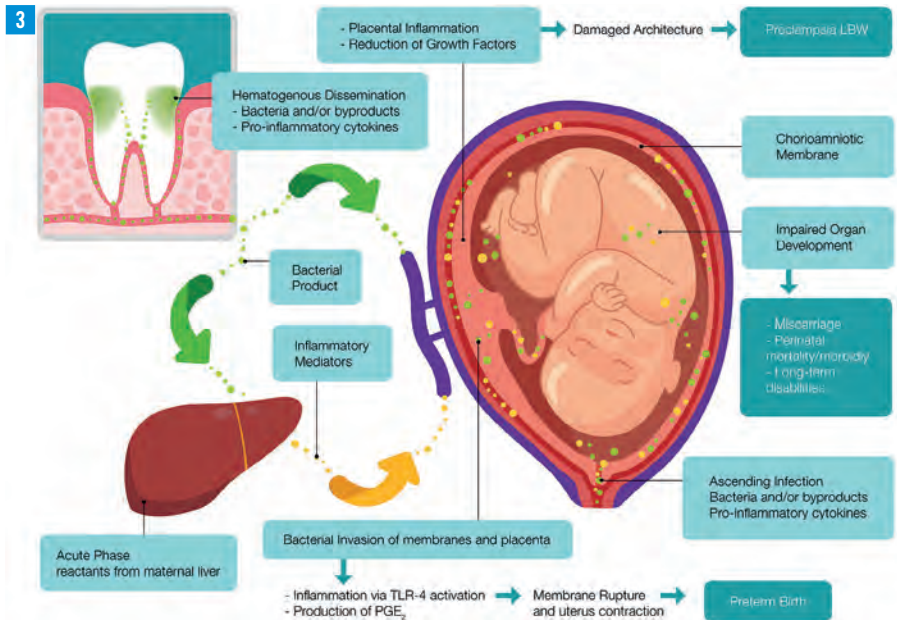


FIGURE 3: Several potential mechanisms have been proposed to elucidate the link between periodontal disease and adverse pregnancy outcomes

to endothelial dysfunction and impaired placental perfusion, predisposing women to preeclampsia.

POTENTIAL MECHANISMS

Several potential mechanisms have been proposed to elucidate the link between periodontal disease and adverse pregnancy outcomes (Figure 3), such as:

- Systemic inflammation
- Placental dysfunction
- Endothelial dysfunction
- Immunological dysregulation
- Oxidative stress.

Systemic inflammation

Periodontal disease is characterised by a dysregulated immune response to bacterial plaque, resulting in chronic inflammation and tissue destruction.

Systemic dissemination of pro-inflammatory cytokines, such as interleukin-1 α (IL-1 α) and tumour necrosis factor-alpha (TNF- α), may promote a systemic inflammatory state that can adversely affect pregnancy outcomes.

Placental dysfunction

Periodontal pathogens and their byproducts may translocate from the oral cavity to the placenta, where they can induce an inflammatory response and compromise placental function. This can result in impaired nutrient and oxygen exchange between the mother and foetus, contributing to intrauterine growth restriction and low birth weight.

Endothelial dysfunction

Periodontal inflammation and systemic inflammation associated with periodontal disease may disrupt endothelial function and impair vascular integrity.

Endothelial dysfunction is a hallmark feature of conditions such as preeclampsia, contributing to hypertension, proteinuria, and maternal organ dysfunction.

Immunological dysregulation

Pregnancy is characterised by immune modulation to accommodate the semi-allogeneic foetus.

Dysregulation of the maternal immune response, as observed in periodontal disease, may disrupt immune tolerance mechanisms and predispose women to adverse pregnancy outcomes.

Oxidative stress

Periodontal disease is associated with increased oxidative stress, characterised by an imbalance between reactive oxygen species (ROS) production and antioxidant defenses.

Oxidative stress can exacerbate inflammation and endothelial dysfunction, contributing to adverse pregnancy outcomes such as preeclampsia.

INTERVENTIONS AND PREVENTIVE STRATEGIES

Given the potential impact of periodontal disease on pregnancy outcomes, preventive strategies and interventions aimed at optimising maternal oral health are of paramount importance.

Dental professionals play a crucial role in promoting oral health during pregnancy through comprehensive periodontal assessment, patient education, and timely intervention (Figure 3).

Some key strategies include preconception oral health evaluation, periodontal maintenance, oral hygiene education, multidisciplinary collaboration and patient education and awareness.

Preconception oral health evaluation

Women planning pregnancy should undergo a comprehensive oral health assessment to identify and address any existing periodontal disease or oral infections. Timely management of periodontal disease prior to conception may help mitigate the risk of adverse pregnancy outcomes.

Periodontal maintenance

Pregnant women with existing periodontal disease should receive regular periodontal maintenance visits to monitor oral health status and provide appropriate interventions, such as scaling and root planing, to control periodontal inflammation and reduce the risk of systemic complications.

Oral hygiene education

Dental professionals should provide pregnant women with personalised oral hygiene instructions, emphasising the importance of daily brushing and interdental cleaning to maintain optimal oral health during pregnancy.

Multidisciplinary collaboration

Collaboration between dental professionals and obstetric care providers is essential to ensure comprehensive prenatal care. Obstetricians should be aware of the potential impact of maternal oral health on pregnancy outcomes and refer pregnant women to dental professionals for timely evaluation and management of periodontal disease.

Patient education and awareness

Pregnant women should be educated about the importance of maintaining good oral health during pregnancy and the potential implications of periodontal disease on maternal and infant health. Health education materials and resources tailored to pregnant women can help increase awareness and promote preventive oral health behaviours.

CONCLUSION

Periodontal disease represents a significant modifiable risk factor for adverse pregnancy outcomes, including preterm birth, low birth weight and preeclampsia.

The underlying mechanisms linking periodontal disease to adverse pregnancy outcomes involve systemic inflammation, placental dysfunction, endothelial dysfunction, immunological dysregulation, and oxidative stress. Dental professionals play a crucial role in promoting maternal and infant health during pregnancy through comprehensive periodontal assessment, patient education and timely intervention. Multidisciplinary collaboration between dental professionals and obstetric care providers is essential to ensure optimal prenatal care and improve pregnancy outcomes.

By integrating oral health promotion and preventive strategies into prenatal care protocols, healthcare providers can contribute to the wellbeing of both mothers and infants. [CD](#)

REFERENCES

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TOP TIPS...

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PATIENT ADVICE FOR DEALING WITH HALITOSIS

1 Get to know the condition.

Understanding the root cause of halitosis is essential for addressing and preventing it. Halitosis is primarily caused by specific bacteria in the mouth, such as streptococci. Oral bacteria, especially those related to gum disease and periodontitis, can produce volatile sulphur compounds (VSCs). These cause foul odours in the mouth and may also indicate gum inflammation. Such compounds are formed when oral bacteria break down food residues, especially proteins and other organic substances.

2 Emphasise regular oral care routine.

Encourage patients to brush their teeth twice daily and floss daily. This simple habit helps remove food particles and plaque from the mouth that can cause bad breath. It can be difficult to notice if your own breath smells. The floss test will show how others perceive your breath.

3 Stress the importance of hydration.

Dry mouth can lead to bad breath, so encourage patients to drink water throughout the day. Drinking plenty of water helps to keep the mouth moist and wash away food particles and bacteria. **Fact:** Without saliva, tooth decay and gum disease are more likely. If your patient suffers from dry mouth, you should remind them to be especially careful to follow good oral hygiene practices to combat tooth decay and gum disease.

4 Suggest dietary modifications.

Some foods temporarily cause bad breath. For example, onions and garlic can still linger in your breath the next day. Avoiding these foods can be a simple way to keep breath fresh. Fruits and vegetables make good snacks; but remind patients to always take breaks between meals as snacking between meals is harmful to your teeth. Encourage dental patients to be mindful of their diet choices.

5 Advocate for sugar-free gum and mints.

Chewing gum stimulates saliva production. Suggest sugar-free options to stimulate saliva production and neutralise acids in the mouth.

6 Encourage tobacco cessation.

Inform patients about the detrimental effects of smoking and tobacco use on oral health, including dry mouth, bad breath and gum disease. Encourage them to quit or seek support to stop smoking.

7 Limit alcohol consumption.

Remind patients that alcohol consumption can lead to dry mouth, which causes bad breath. Limiting alcohol consumption helps maintain saliva production. As many mouthwashes contain alcohol, advise patients to choose an alcohol-free version if they prefer to use one. It is also important to note that long-term use of antibacterial mouthwashes, such as chlorhexidine, can adversely affect taste and cause tooth discolouration.

8 Promote dental check-ups.

Remind patients of the importance of regular dental check-ups to detect potential dental problems early. Finding the root cause of halitosis starts at the dental practice. However, one's daily activities are crucial.

9 Recommend adjunctive aids.

Encourage patients to improve oral hygiene by using an electric toothbrush and consider adding antibacterial light-activated treatment to a daily oral hygiene routine. Lumoral is an antibacterial and light-activated oral care method used in addition to regular toothbrushing. Its antimicrobial effect targets bacteria on dental surfaces, slows down plaque formation and reduces the burden of harmful bacteria in the mouth.

10 Signpost for further support.

If bad breath persists despite efforts to address the problem, it is important to encourage them to consult a general practitioner for further advice. Persistent bad breath may be a sign of underlying health issues. For example, diabetes is known to cause a specific fruity scent in the breath. This may indicate elevated ketone levels, primarily associated with type 1 diabetes. It can also occur in type 2 diabetes with a severe condition known as diabetic ketoacidosis (DKA).

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ORTHODONTICS

AVAN MOHAMMED & YAN HUANG
Extraction versus
non-extraction

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CHRISTIAN LEONHARDT
Complex open bite cases:
part two

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The effect of extractions on facial profile is a controversial issue. The extraction or non-extraction decision should be based on sound treatment planning, clinical assessment of patient's facial profile and appropriate space analysis criteria - Avon Mohammed and Yan Huang, p58

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DR YAN HUANG
Yan qualified from Barts and London Dental School in 2007. Having completed her orthodontic specialist training she obtained her doctorate degree and membership in orthodontics in 2018. Yan works in mixed NHS/private specialist orthodontic practices in London and Kent.

ENHANCED CPD

GDC anticipated outcome: C
CPD hours: one

Topic: Orthodontics

Educational aims and objectives:

To present some of the factors that influence decision-making on tooth extraction in orthodontic treatment, the pros and cons relative to orthodontic extractions and relevant literature. This article qualifies for one hour of enhanced CPD; answer the questions on page 70.



There has been much debate over extraction or non-extraction orthodontic treatment over the years. Angle (1907) believed everyone could have all 32 teeth in functional occlusion and this would provide the best aesthetics for each patient. Arch expansion would be stabilised by remodelling bone with Wolff's law – bone would form in response to stress.

Case (1964) strongly criticised Angle's non-extraction philosophy of its effect on facial aesthetics. Non-extraction produced excessive protrusion on facial profile and expansion of arches not stable in the long term.

Tweed (1944) and Begg (1954) independently abandoned the non-extraction policy due to concerns about relapse and stability.

In the 1940s, Tweed retreated relapse cases with four premolar extractions and showed the resulting occlusion more stable. Tweed's philosophy was that malocclusion is genetically determined due to mismatch between tooth and jaw size.

Begg (1954) was concerned about relapse and believed that the lack of attrition in modern diet could be compensated by extraction.

The extraction debate was reopened in the 1960s, and Begg's and Tweed's philosophies unsubstantiated.

Riedel (1957) believed that the public preferred a fuller profile based on a cephalometric and photographic appraisal of the dentofacial patterns of a group of Seattle Seafair princesses (ie non-extraction/expansion/protrusion).

Proffit (1994) performed a 40-year review of extraction frequency in the United States and showed a marked reduction in orthodontic extractions with 30% extraction treatment in 1953, 76% in 1968 and 28% in 1993.

The reasons for the downward trend in extraction may be the concerns of facial aesthetics, TMJD

and not guaranteed stability. Also, changes in orthodontic techniques such as the development of the straight wire appliance, self-ligation, extraoral traction, anchorage and the use of mini-implant screws (TADs).

FACTORS TO CONSIDER

There are several general and malocclusion factors to consider when deciding on extraction or non-extraction orthodontic treatment.

General factors

- Age of patient
- Growth and development
- Any relevant medical history
- Gross pathology (caries, periodontal conditions, hypoplasia)
- Presence or absence of teeth
- The prognosis of teeth
- Gross teeth displacement and abnormal morphology.

Malocclusion factors

- Patient's dental, facial aesthetics and facial profile
- Anterior-posterior (AP) skeletal pattern – the more severe the crowding the less space is available for camouflage (Bjork, 1969)

DEFINITIONS

- Extraction treatment: the creation of space to facilitate orthodontic treatment by a reduction in number of dental units
- Non-extraction treatment: the creation of space by means other than the reduction in the total number of dental units to facilitate orthodontic treatment.



Avan Mohammed and **Yan Huang** discuss different factors that influence decision-making on tooth extraction in orthodontic treatment, the pros and cons relative to orthodontic extractions and relevant literature

Extraction versus non-extraction



FIGURES 1A, 1B and 1C: Severe upper arch crowding (buccal UR3) and an increased overjet treated with extraction of UR4 UL4



FIGURES 2A, 2B and 2C: Orthodontic alignment of severe lower arch crowding of LR5 and LL5, treated with extraction of LR4 and LL4 and fixed appliances

- Vertical dimensions – extraction spaces are more difficult to close in low angle patients (Möller, 1966)
- Transverse dimension – elimination of crossbites (Ackerman and Proffit, 1997)
- Soft tissue factors (large, flaccid tongue and lips)
- Degree of crowding (mild/moderate/severe) and site of crowding (anterior crowding usually more anchorage demanding than posterior)
- Need for AP movement of teeth for orthodontic camouflage (reduction of an increased OJ, camouflaging class III incisal relationship)
- Space requirements (flattening curve of Spee, reduction of overbite, retroclination of incisors to reduce AOB, centreline correction, correction molar relationship)
- To eliminate local crossbite
- Anchorage requirements of proposed tooth movements (tip and torque adjustments planned for incisors and inclination of the canines)
- Anchorage balance and requirements
- Age of patient (more difficult to close space in older patient)
- Ease of extraction.

Disadvantages of extractions

The following disadvantages of extractions have been found:

- Detrimental to facial profile
- No guarantee of stability
- Inducing TMJD
- Longer and more difficult treatment – six

to eight months longer than non-extraction treatment (Vig et al, 1990; Bishara and Jakobsen, 1997)

- Pain, anxiety and other possible adverse effects of the actual extraction procedure.

EXTRACTION AND STABILITY

Stability can be defined as the maintenance of the position of teeth and corrected features of the malocclusion without change.

Relapse is the return, following correction, of the features of the original malocclusion.

Some clinicians claim that extraction is required to ensure stability. However, extraction-based treatment has also been shown to be unstable.

Tweed (1944) instigated extraction therapy after treating Angle’s cases and believed they would be more stable with extractions.

Little, Wallen and Riedel’s (1981) study on 65 patients who underwent extraction of all first premolars showed that after 10 years of completion of orthodontic treatment, 70% became crowded with 20% of markedly crowded need of retreatment. Mean crowding was 5.25mm.

The study was redone on 31 cases after 20 years and found that crowding increased by 1mm on average, whereas, both arch length and width reduced and only 10% patients had a clinically acceptable result. They found no significant predictors of stability of lower incisor alignment (Little et al, 1988). These two studies generally had small sample sizes and no randomisation.

However, similar findings have demonstrated by others (Vaden, Harris and Gardner, 1997).

Expansion is the main method of relieving crowding in non-extraction cases. Little, Riedel and Stein (1990) followed 26 cases for six years and found that the group that had active expansion in mixed dentition showed the worst relapse and 89% demonstrated crowding. McReynolds and Little (1991) found similar relapse in second premolar extraction cases.

Paquette, Beattie and Johnston (1992) did a 14-and-a-half-year post-treatment reviews of extraction and non-extraction treatment and found 50% of non-extraction group and 75% of extraction group had less than 3.5mm incisor irregularity.

Erdinc, Nanda and Isiksal (2006) assessed long-term stability of incisor crowding in extraction and non-extraction cases and found that in both groups’ incisor irregularity increased, inter-canine width decreased, intermolar width was stable, overbite and overjet increased and incisors returned to pre-treatment position.

Orthodontic relapse is a long-term occurrence and extractions do not definitively confer long-term stability. There are also lifelong maturational changes to consider.

Arch length, inter-canine width and intermolar width decrease post-treatment while incisor irregularity will increase with or without dental extractions.

Long-term retention is the main method of fighting relapse and ensuring maintenance of



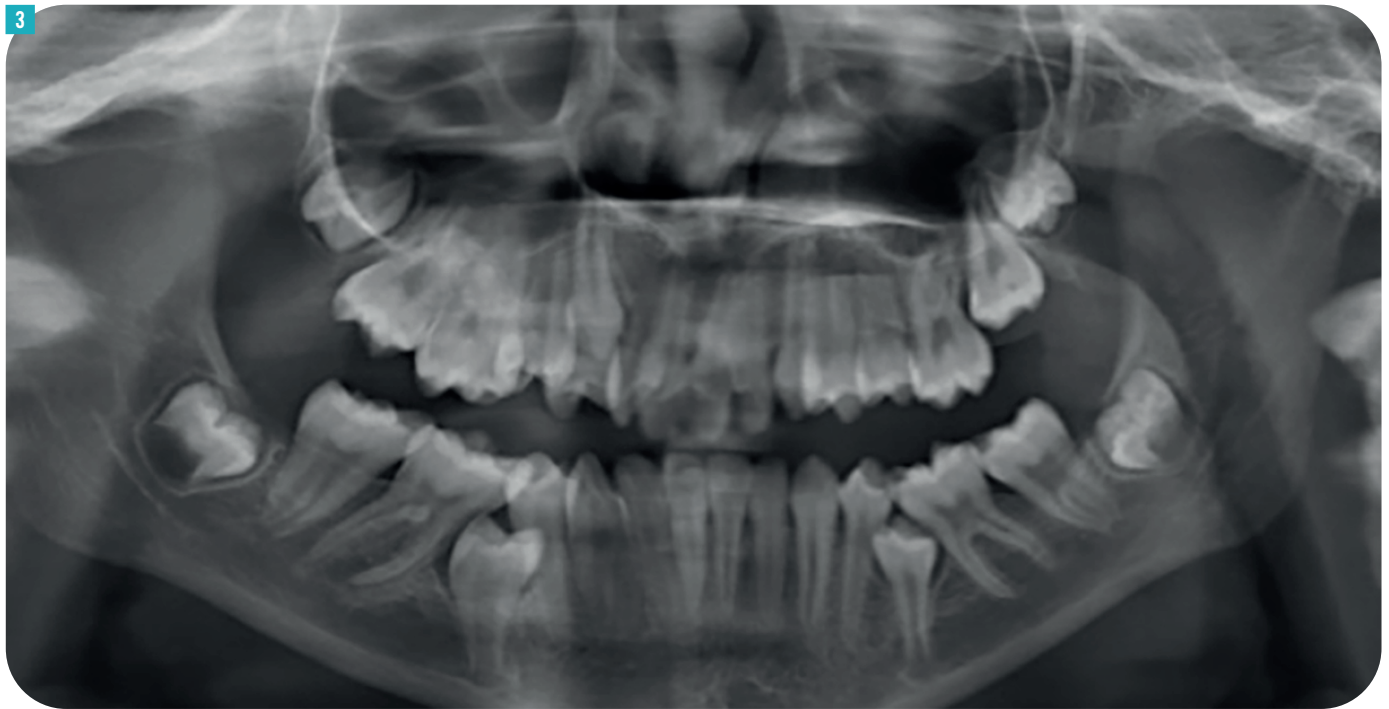


FIGURE 3: OPG X-ray showing impacted LR5 and LL5 due to severe crowding

results in the long term. Vertical growers and soft tissue factors outwit our control.

EXTRACTIONS AND FACIAL AESTHETICS

Skeletal foundation, dental support and soft tissue components of nose, chin, lip tone and thickness are the determinants of soft tissue contours of the face and therefore determine the facial aesthetics of an individual (Ackerman and Proffit, 1997).

Upper and lower lips become more retruded with respect to the E-line between the age of 15 and 45 years. There is little change in the angle of soft tissue convexity between five and 45 years. Greatest soft tissue changes for females occur at 10 to 15 years and 15 to 25 years for males (Bishara et al, 1998).

In addition, the patient's own perception, ethnicity, racial characteristics, and society/peer influence contribute to perception of facial aesthetics.

Extraction changes facial aesthetics: literature discussion

The effect of extractions on facial profile is a controversial issue. The extraction or non-extraction decision should be based on sound treatment planning, clinical assessment of patient's facial profile and appropriate space analysis criteria tailored to the individual patient.

Paquette, Beattie and Johnston (1992) compared borderline extraction and non-

extraction cases. They noticed that extraction cases did have slightly flatter profiles than non-extraction cases, but patients were no less pleased with the result. They also found incisor to lip retraction ratio to be 5:1.4 (upper lip retract 1.4mm for every 5mm upper incisor retraction). The relationship between lip retraction and amount of incisor retraction varies between patients and between studies.

Bowman and Johnston (2000) found that extraction potentially benefits those patients who had initial lip protrusion (more than 2-3mm behind Ricketts' E-line).

Konstantonis (2012) followed up extraction and non-extraction class I cases for 20 years and found that extractions lead to an average of 2mm retraction of lower lip to the E-line and a five degree of increase in nasolabial angle. However, this has minimal effect on aesthetics and facial profile.

Leonardia and colleagues (2010) carried out a systematic review of premolar extractions in non-growing patients. They found that both upper and lower lips were retracted (average 2-4mm) and nasolabial angle was increased following premolar extraction. There are large individual variations.

Extraction does not change facial aesthetics: literature discussion

Staggers (1990) compared extraction of first premolars and second molars and found greater retraction of incisors with first premolar

extraction group. However, no significant differences were found between the groups in upper lip protrusion or angle of facial convexity.

Bishara and Jakobsen (1997) carried out a study asking lay people to assess the changes in facial profile of extraction and non-extraction cases. They found that profiles of extraction cases were better perceived than non-extraction immediately post-treatment. Both groups perceived as more favourable after treatment. There is no significant difference in perception of extraction and non-extraction facial profiles overall.

Ismail and Moss (2002) found no significant effect of extraction on soft tissue profile when assessed with 3D laser scanning.

Stephens and colleagues (2005) found extraction and non-extraction patients ended up with similar profiles after treatment.

EXTRACTIONS AND FACIAL AESTHETICS: SUMMARY

The effect on lips and nasolabial angle (NLA) with extractions and incisor movement vary depending on the degree of tooth movement, incisor inclination, soft tissue thickness, lip length and form, NLA and nose form/shape/nasal tip.

Rathod and colleagues (2015) assessed long-term soft tissue response in premolar extraction group compared to untreated control groups. They found no differences in soft tissue profiles, but some directional changes. Changes in soft



FIGURE 4A: Before, severe crowding lower arch treated with extraction of LR4 and LL4

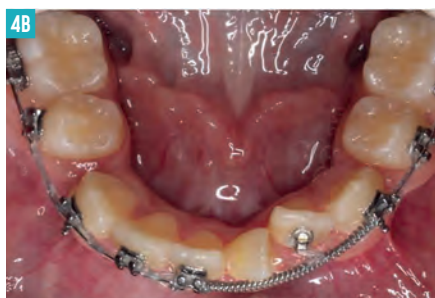


FIGURE 4B: After, severe crowding lower arch treated with extraction of LR4 and LL4



FIGURE 5A: Before, severe crowding lower arch treated with extraction of LR4 and LL4



FIGURE 5B: After, severe crowding lower arch treated with extraction of LR4 and LL4

tissue profile in the long term were greatest for lips and chin. In the untreated control group, these changes were in the downward and forward direction. In the extraction groups, the changes were in a more forward direction.

They concluded that extraction treatment does not adversely affect soft tissue profile changes over time.

Relief crowding (without excessive expansion)

To reduce overjet (OJ) and overbite (OB)

Anchorage considerations

Buccal segment relationship correction

Incisor relationship (eg in class III cases – lower incisor retroclination)

Camouflage of skeletal pattern

Decompensation to address skeletal pattern

TABLE 1: Reasons for extracting teeth in orthodontic treatment

Janson and colleagues (2016) performed a retrospective study looking at any effect of extractions on facial aesthetics in class II division 1 cases with non-extraction, two upper premolar extractions and four premolar extraction groups treated with a standard set of mechanics using edgewise mechanics.

They assessed post-treatment occlusal outcome and lateral and frontal photos by both orthodontists and lay panel. There was no significant difference in any of the measurements between the three groups at the post-treatment stage and eight years after treatment in facial aesthetics. They concluded that there is no evidence that extracting teeth as part of orthodontic treatment causes any harm to facial aesthetics of patients.

EXTRACTION AND SMILE AESTHETICS

The ideal smile has a 2-3mm incisor show at rest and a full incisor show plus 1-2mm gingivae show in smiling.

Most people prefer broad smiles with small buccal corridors (Moore et al, 2005). Roden-Johnson, Gallerano and English (2005) found no significant difference between attractiveness of smiles with larger or small buccal corridors.

Martin and colleagues (2007) used female photographs altered to display the six to six and the five to five. They found orthodontists and lay people rated small buccal corridors best, but lay people preferred five to five smiles best while orthodontists preferred six to six smiles.

Ghaffar and Fida (2011) also asked lay people to judge between extraction and no extraction smile aesthetics and found no difference noticed for any variables studied.

Meyer, Woods and Manton (2014) asked orthodontists, dentists and lay people to assess and evaluate post-treatment full face frontal smiling photographs of 30 premolar extraction cases and 27 non-extraction cases. They did not find any difference in buccal corridor widths or attractiveness of the smiles. Overall, there is no evidence to suggest that extractions contribute to narrowing of the smile.

EXTRACTIONS AND TEMPOROMANDIBULAR JOINT DISORDER

Bowbeer (1987) proposed that extractions cause the condyle to be displaced distally with incisor retraction into extraction spaces. This was mainly based on personal opinions.

Multiple studies have found that the frequency of temporomandibular joint disorder (TMJD) is the same in extraction and non-extraction samples, with no greater prevalence of TMJD in extraction cases (Paquette, Beattie and Johnston, 1992; Luppapanornlarp and Paquette, 1993; Beattie, Paquette and Johnston, 1994; Mohlin et al, 2004).

Luecke and Johnston (1992) assessed condylar position with extractions and found no association. Kremenak and colleagues (1992) found no difference 10 years post-treatment in incidence of TMJD in patients who had premolar extractions and no treatment.


Egermark, Magnusson and Carlsson (2003) performed a 20-year follow-up study and found that orthodontic treatment in childhood does not increase the risk of developing TMJD.

CONCLUSION

Premolar extractions seem to have a small effect on facial profile but not necessarily detrimental. The evaluation for profile is largely subjective and individual variation in response to extraction is large.

Inappropriate extraction will reduce lip support and inappropriate non-extraction will result in excessive lip fullness or lip protrusion.

The decision and pattern of tooth extraction should only be made after careful clinical and radiographic examination of an individual patient.

The orthodontist should understand the benefits and limitations associated with extraction and non-extraction treatment in order to provide the patient with the right treatment. 

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Complex open bite cases: part two

Christian Leonhardt continues his series on treatment planning in complex open bite cases with a modern protocol with a discussion on airway assessment

In the context of the airway component within the airway-facially generated treatment planning (AFGTP) pyramid treatment

protocol for complex open bite cases, an in-depth evaluation of the patient's airway is paramount (Figure 1). This evaluation encompasses three aspects:

1. Structure
2. Function
3. Behaviour.

STRUCTURE

The structural component of airway assessment reveals significant findings in this case. The patient presents with a high palate and a narrow arch, measuring only 35mm in width.

A high palate and narrow arch can restrict the available space for the tongue and may contribute to issues such as tongue thrust and mouth breathing.

Understanding these structural limitations is crucial for formulating a comprehensive treatment plan that addresses both the dental and airway aspects of the open bite case.

FUNCTION

Evaluating airway function is equally essential. In this case, the patient exhibits an anterior tongue thrust, a condition where the tongue habitually pushes against the anterior teeth during swallowing and speech.

Additionally, there is evidence of a posterior tongue tie, which can further compromise tongue mobility and proper swallowing patterns. These functional

concerns can have a direct impact on dentofacial development and open bite malocclusion.

BEHAVIOUR

The behaviour component of airway assessment emphasises the importance of myofunctional training. While myofunctional training has already commenced for this patient, it is essential to recognise that it may be a lifelong requirement.

Myofunctional therapy focuses on retraining and optimising the functions of the orofacial muscles, including tongue posture, swallowing patterns, and breathing habits. In cases with compromised airway function and related issues such as tongue thrust and tongue tie, myofunctional training is instrumental in promoting proper function and maintaining treatment results over time.

In summary, a comprehensive airway assessment is a foundational step in the AFGTP-pyramid treatment protocol.

In this case, structural limitations such as a high palate and narrow arch, functional challenges including anterior tongue thrust and posterior tongue tie, and the need for ongoing myofunctional training highlight the interconnectedness of airway health with dentofacial and orthodontic considerations.

By addressing these components holistically, clinicians can provide more effective and lasting solutions for complex open bite cases while promoting long-term airway health and overall wellbeing.

DENTOFACIAL EVALUATION

In the dentofacial component of the AFGTP-pyramid treatment protocol for complex open bite cases, the dentofacial evaluation and the significance of tooth position in facial harmony assume a pivotal role.

This phase involves an intricate analysis of tooth positioning within the facial framework, recognising the profound influence of the anterior teeth on facial aesthetics and overall profile (Figures 2a and 2b).

Tooth position in facial harmony

The position of the teeth within the facial envelope is paramount.

In this context, anterior teeth play a crucial role in framing the facial profile.

The inclination, alignment and prominence of these teeth can significantly impact facial aesthetics.

When addressing complex open bite cases, it is imperative that the clinician considers the harmonious integration of the teeth with the patient's facial characteristics.

Impact of tooth display

The display of teeth in the face is a vital consideration. The amount of tooth and gingiva patient's exhibit when smiling varies.

In cases where all teeth and a significant portion of the gum tissue are exposed, a high-risk scenario is signalled for both aesthetic and dentofacial concerns.

This excessive tooth and gum display can negatively affect facial aesthetics and overall facial balance.



DR CHRISTIAN LEONHARDT

Christian graduated from Julius Maximilian University of Würzburg in Germany. He prioritises achieving aesthetic, functional, biomechanical and periodontal outcomes, with a particular focus on airway health. As a mentor and leader in continuing dental education, Christian recognises the pivotal role of ongoing learning in delivering superior patient outcomes.

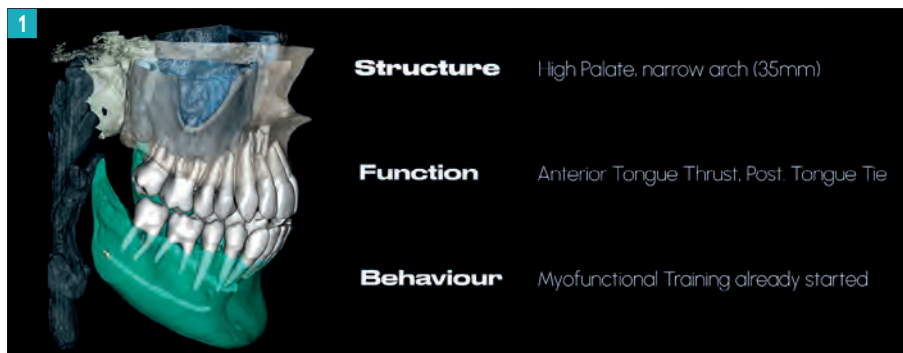


FIGURE 1: Airway analysis



FIGURES 2A and 2B: Dentofacial evaluation

Aesthetic and dentofacial implications

Excessive tooth and gum display can lead to various aesthetic and dentofacial issues.

Patients who exhibit all teeth and gum when smiling may appear to have a ‘gummy smile’, where the excessive gingival display overshadows the beauty of their teeth and facial features.

This imbalance can compromise self-esteem and impact the patient’s psychosocial wellbeing.

In this particular case, where the patient exhibits a high degree of tooth and gum display, there is a heightened risk for aesthetic and

dentofacial concerns. Such cases demand a comprehensive treatment plan that addresses both dental and facial aspects to achieve facial harmony and an aesthetically pleasing outcome.

The importance of recognising the impact of tooth display on the face cannot be overstated (Figures 3a to 3d). Literature underscores the significance of considering the interplay between dental aesthetics and facial profile in treatment planning for open bite cases (Sarver, 2001; Kokich, Kiyak and Shapiro, 1999).

By comprehensively addressing the positioning and display of teeth within the facial

envelope, clinicians can guide their patients toward enhanced aesthetic and dentofacial outcomes while bolstering their self-confidence and overall quality of life.

A thorough evaluation of the dentofacial component in complex open bite cases is essential to achieving not only functional occlusion but also an aesthetically pleasing result that harmonises with the patient’s facial characteristics.

Addressing excessive tooth and gum display is integral to delivering comprehensive care and promoting the patient’s wellbeing.

MANAGEMENT OF A GUMMY SMILE

Addressing the management of a gummy smile with vertical maxillary excess (VME) and high lip dynamics, characterised by excessive gingival display when smiling, requires a precise diagnosis and tailored treatment plan, as different aetiological factors may contribute to this condition.

In this specific case, the patient presented with VME and high lip dynamics (Figure 4).

The chosen treatment approach was orthodontic, as the patient opted against maxillary and mandibular advancement (MMA) surgery.

Managing this complex presentation necessitates meticulous risk management and a customised treatment protocol.

Vertical maxillary excess

Vertical maxillary excess (VME) is a crucial factor contributing to the gummy smile in this case. It refers to an excessive vertical dimension of the maxilla, leading to a higher smile line and increased gingival exposure.

In addressing VME without surgery, orthodontic intervention becomes essential. However, successful management hinges on a precise diagnosis and treatment planning sequence.

High lip dynamics

High lip dynamics refer to the patient’s lips moving significantly upward when smiling, exposing the excessive gingival display. This dynamic element adds complexity to the treatment as the orthodontic intervention must not only address the static VME but also consider the dynamic aspects of the patient’s smile.

TREATMENT PROTOCOL AND RISK MANAGEMENT

Precise diagnosis

Accurate diagnosis is paramount. Utilising advanced diagnostic tools such as cephalometric analysis and 3D imaging aids in assessing the extent of VME and planning the appropriate tooth movements to reduce gingival display.





FIGURE 3A: Options for treating a gummy smile. Initial situation



FIGURE 3B: Closing the front (disadvantages in the aesthetics)



FIGURE 3C: Intrusion of the front teeth in relation to the face



FIGURE 3D: Influence in the face and profile

Orthodontic treatment

The chosen orthodontic treatment plan should aim to intrude the maxillary incisors, effectively reducing the vertical dimension of the maxilla. This should be done with great precision to ensure optimal aesthetic outcomes while maintaining a stable occlusion.

Aligners and tools

Aligner therapy can be an effective treatment modality for managing VME. Customised aligners can facilitate controlled tooth movement and intrusion. Additionally, auxiliary tools like intrusion arches and elastics may be employed to aid in achieving the desired results.

Monitoring and adjustment

Frequent monitoring of the patient's progress is essential throughout treatment. Adjustments to the orthodontic plan and aligner modifications may be necessary to achieve the desired reduction in gingival display.

Patient compliance

Ensuring the patient's adherence to treatment instructions, including wearing aligners as prescribed, is critical for success.

Risk mitigation

Recognising that orthodontic correction of vertical maxillary excess and high lip dynamics is a nuanced process, risk management should be integrated into the treatment plan. This includes addressing potential complications and having contingency plans in place.

In addition, I think it's important to emphasise that orthodontic correction of VME and high lip dynamics requires a high level of expertise in treatment planning and execution.

In this case, the patient's preference for non-surgical intervention underscored the importance of careful sequencing of movements and the selection of appropriate tools and techniques.

Managing a gummy smile with vertical maxillary excess and high lip dynamics through orthodontic means requires a tailored treatment approach with meticulous attention to detail.

However, with the right treatment protocol, risk management strategies and patient collaboration, it is possible to achieve a satisfying aesthetic result while maintaining occlusal stability and avoiding surgical intervention, as per the patient's preference in this case.

DIGITAL SMILE DESIGN

In the contemporary landscape of prosthodontics and orthodontics, digital smile design (DSD) has emerged as a powerful tool that offers numerous advantages in the treatment of complex cases, including gummy smiles.

DSD combines digital technology with artistic expertise to enhance the planning and execution of dental and facial aesthetic procedures, allowing for a more predictable and patient-centred approach.

DIGITAL SMILE DESIGN ADVANTAGES: GUMMY SMILE MANAGEMENT

When it comes to the management of a gummy smile, DSD offers the following advantages:

- **Precise treatment planning:** DSD enables clinicians to visualise and plan the final aesthetic outcome in advance. By creating a digital mock-up of the desired smile, including tooth movements and gingival contours, practitioners gain a clear understanding of the necessary steps for treatment success. This planning is invaluable in gummy smile cases, where precision is paramount
- **Enhanced communication:** DSD facilitates communication among the treatment team, including prosthodontists, orthodontists, oral surgeons and dental technicians. The digital mock-up serves as a common reference point, ensuring that all team members are aligned with the treatment goals and desired outcomes
- **Patient-centred approach:** digital smile design allows patients to actively participate in the treatment planning process. Patients can see the proposed changes to their smile and provide input, fostering a sense of collaboration and satisfaction with the anticipated results



FIGURE 4: Where to place teeth in the face



FIGURE 5: Digital smile design



FIGURE 6: From 2D to 3D

- Treatment sequence: DSD provides a step-by-step roadmap for treatment. In gummy smile cases, this is particularly important when addressing issues like vertical maxillary excess and lip dynamics. The digital mock-up can indicate which teeth need to be moved, such as posterior teeth being intruded to reduce gingival display
- Enhanced aesthetic outcomes: by providing a detailed visualisation of the expected aesthetic results, digital smile design helps

ensure that the final outcome meets the patient's aesthetic expectations. This is crucial in gummy smile management, where achieving a harmonious and balanced smile is the primary goal

- Functional considerations: DSD can assist in evaluating the functional aspects of treatment. It allows for the assessment of occlusal changes, ensuring that the treatment not only enhances aesthetics but also promotes proper dental function.

Additionally, DSD can provide insights into craniofacial asymmetries and jaw position. It allows clinicians to assess whether the patient's facial structure is canted or asymmetric, aiding in the development of a more balanced and harmonious smile.

Digital smile design has revolutionised the treatment planning process for gummy smile cases, offering precision, enhanced communication and patient satisfaction. Its incorporation into prosthodontic and orthodontic procedures, in combination with a multidisciplinary approach, ensures that complex cases are managed with the utmost precision and aesthetic success.

ORTHODONTIC MOVEMENTS

The treatment planning process, influenced by the airway-facially generated treatment planning (AFGTP) technique, has pinpointed specific orthodontic movements as a pivotal component in addressing the complex open bite case.

The guiding principles have emphasised the necessity of precise tooth repositioning to achieve desired outcomes.

Cranial repositioning of posterior teeth

One of the central movements in the treatment plan involves cranial repositioning of the posterior teeth.

This movement is aimed at closing the open bite by elevating the posterior teeth, effectively reducing the excessive gap between the upper and lower arches.

The cranial movement is a strategic response to the open bite condition, aligning the posterior teeth with the desired occlusal plane.

Adjustment of the curve of Spee

Simultaneously, the treatment plan incorporates adjustments to the curve of Spee. The objective is to create an ideal occlusal curve that ensures proper contact between the anterior and posterior teeth during closure.

This alignment of the curve of Spee contributes to achieving an occlusion that not only functions optimally but also enhances aesthetic harmony.

Derotation and torquing

Derotation and torquing are essential orthodontic movements integral to the treatment strategy. These movements are meticulously planned and executed to align teeth properly within the arches.

Derotation addresses the rotation of individual teeth, while torquing corrects their inclination or angulation. These precise movements are fundamental to establishing ideal tooth relationships and occlusion.



Preservation of anterior vertical position

A critical consideration in the treatment plan is the preservation of the vertical position of the anterior teeth. This aspect is crucial for maintaining aesthetic proportions, especially given the patient’s adequate lip display (+3mm from the reposed lip in the ‘Emma’ sound).

By keeping the anterior teeth in a stable vertical position, the treatment aims to correct the open bite primarily by repositioning the upper posterior teeth.

The orthodontic movements orchestrated within this treatment plan, guided by the AFGTP technique and comprehensive treatment planning, are strategically designed to address the complexities of the open bite case.

These movements encompass cranial repositioning of posterior teeth, curve of Spee alignment, derotation and torquing, all orchestrated to achieve functional and aesthetic improvements while ensuring that the anterior teeth retain their vertical position in alignment with the patient’s display characteristics.

ADDRESSING FUNCTION

In the functional treatment planning process for posterior intrusion and counterclockwise (CCW)-autorotation following the assessment of airway and dentofacial components, the third critical step is addressing function.

In complex open bite cases, where posterior teeth intrusion is necessary, precise planning becomes paramount to ensure optimal functional outcomes. Several key questions and solutions arise in this context:

- Bite position after treatment: a fundamental concern is determining the bite position after posterior teeth intrusion. Precise planning ensures that the final occlusion aligns harmoniously, allowing for functional and aesthetic improvements. Achieving an ideal occlusion post-treatment is a primary goal
- Autorotation in counterclockwise (CCW) rotation: CCW rotation of the mandible is often necessary when intruding upper posterior teeth. This involves careful manipulation of the mandibular position to accommodate the intrusion. Understanding how autorotation works and planning for it is crucial for a successful outcome
- Anterior clearance, overjet and functional envelope: maintaining adequate anterior clearance within the functional envelope is essential. Overjet, where the upper and lower front teeth excessively overlap, can affect function negatively. Precise planning must ensure proper anterior clearance while optimising the functional envelope
- Creating acceptable function in the outcome: achieving acceptable function during

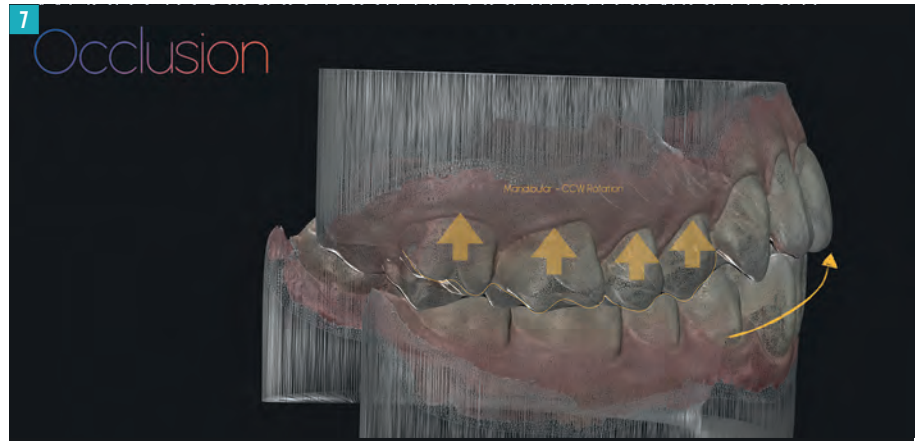


FIGURE 7: Where to place teeth in centric relation – occlusion

treatment planning is pivotal. Two solutions are commonly employed: a hybrid analogue/digital approach and a fully digital solution.

Hybrid approach

In the hybrid approach, segmented models are used to simulate CCW rotation in an articulator.

The initial contact points in centric occlusion (CO) are adjusted to reach the correct occlusal vertical dimension (OVD). Subsequently, this adjusted bite is scanned and matched to the original intraoral scan. This approach offers precision while incorporating analogue elements.

Fully digital solution


A more precise fully digital solution involves 4D axiography, which identifies the mandibular rotation axis and simulates OVD closure accurately. This method ensures a correct mandibular position at the end of treatment. The greater precision in planning leads to improved outcomes.

CASE IMPLEMENTATION

In this case, the treatment plan called for the intrusion of molars by 2.8mm. Precise planning was employed to achieve this. The mandible was rotated into exact alignment with the upper jaw to facilitate the intrusion. This rotation resulted in the reduction of overjet in the anterior region.

The planned intrusion of the molars and the accompanying autorotation allowed for an optimal setup for the dental technician, who could then position the front teeth correctly in the anterior-posterior plane.

Precise planning in the context of posterior intrusion and autorotation is pivotal for functional success in complex open bite cases.

Employing hybrid or fully digital approaches ensures the highest level of accuracy, facilitating optimal treatment outcomes and enhancing patient satisfaction. 

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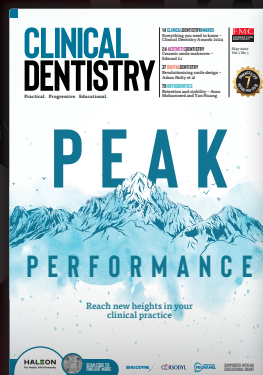
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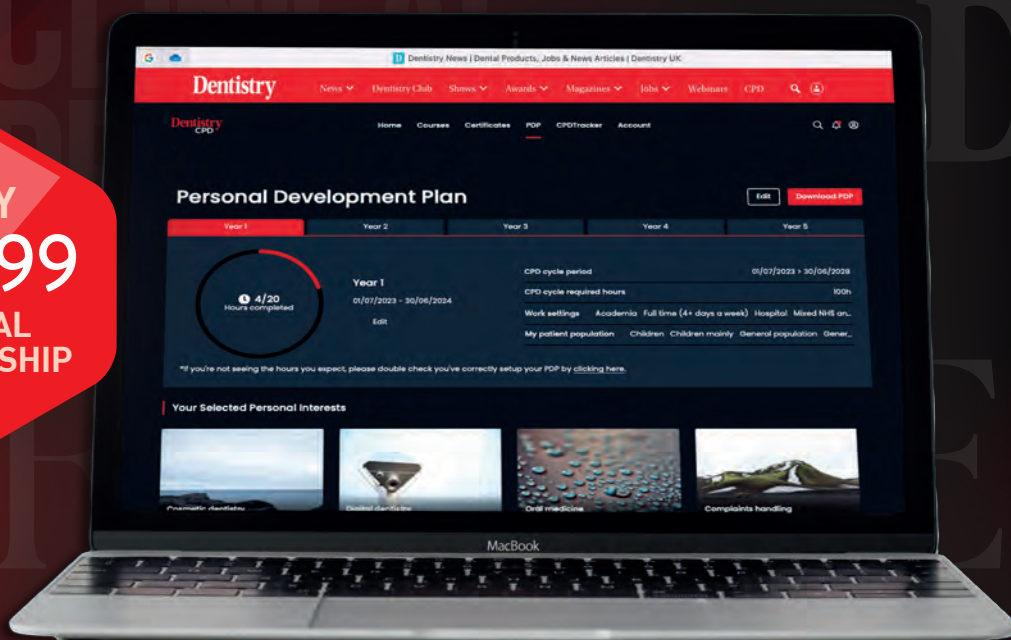
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This year there were 27 posters on a wide range of topics entered at the BSSPD conference. This presented the judges with a challenging task.

The eventual winner was Dr Tong Wah Lim from the University of Hong Kong for his poster entitled, 'Effect of ultrasonic cleaner combined with denture cleanser on removable denture microbiome in community-dwelling elderly: a randomised controlled clinical trial'.

The trial demonstrated that the denture biofilm samples after ultrasonic cleaning with chemical cleanser intervention harboured ecologically less complex and less anaerobic biofilms while reducing pathogenic microbiome.

This was through the combination of antimicrobial therapy and ultrasonic cleaning, which affected both the microbial community composition and the abundance of opportunistic pathogens, resulting in a less pathogenic removable denture biofilm.

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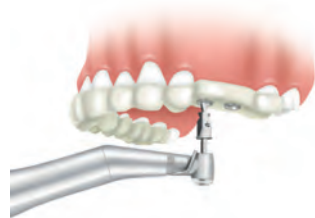
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**GENERAL DENTISTRY
CD/AUG/CURRIE/PAGE 14**

1. In the context of this article, what does OSA stand for?
 - a. Obsessive sleep anxiety
 - b. Overrated snoring appliances
 - c. Obstructive sleep apnoea
 - d. Occurring snoring attacks
2. According to the author, OSA is most common in which age group?
 - a. 20- to 40-year-olds
 - b. 30- to 40-year-olds
 - c. 40- to 50-year-olds
 - d. 50- to 60-year-olds
3. What can continuous positive airway pressure improve for OSA sufferers?
 - a. Sleep quality
 - b. Quality of life
 - c. Blood pressure
 - d. All of the above
4. When should patients be reviewed after commencing MAA treatment to check their efficacy?
 - a. One to three days
 - b. One to three weeks
 - c. One to three months
 - d. One to three years

**AESTHETIC DENTISTRY
CD/AUG/HUYNH/PAGE 23**

1. In the case study, how had the patient's upper right central incisor broken?
 - a. The patient had an ice hockey injury
 - b. The patient fell off a horse
 - c. The patient couldn't remember
 - d. The patient bit into an apple

2. The palatal shell was kept reasonably thin, and stabilised with Brilliant Everglow flowable composite in what shade?
 - a. BL Trans
 - b. A2/B2
 - c. A3/D3
 - d. OA2
3. Following treatment in this case, how long was left to see how the restoration had blended?
 - a. One week
 - b. Two weeks
 - c. Three weeks
 - d. One month
4. Upon reflection, the author states that he feels the incisal area is a little too what?
 - a. Blue
 - b. Red
 - c. Yellow
 - d. Grey

**DIGITAL DENTISTRY
CD/AUG/FAHEY/PAGE 32**

1. According to the author, what does guided surgery forces practitioners to look at?
 - a. Three-dimensional anatomy, including bone volume, character and nature
 - b. Soft tissue thickness
 - c. The distances available for implant placement
 - d. All of the above
2. What dental treatment did the patient in this case opt for?
 - a. Maryland bridges
 - b. Ceramic veneers
 - c. Orthodontics and implant placement
 - d. Orthodontics and composite bonding
3. In the case presentation, which teeth were restored with dental implants?
 - a. UR1 and UL1
 - b. UR2 and UL2
 - c. UR3 and UL3
 - d. UR4 and UL4

4. Why were Conelog implants selected for this case?
 - a. They provide a stable connection
 - b. They feature a geometry that facilitates high primary stability
 - c. They integrate successfully
 - d. All of the above

**ENDODONTICS
CD/AUGUST/JOHNSON/PAGE 38**

1. When was the patient referred to the author by another practitioner at the practice?
 - a. March 2022
 - b. May 2022
 - c. March 2023
 - d. May 2023
2. Which tooth was in need of treatment in this case report?
 - a. UR3
 - b. UR4
 - c. UR5
 - d. UR6
3. How long after treatment did the patient attend for review?
 - a. Six months
 - b. Nine months
 - c. 12 months
 - d. 24 months
4. According to the author, using specialised endodontic tips provide...
 - a. Increased safety
 - b. Better visibility
 - c. Reduced likelihood of perforations
 - d. All of the above

IMPLANT DENTISTRY CD/AUG/ANITUA/PAGE 43

- When it comes to the challenge of manufacturing the prostheses in immediate load implant dentistry, what timeframe does the author specify?
 - a. Less than 72 hours
 - b. 73 hours
 - c. One week
 - d. Two weeks
- In simultaneous loading tests, what load was applied at the ends of the bar of the assembly?
 - a. 100 Newtons
 - b. 250 Newtons
 - c. 350 Newtons
 - d. 500 Newtons
- When the load was applied in the central area of the bar (parallel to the implants), what was the average maximum stress for all the measurements?
 - a. 128Mpa
 - b. 137Mpa
 - c. 242Mpa
 - d. 391Mpa
- In addition to a good functioning of the assembly, what clinical factors must be considered to assess whether it may be harmful to the surrounding bone?
 - a. Bone density
 - b. The number of implants involved in the prosthesis
 - c. The diameter and length of the inserted implant
 - d. All of the above

ORAL HEALTH CD/AUG/PATEL/PAGE 51

- What adverse pregnancy outcome does periodontal disease impact?
 - a. Preterm birth
 - b. Low birth weight
 - c. Preeclampsia
 - d. All of the above
- Preterm birth is defined as delivery before how many weeks of gestation?
 - a. 37
 - b. 38
 - c. 39
 - d. 40
- How do dental professionals play a crucial role in promoting oral health during pregnancy?
 - a. Through comprehensive periodontal assessment
 - b. Through patient education
 - c. Through timely intervention
 - d. All of the above
- Who should dental professionals collaborate with to ensure comprehensive prenatal care?
 - a. Physiotherapists
 - b. General medical practitioners
 - c. Obstetric care providers
 - d. Ophthalmologists

ORTHODONTICS CD/AUG/MOHAMMED/S8

- Who strongly criticised Angle's non-extraction philosophy of its effect on facial aesthetics?
 - a. Riedel (1957)
 - b. Case (1964)
 - c. Proffit (1994)
 - d. Möller (1966)
- What malocclusion factor should be considered when deciding on extraction or non-extraction orthodontic treatment?
 - a. Soft tissue factors
 - b. The patient's dental, facial aesthetics and facial profile
 - c. Anchorage balance and requirements
 - d. All of the above
- What was the mean crowding found from Little, Wallen and Riedel's (1981) study on 65 patients who underwent extraction of all first premolars?
 - a. 2.25mm
 - b. 3.25mm
 - c. 4.25mm
 - d. 5.25mm
- Paquette, Beattie and Johnston (1992) compared borderline extraction and non-extraction cases. What incisor to lip retraction ratio did they find?
 - a. 5:1.0
 - b. 5:1.2
 - c. 5:1.4
 - d. 5:1.6

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