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Editorial

By Dr David Muscat

Dear colleagues,

We would like to welcome the new graduates to our dental community. We hope that amongst the new graduates there may be one or two who may join the dental committee in the future. We always need new blood, new ideas and different angles and perspectives and approaches.

As new members of the Dental Association, these members are offered free membership till the end of 2024, and then they start paying from January 2025.

CPD is more important nowadays as it has always been, with new emerging technologies and digitalization. Group practices are

becoming more commonplace with individual dentists excelling at their specialisations or special interests. We encourage the new graduates to pursue Masters Courses, and nowadays there are also financial incentives to do so such as Endeavour and Tess. You can also get tax relief with Get Qualified.

It would also be a good idea for them to get some extra experience working in the Dental department at Mater Dei for a year or two before plunging into private practice. There are some very good large (and small) practices in Malta that can guide and mentor new graduates.

The most important thing for new graduates to take note of is that during their career the patient must be first and foremost and that they must always

undertake their duties and perform treatments in an ethical and professional manner and be honourable at all times.

There are a series of DAM periodontal lectures planned as well as two short GC CPD courses in Malta.. Ivoclar Vivadent has organised some lectures overseas.

There have been some events in Malta recently which are covered in this issue.

Hope you all had a great Summer. The cover picture is by the artist Jacqui Agius and is entitled 'Boats at Maraxlokk'.

David

Dr David Muscat B.D.S. (LON)
Editor / Secretary, P.R.O. D.A.M.

DR KEVIN BRIFFA: IRONMAN CHALLENGE POZNAN, POLAND

"I am incredibly proud of Kevin for his outstanding achievement in completing his second Ironman 70.3 race in Poznan, finishing with an impressive time of 5:34:53. This new personal best is a testament to his unwavering dedication and commitment to the sport.

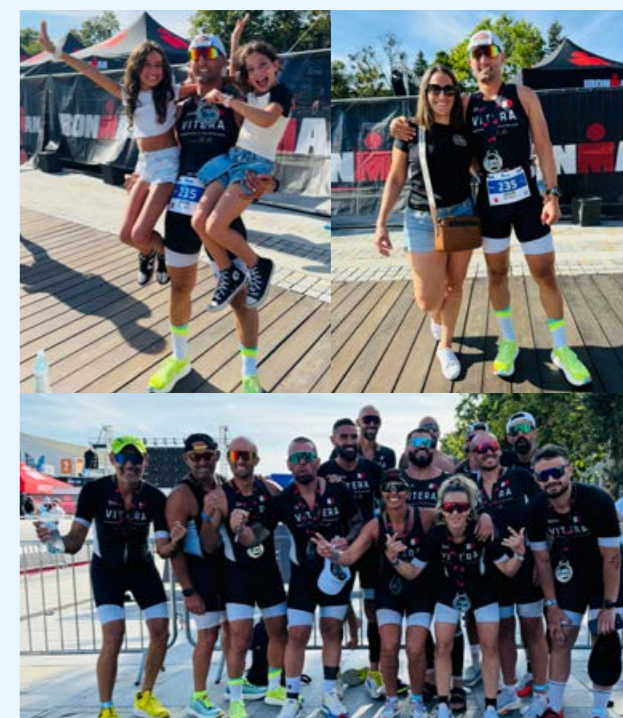
"Kevin's journey into triathlon began just a year ago, and in that short span of time, he has already completed two half-Ironman races, a feat that speaks volumes about his determination and work ethic.

"Kevin's disciplined approach to training is

truly inspiring. Despite the demands of daily life, he trains every morning before work, proving that with the right mindset, anyone can find the time to exercise and prioritize their health.

"His journey is a powerful reminder that it is never too late to start something new. Whether you're aiming to improve your fitness or take on a challenging sport like triathlon, Kevin's story shows that with dedication and perseverance, remarkable achievements are within reach."

– Coach Jonathan Caruana (Vitera Running & Triathlon)



BULK FILL COMPOSITE

By Dr Kyle Vella MDS

ABSTRACT

Incremental placement of conventional composite resin (CCR) in deep cavities using methods such as the herringbone technique is well established in restorative dentistry. It allows for better control of polymerization and its ramifications. Nonetheless, in practice, it tends to lengthen treatment times and is sometimes impractical clinically. Bulk fill composite resin (BFCR) offers a solution to this issue.



INTRODUCTION

BFCR allows for a larger increment without compromising on depth of cure, while also exhibiting reduced polymerization shrinkage and improved mechanical properties.

Therefore, allowing for an easier and quicker restorative process. Newer generations of BFCR have also implemented heated carrier systems to allow for further improvements in ease of application and mechanical properties.

DEPTH OF CURE

CCR requires increment thicknesses to be below 2mm for optimal light curing. The major advantage offered by BFCR is the ability to be cured sufficiently at depths of up to 4-5mm. Larger increments result in reduced clinical time, particularly in larger and more complex cavities and facilitating treatment in hard to access areas.

This improvement reduces the chances of leaving uncured composite in the depths of the cavity which may lead to the potential failure of the restoration in the future and also possible post-operative discomfort. (Odum & et al., 2023)

Avoiding an incremental layering technique reduces the chances of inadvertently creating voids and/or gaps in the final restoration. The adaptation is also improved on the cavity floor and walls which prevents open margins from being created and possible microleakage and recurrent decay.

The improved depth of cure is achieved by using new photoinitiator systems and higher translucency of larger sized filler particles. (Fraga & et al., 2021)

POLYMERIZATION SHRINKAGE

Polymerization shrinkage and its effects are of greater note when composite increments are larger and attached to several walls, the best example of which being deep class one cavities. Thus, due to the larger and deeper increments allowed for by BFCR counteracting this effect is pivotal.

Several strategies have been implemented by manufacturers to mitigate polymerization shrinkage. Specifically, low shrinkage monomers in combination with optimized filler content and stress relieving additives have been created. (Yang & et al., 2022)

The resulting reduction in shrinkage stress leads to bulk fill restorations having improved marginal integrity, reduced postoperative sensitivity and long term durability.

Preheating bulk fill resins (which allow it, such as Voco's VisCalor bulk) has also been shown to reduce polymerization shrinkage even further. This is especially useful in high viscosity composites which would otherwise be hard to handle and adapt to cavity walls clinically. (Abdelaziz & et al., 2023)

MECHANICAL PROPERTIES

BFCR hardness, wear resistance, flexural strength, and fracture toughness have been tailored to its application and allow these materials to endure the forces of mastication and maintain the longevity of the restoration. In several instances, BFCR surpasses CCR in the above-mentioned mechanical properties.

In certain instances, BFCR's superior flexural strength and wear resistance offer better posterior restorations when compared to CCR. BFCR also retain their mechanical properties better than CCR on aging. (Marovic & et al., 2022)

The team from Malta on the way to Voco Cuxhaven Germany



THERMOVISCIOUS PROPERTIES

Thermoviscous bulk fill composite is a recent innovation, which is being supported by recent research and proving to be advantageous clinically.

VisCalor bulk by Voco benefits greatly from being heated. When preheated to 65°C this results in a dramatic improvement in clinical handling whilst also reducing polymerization shrinkage (Abdelaziz & et al., 2023).

The resulting higher flowability at this temperature also allows for better adaptation to cavity walls while maintaining its mechanical properties. This has been proven using electron microscopy which showed VisCalor demonstrating superior marginal integrity to other bulk fills. (Hassan & et al., 2024)

Thermoviscous bulk fills also perform better exhibiting less microleakage than sonic fill composites in class one cavities. (Akah, 2022)

CONCLUSION

The use of bulk fill composites allows for easier, faster, and mechanically better restorations in routine dentistry. These recent innovations are worthy of note as the clinical advantages highlighted are undeniable.

When used correctly, these materials will result in improved clinical outcomes and patient satisfaction. As research continues, these materials are likely to become vital in large restorations. ■

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TEMPORARY RESTORATIONS

INSIGHTS FROM A VISIT TO VOCO MANUFACTURING PLANT

By Dr Kristian Vella

Temporary restorations are an integral part of dental practice, providing essential protection and function between treatment stages. During a recent visit to the VOCO manufacturing plant in Cuxhaven, Germany, I had the opportunity to observe the production and development of materials that are used globally for temporary restorations. This experience offered valuable insights into the complexities and considerations involved in selecting and using these materials effectively.

THE ROLE OF TEMPORARY RESTORATIONS

Temporary restorations serve several critical functions. Primarily, they protect the prepared tooth from external stimuli, reducing sensitivity and preventing contamination. They also maintain or restore esthetics and function, ensuring that patients can continue their daily activities without discomfort or embarrassment.

Additionally, temporaries maintain the position of the prepared tooth and adjacent structures, preventing unwanted tooth movement that could complicate final restoration placement.

MATERIAL CONSIDERATIONS

One of the key takeaways from my visit was the importance of material selection in temporary restorations. Temporary restorative materials must balance ease of use with the mechanical properties necessary to withstand occlusal forces and environmental exposure in the oral cavity.

At the VOCO plant, the development process for these materials involves rigorous testing to ensure they meet clinical demands.

Common materials used for temporary restorations include polyethyl methacrylate (PEMA), polymethyl methacrylate (PMMA), bis-acryl composite, and resin-based materials. Each of these has specific properties that make them suitable for different clinical situations.

- PEMA is appreciated for its ease of manipulation and reasonable strength, making it a popular choice for short-term restorations.
- PMMA is known for its durability and esthetic properties, though it can be more technique-sensitive.
- Bis-acryl composite materials offer an excellent balance between strength, esthetics, and ease of use, with the added benefit of lower polymerization shrinkage.
- Resin-based materials provide superior esthetics and strength, making them ideal for cases where the temporary restoration must endure for an extended period.

CLINICAL APPLICATION AND HANDLING

The application process for temporary restorations must be carefully managed to avoid common pitfalls such as poor marginal adaptation, rough surfaces, and inadequate strength. During my visit, I observed that VOCO places significant emphasis on the ease of manipulation and the handling properties of their materials, which are crucial for achieving optimal results.

Temporary restorations are typically fabricated chairside, requiring materials that set quickly and can be easily adjusted. The setting time, consistency, and ease of removal are important factors to consider when selecting a material. For instance, materials that set too quickly may not allow sufficient working time, while those with too slow a set time can prolong the treatment process unnecessarily.



reduce the risk of caries formation under the temporary restoration.

THE IMPORTANCE OF MARGINAL INTEGRITY

Marginal integrity is a critical factor in the success of temporary restorations. Poor marginal fit can lead to microleakage, sensitivity, and secondary caries. During the visit, it was evident that VOCO's research and development teams focus heavily on ensuring that their materials can achieve tight marginal seals with minimal shrinkage, which is vital for protecting the underlying tooth structure.

Achieving good marginal integrity begins with proper tooth preparation and impression techniques. However, the properties of the temporary material itself also play a significant role. Materials that flow well and have low polymerization shrinkage tend to provide better marginal adaptation.

PATIENT COMFORT AND ESTHETICS

Patient comfort and esthetics are also paramount when it comes to temporary restorations. The color stability,

polishability, and overall appearance of the temporary material can significantly impact patient satisfaction. Materials that mimic the natural tooth color and can be easily polished to a high sheen are preferred, especially for restorations in the anterior region.

During the manufacturing process at VOCO, I observed that a great deal of effort is put into developing materials that offer both excellent esthetics and patient comfort. This includes not only the color and translucency of the materials but also their wear resistance and compatibility with different types of cement.

CONCLUSION

The visit to the VOCO manufacturing plant underscored the importance of temporary restorations in modern dental practice. The careful selection and application of temporary restorative materials are crucial for ensuring patient comfort, protecting tooth structure, and facilitating the success of final restorations. As dental materials continue to evolve, staying informed about advancements in this area can help practitioners provide the highest level of care.

In summary, temporary restorations may only be in place for a short time, but their impact on treatment outcomes and patient satisfaction is significant. By choosing the right materials and mastering the techniques for their application, we can ensure that our patients receive the best possible care at every stage of their treatment. ■

UPDATES FOLLOWING COUNCIL OF EUROPEAN DENTISTS MEETING IN ATHENS, GREECE MAY 2024



In May 2024, I attended as a representative of Dental Association of Malta the Council of European Dentists CED General Meeting in Athens under the chairmanship of CED President Dr. Freddie Sloth-Lisbjerg. The meeting was kindly hosted by the Hellenic Dental Association - whose President Dr. Athanasios Devliotis welcomed the delegates. The General Meeting delegates also had the honour of being addressed by the Minister of Health for Greece, Adonis Georgiadis.

By Audrey Camilleri
International Liaison Officer,
Dental Association of Malta

A foreword address regarding the key concern of strengthening quality and safety in European oral health was given by Dr João Breda, the Head of Athens Office for WHO Greece and Quality of Care Special Adviser for the Regional Director Division of Country Health Policies and Systems.

Dr Breda's insights provided upmost interest for the dental profession for current and future priorities and challenges.

The CED delegates voted on the Budget 2025. In addition to that, the General Meeting held a discussion and vote on the number of General Meetings per year, with the delegates agreeing to maintain the current framework of two per year.

The CED Statutes and Internal Rules were also updated, as

the General Meeting voted and agreed on the introduction of the principle of reimbursement for the CED President position's costs.

As such, the travelling and subsistence costs for CED meetings and other relevant activities (e.g. meetings, workshops etc. of other organisations, meetings with CED Secretariat) shall be reimbursed through the CED budget (based on presented proof, e.g., invoices) when it comes to the position of the CED President.

During its General Meeting, the CED presented the 2024 CED Manifesto for the new EU Mandate 20242029. This document will contribute to support and drive CED's work and outreach to EU policymaker and other key stakeholders at national and European level for the upcoming

5 years. CED's three main priorities for the upcoming mandate are prioritising patient safety and oral health across Europe by focusing on prevention, antimicrobial resistance, and availability of provenly safe and effective medical devices; ensuring that EU policy works for a balanced European dentist workforce; and working towards a digital health future that does not impede the dental profession and delivery of care across all Member States.

In addition to being updated on the latest developments in the CED Working Groups and Task Forces, the General Meeting also adopted a Statement on Waste Management and Sustainability in Dentistry.

Through its Statement, the CED highlights the need to work together to improve oral and consequently

overall health to reduce the amount of curative treatments and lower the pollution caused by medicine residues and travel movements.

The Statement also highlights that manufacturers play a vital role in promoting sustainable waste management in dentistry, by developing eco-friendly and recyclable dental products, reducing the environmental impact of their materials.

The Statement also underlines that policies regulating waste management strategies for healthcare practices should guarantee that such strategies remain proportionate and realistic, and do not introduce any significant financial and administrative burdens on dental practices.

The CED insists on the need to avoid excessive bureaucratic burden for dental practices that qualify as small and microenterprises at all costs.

The CED meeting was also an opportunity to exchange information about developments impacting dentists at national level, including implementation of EU and national legislation, changes in funding of oral health and education of dentists, dental medical devices.

Of particular interest were topics such as dentistry and waste, corporate dentistry, implications of the Medical Devices Regulation, clinical training under the Professional Qualifications Directive.

In relation to the topic of medical devices, the General Meeting discussed and affirmed the dentists' crucial right to own and use a CAD/CAM system for their own patients.

The General Meeting was also addressed by the European Dental Students' Association, and namely Charlotte Cartner (Secretary General) and Saulé Skinkyté (Community Manager) who presented the latest EDSA activities, highlighting various opportunities for future CED - EDSA collaboration. 🇪🇺

Professor Mangion (1909-1980) honoured with a street name

He was Dean and Professor of the Dental Faculty from 1957 till his retirement in 1969. Professor Mangion hailed from Floriana and the Public Central Library is in this street.



Klaus, Prof. George Camilleri, Fred Pace Balzan, Bobby Soon, Michael Abbot, Fred Magri Demajo, Prof. Mangion, Paul Vella, Dr. George Manara, March 1970



Fred Pace Balzan, Klaus & Michael Abbot, 1970



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CONSERVATIVE MANAGEMENT OF A DENTIGEROUS CYST WITH UNCHARACTERISTIC FEATURES

A case report by Adam Borg

ABSTRACT

Dentigerous cysts (DCs) are the second most common odontogenic cyst. The aetiology is not well understood. DCs are rarely seen between the ages of 10 and 19. They are most commonly associated with lower third molars and are exceedingly rare when associated with lower 1st premolars. They are usually treated with enucleation but the technique chosen is dependent on numerous factors. In the present case report, a 14-year-old male patient with a DC associated with an unerupted lower right 1st premolar and the conservative management performed is reported. A discussion on the decision making process for treatment is presented.

KEYWORDS

- Mixed dentition
- Dentigerous cyst
- Odontogenic Keratocyst
- Ameloblastoma
- Marsupialisation
- Enucleation

INTRODUCTION

Dentigerous cysts (DCs) are the 2nd most common benign cyst of developmental origin (McKinney & Lukes, 2021) (3). The aetiology of DCs is not well understood but is assumed to be caused by osmotic movement of water into the space between the reduced dental epithelium and the crown of an unerupted tooth (Rajae and Karima, 2021; AlKhudair et al. 2019; McKinney and Lukes, 2021) (1, 2 and 3).

The fluid movement into the cyst will result in its growth that is aided by the release of bone resorbing factors.

The cyst can achieve a very large size and may even cause cortical bone expansion but will rarely lead to pathological fracture (Morais et al. 2014; Sciubba & Regezi, 1993) (9 and 11). A DC, by definition, is attached to the tooth cervix at the cemento-enamel junction, and it encloses the crown of the unerupted tooth (Sciubba & Regezi, 1993) (11).

DCs have been reported across a wide age range but are the most common between the ages of 20 to 40 years. In this age group, males show an increased incidence with an odds ratio of 1.6:1 (McKinney & Lukes, 2021; Sciubba & Regezi, 1993) (3 and 11). In children and adolescents, the predilection shifts slightly to favour occurrence in females (McKinney & Lukes, 2021; Speight & Shear, 2007) (3 and 14).

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CONSERVATIVE MANAGEMENT OF A DENTIGEROUS CYST WITH UNCHARACTERISTIC FEATURES

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DCs are rarely found in paediatric patients as they almost exclusively affect the permanent dentition, with the most commonly affected teeth being the mandibular 3rd molar, the maxillary canines, the maxillary 3rd molars and the lower premolars (Morais et al. 2014; Halai & Koshal, 2018) (9 and 12). DCs associated with unerupted lower 1st premolars are much less common (Noujeim & Nasr, 2021) (13).

DCs are characterised by slow growth and will rarely present with symptoms, unless otherwise infected or if they grow to a significant size (Rajae and Karima, 2021; McKinney and Lukes, 2021; Khandeparker et al. 2018) (1,3 and 4).

When large, the most commonly seen complications include; paresthesia of the inferior alveolar nerve, caused by compression of the nerve with the growth of the cyst, formation of a palpable mass, displacement of adjacent teeth, impaction of neighbouring teeth or even development of crowding/spacing (Rajae & Karima, 2021; Morais et al. 2014) (1 and 9).

Radiographically, DC is a well defined, unilocular, radiolucent lesion, usually with corticated borders and is intimately associated with the cemento-enamel junction of an impacted tooth (Sciubba & Regezi, 1993) (11).

Radiographic diagnosis can never yield a definitive diagnosis and hence, histopathological analysis is considered to be the golden standard for DCs (McKinney & Lukes, 2021; Khandeparker et al. 2018; Morais et al. 2014) (3, 4 and 9). Although several reports about

DCs are available in the literature, it is a rare occurrence to find DCs in the age group of 10-19 years of age. Additionally, DCs associated with mandibular 1st premolars are exceedingly rare.

Hence, based on the clinical findings of this case, it is evident that the case is considered to be a rare finding. The aim of this report is to document the clinical, radiographic and histological presentation of a DC along with the treatment planning and decision making process that lead to the conservative management of said patient.

CASE REPORT

A 14 y/o male patient presented to the University teaching clinic with his guardian. The patient had no presenting complaint. The patient



Figure 1: Frontal extraoral photograph showing competence of lips

explained that he had a prior history of tics and that they are currently well controlled with Aripiprazole. Hence, the patient was considered to be medically fit overall. The patient had no drug allergies and was previously hospitalised but was unsure why.

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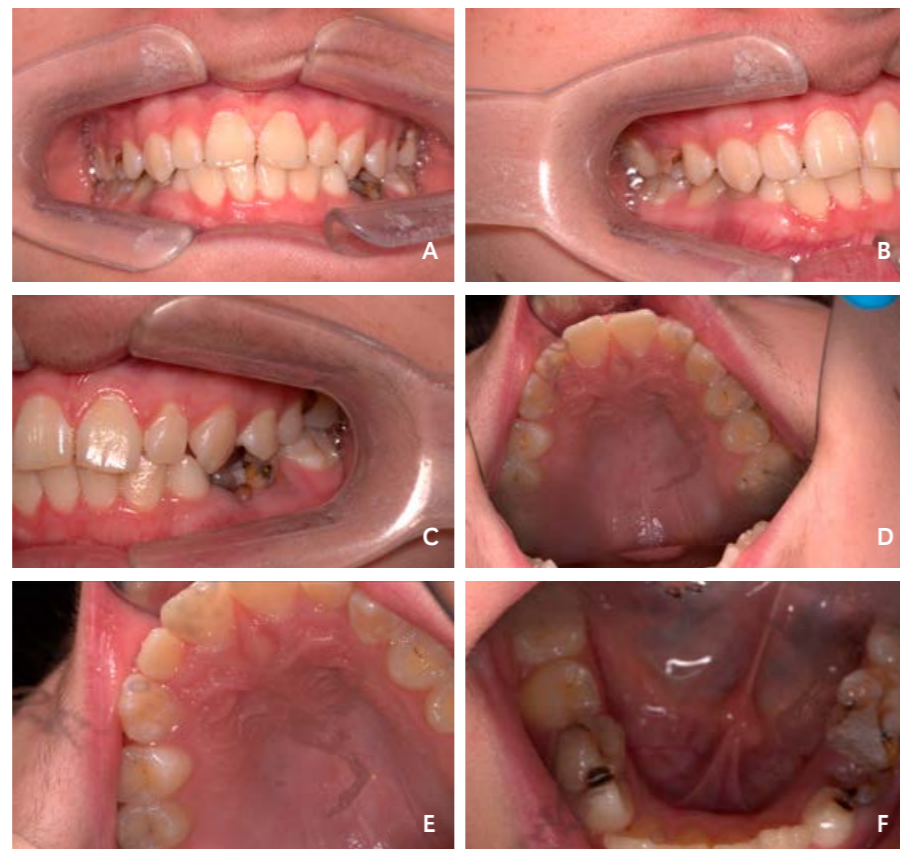


Figure 2 A, B, C, D, E and F: Intraoral photographs (A) anterior view, (B) Right lateral view, (C) Left lateral view, (D and E) Upper occlusal views, (F) Lower occlusal view

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360° Nozzle rotation

360° rotation for complete hygiene



CONSERVATIVE MANAGEMENT OF A DENTIGEROUS CYST WITH UNCHARACTERISTIC FEATURES

Continues from page 12

The patient's diet mainly included fast food-type foodstuff as well as chocolate and candy and soft drinks throughout the day. The patient mentioned an oral hygiene regime that included brushing his teeth twice daily with poor technique.

His prior dental history included an initial appointment with treatment planning, restorations, extractions and had no prior negative interactions with any local anaesthetic agents. The last time the patient had radiographs taken was approximately 4 years ago.

On extraoral assessment, the patient showed no abnormalities with regular speech and gait as well as competent lips and mouth opening within normal limits (Figure 1). Intraoral assessment yielded the following findings: 1) Numerous active carious lesions, 2) numerous retained primary teeth, 3) generalised plaque and calculus, 4) numerous restorations, 5) slight soft tissue swelling in the area of the lower right deciduous molars (Figure 2B).

Detection and diagnosis of carious lesions is essential to establish an appropriate treatment plan. Caries can generally be detected through a visual-tactile approach, however, accuracy of proximal lesion diagnosis with the visual-tactile approach can be best described as limited (Schwendicke, Göstemeyer, 2020) (7). Amongst the numerous diagnostic methods available, bitewing radiographs seem to be the gold standard for detection of proximal lesions (Schwendicke, Göstemeyer, 2020) (7).

Hence, bilateral bitewings were taken and recorded so as to aid in treatment planning by determining the presence



Figure 3 A and B (top): Bilateral bitewing radiographs (A) right and (B) left.



Figure 4 (above): Investigative orthopantomogram (OPG)

and/or extent of interproximal carious lesions and to visualise the crowns of the permanent teeth under the retained primary teeth. This investigation yielded a lot of valuable information that resulted in an update of the treatment plan. From the bilateral bitewings, it was noted that the patient had active carious lesions as per the image below:

17(O), 18(O,P), 55(O)	64(O), 25(O), 26(O), 27(O)
47(O), 46(O), 84(M), 83(D)	73(D), 36(O,B), 37(O)

The right sided bitewing also showed an abnormally positioned 44, an area of radiolucent nature inferior to the retained 84 and mesial tipping of the 45 (Figure 3). This prompted further radiographic examination.

According to the ALARA principle, an OPG was merited in this case since it would alter the treatment plan for the patient. Hence, an OPG was taken and recorded (Figure 4).

The OPG showed numerous valuable findings including: 1) the presence of the tooth germs for teeth 18, 28, 38 and 48, 2) numerous unerupted, fully developed permanent teeth, including the 44, 43, 33, 34 and 35, 3) well-limited, radiolucent area approximately 4mm in diameter in the area of the roots of teeth 21 and 22, 4) homogenous (despite the superimposition of the spine), rounded but scalloped radiolucent lesion with corticated borders in the right body of the mandible with the superior limit being the alveolar crest,

the crown of the 44 seemed to be intimately associated with the lesion, 5) inferiorly displaced canine at the level of the base of the mandible with slight root resorption, 6) laterally displaced roots of teeth 41 and 42.

The radiolucent area in the location of the roots of teeth 21 and 22 is very well-limited and the lamina dura can be traced around the entire root surface of both teeth. These findings indicate either the presence of a very slow growing lesion or a deficiency in the OPG and hence, this area was not of immediate concern. Since the area is located outside of the focal trough, a periapical of the area would be indicated so as to obtain greater diagnostic information and confirm the absence/presence of pathology.

The lower lesion was of greater urgency due to its large extent and hence the patient was referred to the surgical department for further management. A clinical and radiographic differential diagnosis was established:

1. Dentigerous cyst
2. Odontogenic Keratocyst
3. Ameloblastoma

The patient was seen by the surgical department for a consultation and a cone beam computed tomography (CBCT) was taken and recorded (as seen in figures 5, 6 and 7) in order to establish the proper extent and location of the lesion. The multiplanar reconstruction and the 3D model allowed the surgical team to establish the exact dimensions of the lesion and its association with adjacent structures.

The mesial limit of the lesion was the distal border of the mesio-inferiorly displaced 43 and the distal border of the laterally displaced roots of teeth 42 and 41. The inferior limit was the inferior border of the cortical bone of the body of the mandible. The distal limit of the lesion was the mesial surface of the mesial root of tooth 46 and the superior limit of the lesion was the alveolar crest.

The surgical department decided to proceed with treatment of the patient by marsupialisation of the lesion (due to its large dimensions) and removing

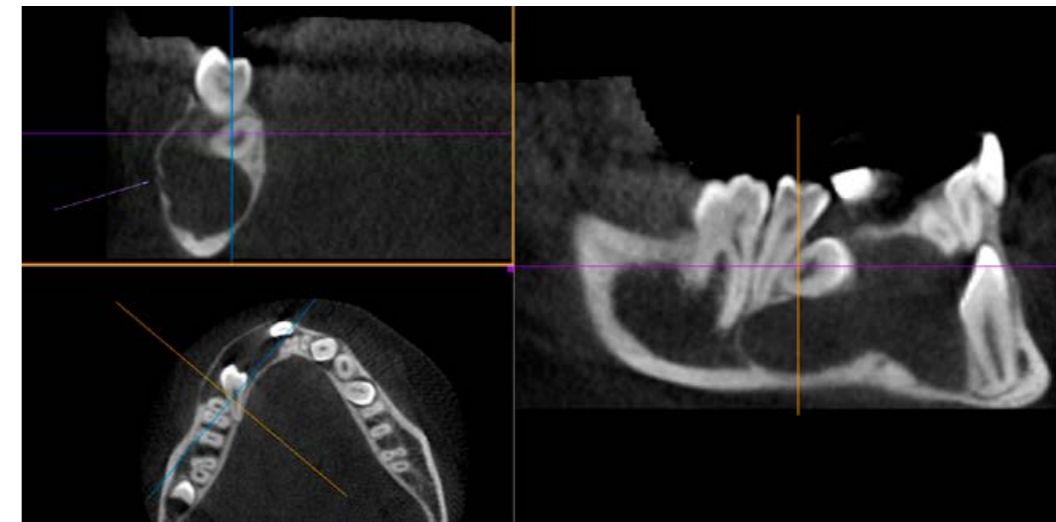


Figure 5: CBCT showing the extent of the lesion as well as its intimate association with the CEJ of the lower right 1st premolar in a coronal view (top left) with the purple arrow indicating the location of the mental foramen, sagittal view (right) and axial view (bottom left).

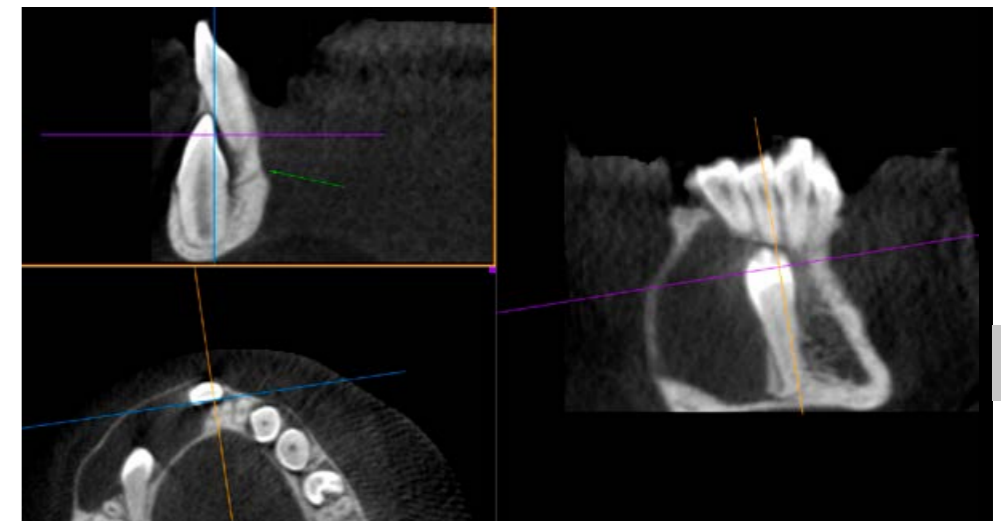


Figure 6: CBCT showing mesial extent of the lesion, showing displacement of the lower right permanent canine as well as root displacement of the lower right incisors with concomitant root resorption. The coronal view (top left) shows the close association with the mandibular incisive canal, indicated by the green arrow. The sagittal view (right) and axial view (bottom left) can also be seen.

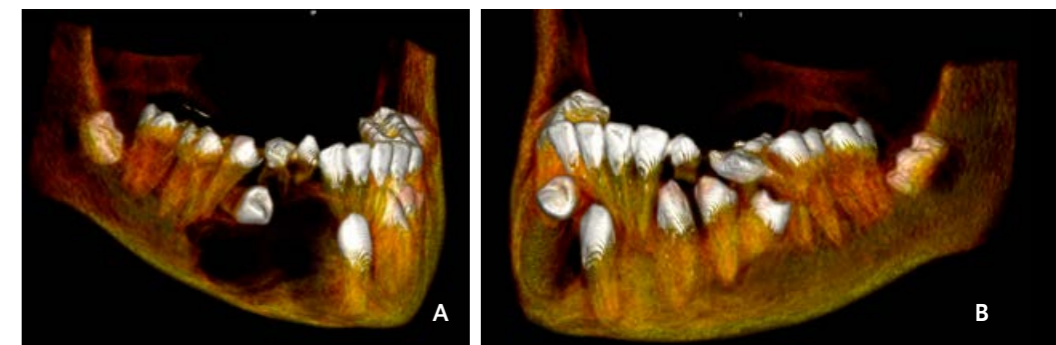


Figure 7 A and B: 3D reconstruction showing the extent of the cyst as well as the displacement of adjacent structures, including the impacted lower right canine and the root displacement of the right later and central incisors.

a section of the lining for histological analysis. This procedure was carried out under local anaesthesia since the patient's cooperation was very good. The area was anaesthetised and an enveloping incision was established and reflected to allow for adequate visualisation of the surgical field. Next, the overlying

bone was removed via a surgical bone drill and the associated tooth (44) was visualised. A section of the lining was sectioned and placed in a carrier solution, to be taken to the histology department.

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CONSERVATIVE MANAGEMENT OF A DENTIGEROUS CYST WITH UNCHARACTERISTIC FEATURES

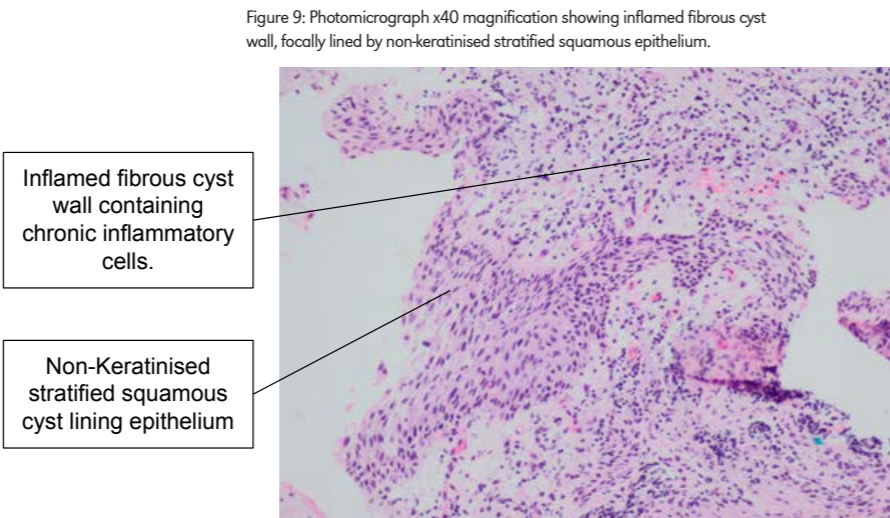
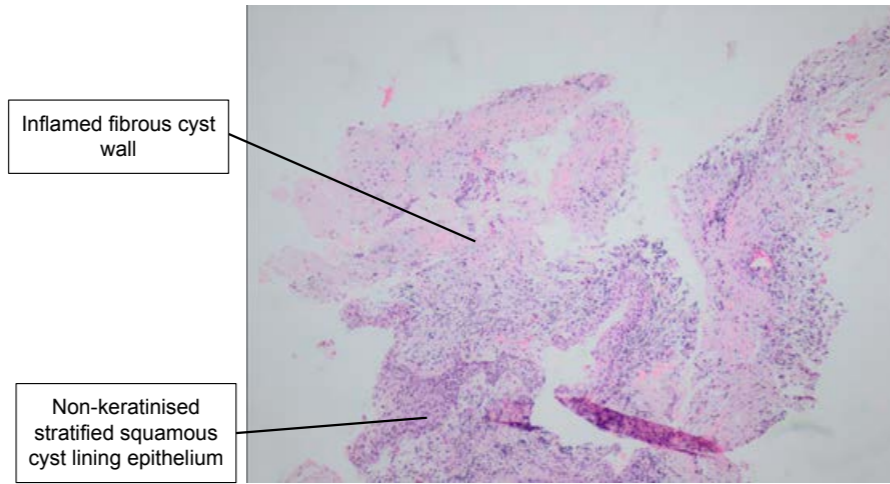


Figure 8 A, B, C, D and E: Surgical photographs (A) Enveloping incision, (B) Removal of overlying bone and visualisation of the impacted 44, (C) Irrigation and cavity toilet of the surgical site, (D) Packing of the wound with BIPP, (E) Suturing of the surgical site with silk sutures and BIPP in the wound.

Continues from page 12

The wound was irrigated with saline solution and packed with Bismuth Iodoform Paraffin Paste (BIPP) dressing. The wound was then sutured with 4-0 non-resorbable silk sutures and a reverse cutting ½ circle needle (Figure 8).

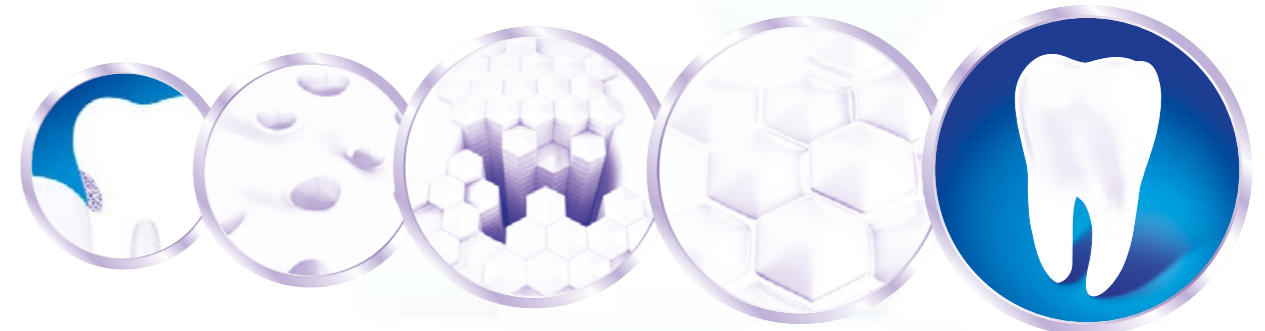
The sample taken was sent to the Histopathology department for further analysis. The main findings included fragments of an inflamed fibrous cyst wall that contained variably dense chronic inflammatory cell infiltrate and dystrophic

calcifications. A single fragment was lined by non-keratinised, mildly hyperplastic squamous epithelium. The histological features were said to be in keeping with the diagnosis of a DC (Figures 9 and 10).

Review sessions were established so as to assess the healing of the wound, remove the non-resorbable sutures, take impressions for the fabrication of an obturator and replace the BIPP dressing. to the histology department.

Continues on page 19

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CONSERVATIVE MANAGEMENT OF A DENTIGEROUS CYST WITH UNCHARACTERISTIC FEATURES

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The wound was irrigated with An obturator was required to maintain patency of the surgical opening, to decompress the cystic lesion, and to prevent the accumulation of food debris into the cystic cavity (Kajjari et al. 2021) (10).

A post treatment OPG was recorded so as to assess cystic cavity shrinkage and bone cortex remodelling (Abu-Mostafa, 2022) (8) (figure 11). The obturator needed to be trimmed in the TC as the patient presented with discomfort in the area of the cyst and in the area of the Adam's clasps.

Shortly after, the patient was seen again by the surgical team and the patient was instructed to no longer wear the obturator.

The treatment plan of the patient was updated as follows: 1) restoration of the carious lesions, 2) Removal of the deciduous lower molars bilaterally, 3) Ortho consultation for surgery and orthodontic traction of 44 (and possibly the 41, 42, 43).

DISCUSSION

Extensive reports on Dentigerous cysts (DCs) are present in the literature. DCs are the second most common type of benign, developmental, odontogenic cysts (McKinney & Lukes, 2021) (3). The exact cause of the cyst is not understood but theories have been developed.

The most widely accepted theory is known as the 'intrafollicular' theory and it suggests that DC develops as a result of fluid accumulation between the reduced enamel epithelium and the crown of an unerupted tooth (Rajae & Karima, 2021; ALKhudair



Figure 11: Post-treatment OPG to assess cystic cavity shrinkage and bone cortex remodelling (6 months of postoperative follow up).

et al. 2019; McKinney & Lukes, 2021). (1, 2 and 3) Fluid moves between the layers via osmosis and results in growth of the lesion.

A DC can be either inflammatory or non-inflammatory. The inflammatory type occurs due to the inflammation of a non-vital deciduous tooth. The non-inflammatory type develops due to pressure exerted by the erupting tooth on an impacted follicle (Rajae & Karima, 2021; McKinney & Lukes, 2021) (1 and 3).

DCs have been recorded across a wide age range but they seem to peak in incidence between the ages of 20 and 40 with a slight male predilection.

However, numerous studies showed that when a DC occurs in children and adolescents between the ages of 10 and 19 years, the predilection shifts slightly to favour occurrence in females (McKinney & Lukes, 2021; Speight & Shear, 2007) (3 and 14).

They are rarely seen in paediatric patients since they tend to occur almost exclusively in the permanent dentition, with the most commonly affected teeth being the mandibular 3rd molar, the maxillary canines, the maxillary 3rd molars and the lower premolars respectively.

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(Morais et al. 2014; Halai & Koshal, 2018) (9 and 12). DCs associated with unerupted lower 1st premolars are much less common (Noujeim & Nasr, 2021) (13).

Hence, the present case shows a relatively rare finding: a DC associated with an impacted lower 1st premolar that is found in a young, male patient.

As observed in the case reported herein, DCs grow very slowly and tend to be asymptomatic. (Rajae & Karima, 2021; McKinney & Lukes, 2021; Khandeparker et al. 2018) (1,3 and 4) This means that they are generally discovered by chance when performing radiographic examinations (Khandeparker et al. 2018) (4).

Occasionally, they may be large enough to lead to the formation of a palpable mass and when of a larger size, they will tend to displace adjacent teeth, leading to impaction of neighbouring teeth or even development of crowding/spacing.

This is in line with the findings of this case. The most commonly seen complication of a DC is the paresthesia of the inferior alveolar nerve, caused by compression of the nerve with the growth of the cyst (Rajae & Karima, 2021; Morais et al. 2014) (1 and 9).

Radiographically, DCs typically present as well-defined unilocular radiolucencies, often with a sclerotic border and are intimately associated with the crown of an impacted tooth.

This finding tends to be consistent with other lesions, including, OKCs and unicystic ameloblastoma.

(McKinney & Lukes, 2021; Khandeparker et al. 2018) (3 and 4). DCs are generally suspected when the size of the space of the follicle appears to be greater than 5mm (Rajae & Karima, 2021; Khandeparker et al. 2018) (1 and 4).

Radiographic diagnosis can never yield a definitive diagnosis and hence, histopathological analysis is considered to be the golden standard (McKinney & Lukes, 2021; Khandeparker et al. 2018; Morais et al. 2014) (3, 4 and 9).

DCs can be treated either by enucleation or marsupialisation (Rajae & Karima, 2021; Arakeri et al. 2015) (1 and 5). Each technique presents its own set of advantages and disadvantages and hence the treatment chosen will depend entirely on the unique properties of the case.

The most important factors to consider would be the size of the lesion, the location, the proximity to vital structures, whether or not the unerupted tooth will be extracted and the availability of the patient for follow-up sessions (McKinney & Lukes, 2021; Arakeri et al. 2015) (3 and 5). Marsupialisation is the technique that involves converting the cyst into a pouch by suturing the cyst lining to the oral mucosa.

This method is more conservative, and hence is desirable if the preservation of the displaced teeth is required.

This is generally the treatment option chosen in younger patients (Arakeri et al. 2015) (5). When a cyst is large, marsupialisation tends to be the treatment of choice as it decreases the risk of pathological fracture and damage to adjacent structures (Rajae & Karima, 2021; Khandeparker et

al. 2018; Önay et al. 2019) (1, 4 and 6). Marsupialisation presents with fewer complications than enucleation with regards to protection of adjacent tissue (Rajae & Karima, 2021) (1).

The disadvantage of marsupialisation is that the pathological tissue is left in situ, slower healing and cicatrization/scar formation will occur (Arakeri et al. 2019) (5 and 6).

Enucleation is a more radical method that involves the complete removal of the cyst. It is the chosen treatment plan whenever the cyst is small, and saving the involved tooth is impossible (Rajae and Karima, 2021) (1).

In the present case, marsupialisation with preservation of the involved tooth was chosen due to the large dimension of the cyst and the thin residual bone that was leftover both superiorly and inferiorly and due to the growth potential of the patient, that would potentiate the movement of the impacted 44 and 43 with a fixed orthodontic procedure.

Also, a part of the wall of the cyst was sent to the histology department for further analysis. The characteristic histopathological features include an epithelium that consists of two to four layers of smooth non-keratinised cells with a smooth interface between the epithelium and connective tissue.

Other types of lesions like ameloblastoma and squamous cell carcinoma may develop from the cells that line a DCs but recurrence of DCs is rarely ever seen, especially if complete surgical removal of the cyst was performed (Khandeparker et al. 2018; Morais et al. 2014) (4 and 9).

Many studies show differing opinions with regards to the appropriate treatment option for

large DCs. The main reason is that larger cysts have questionable potential for development of a blood clot and new bone formation (Rajae and Karima, 2021) (1).

When the blood pools in an otherwise devitalised area, it can become a focus for infection, leading to more unwanted consequences.

The present case report shows cystic cavity shrinkage and bone cortex remodelling following the marsupialisation of the lesion.

Hence, the findings of this case differ to the opinion of many authors. This case indicates that when a large DC is present in a young, growing patient, the case can be managed more conservatively and still present with a very good clinical and biological outcome.

CONCLUSION AND LEARNING POINTS

Within the limitations of this case report, the present findings suggest that DCs with uncommon features such as the involvement of an impacted lower 1st premolar within a 14 y/o male could be treated with a conservative approach based on the outcomes of the aforementioned case. This was likely due to the growth potential of the patient as well as the rigorous follow up that was conducted.

The importance of proper diagnosis and treatment planning is made evident when considering the surgical management of other lesions that are included within the differential diagnosis of DCs. These lesions include; OKC and unicystic ameloblastoma.

They are usually more aggressively managed and require either resection

of bone or removal of a healthy bone margin respectively. Hence, an improper diagnosis would have led to overtreatment of the patient. Follow-up of the patient was very important so as to assess cystic cavity shrinkage and bone cortex remodelling.

NOTES ON PATIENT'S CONSENT

Written consent was acquired from the patient's guardian (since the patient is 14 years old). All procedures were explained in detail to both the patient and the guardian, obtaining valid consent both during the pre-op session and prior to the surgical procedure too.

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DIAGNOSTIC CHALLENGE OF A WHITE ORAL LESION

EMBRACING A HOLISTIC APPROACH TO PREVENT UNDER-MANAGEMENT

A case report by Matthew Gatt

ABSTRACT

This case report addresses diagnostic challenges and management complexities related to a white oral plaque in a 33-year-old male with inconclusive clinical and histopathological findings. Although suggestive of oral leukoplakia based on the patient's history and clinical presentation of the plaque, histopathological examination suggested prior lichenoid inflammation, leading to an inconclusive definitive diagnosis. The study highlights the difficulties in determining the nature of the lesion and underscores the significance of a holistic approach, encompassing clinical, histological, and patient-specific factors. Special attention is drawn to the risk of under-management in cases involving potentially malignant disorders, urging a comprehensive strategy for effective diagnosis and treatment. Future research should focus on the development of more precise diagnostic tools for distinguishing between different oral potentially malignant disorders and refining the risk assessment of potentially malignant oral lesions, taking into account not only histological features but also clinical and patient-specific factors.

KEYWORDS

- White oral plaque
- Leukoplakia
- Oral lichen planus
- Oral lichenoid reactions
- Cinnamon stomatitis
- Challenges in diagnosis

INTRODUCTION

White lesions are a common presentation in the oral cavity and can have multiple aetiologies ranging from benign to malignant conditions. Other white lesions, although benign at presentation, carry an elevated risk of progressing to malignancy in the future (Mortazavi et al., 2019).

Therefore, establishing an accurate diagnosis is crucial for clinicians when making informed decisions about the management of these lesions. However, distinguishing between benign, potentially malignant, and malignant white lesions is challenging due to shared clinical and histological features. In addition, various definitions have been published throughout the years which has led to inconsistency and confusion in diagnoses (Aguirre-Urizar, Lafuente-Ibáñez de Mendoza, & Warnakulasuriya, 2021).

In some white lesions, an accurate diagnosis cannot be made due to inconsistent features (Carrard & van der Waal, 2018). In such cases, this may lead to improper management which can be significant and impact the patient's well-being.

Therefore, meticulous consideration is required to reduce the risks of over- and under-management (Warnakulasuriya et al., 2021). The case report will discuss a presentation of a white homogenous plaque in a 33-year-old male with conflicting clinical and histopathological presentations.

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The aim of this report is to discuss the challenges in diagnosis and how this may affect clinical management.

CASE PRESENTATION

A 33-year-old male of Southeastern Asian origin presented to the dental Teaching clinic in February 2022 after being referred from the Mobile Dental Unit due to a suspicious intra-oral plaque. The patient was unaware of the plaque and reported no other presenting complaints.

The patient reported no previous dental history and had a clear medical history with no known drug

allergies. The patient had a smoking history of 1 packet of cigarettes a day and alcohol consumption of 4 units a week for the past 5 years. Intra-oral examination revealed a full dentition with poor oral hygiene and periodontal disease.

A white plaque on the left buccal mucosa close to the vestibule that could not be scraped off was present (Figure 1). The plaque was approximately 2.5cm by 1cm with a homogenous appearance. Upon further questioning, the patient did not report any use of smokeless tobacco, betel quid/gutka, or pan masala.

However, the patient reported frequent use of cinnamon sweets which were placed in the buccal

sulcus and left to dissolve in the area of the lesion. The patient reported that the use of these 'sweets' had been stopped since moving to Malta 5 years ago.

In May 2022 an incisional biopsy was performed under local anaesthesia for histopathological examination. The patient attended a follow-up appointment and delivery of histological diagnosis 2 weeks later.

Histological diagnosis stated, "Epithelial acanthosis and hyperkeratosis with underlying pigment incontinence suggestive of previous lichenoid inflammation" (see Appendix B).

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In addition, occasional lymphocytes in the superficial lamina propria and basement membrane were present with no evidence of dysplasia or malignancy (Figure 2). A definite diagnosis was not possible due to the paucity of the inflammatory infiltrate present, however, the features were suggestive of oral lichen planus (OLP).

Although a definitive diagnosis was not possible, a treatment plan was made based on all the available information, including the patient's history, and clinical and histological findings.

The proposed treatment plan consisted of smoking cessation advice, periodontal treatment and complete excision of the plaque under local anaesthesia however, the patient did not consent to the surgical procedure.

Therefore, an alternative treatment plan was made which consisted of biannual review appointments with incisional biopsies if the lesion showed concerning clinical changes.

During a follow-up appointment, 7 months post-surgery the plaque showed no significant changes (Figure 3). The patient failed to attend further review appointments.

DISCUSSION

The term oral potentially malignant disorders (OPMD) was first described in 2007 by the WHO Collaborating Centre for Oral Cancer Workshop (Warnakulasuriya, Johnson, & Van Der Waal, 2007).

In 2020 the same workshop redefined OPMD as "any oral mucosal

abnormality that is associated with a statistically increased risk of developing oral cancer" (Warnakulasuriya et al., 2021). This implies that such disorders carry an increased risk of future malignancy, not only at the site of diagnosis but throughout the entire oral cavity.

This is due to the concept of field change, that even healthy mucosa may contain molecular irregularities that elevate the risk of malignancy (Warnakulasuriya et al., 2021). The term "potentially" indicates that although there is an increased risk, not all OPMD may develop into malignancy.

In fact, the majority of OPMD never undergo malignant transformation. Previously used terms such as "precancer" and "pre-malignant" are not appropriate as these suggest a definite future malignant transformation (Warnakulasuriya et al., 2021).

Proper diagnosis of OPMD is essential for early intervention to prevent future malignant transformation and improve the prognosis (Jeddy, Ravi, & Radhika, 2017).

This case presented some overlapping and conflicting clinical and histological findings that widened the scope of the differential diagnosis and complicated the establishment of a single definitive diagnosis, thereby affecting the optimal choice of long-term treatment plan and management.

INITIAL CLINICAL DIAGNOSIS – ORAL LEUKOPLAKIA

Several OPMDs present clinically as white lesions with similar clinical and histological features which makes diagnosis and subsequent

management challenging (Mortazavi et al., 2019). The most common OPMD is oral leukoplakia (OL) (Warnakulasuriya et al., 2021), which is defined as "A white plaque of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer" (Warnakulasuriya, Johnson, & Van Der Waal, 2007).

According to a meta-analysis by Zhang, Li, Zeng, Hu, & Hua (2023) the average global prevalence of OL was 1.39%, varying from 0.12 to 33.33%. This meta-analysis demonstrated that OL was more common in males, persons over 60 years of age, and people who use tobacco and alcohol (Zhang et al. 2023).

Homogeneous and non-homogenous leukoplakia are the two primary clinical variants of OL. The homogenous type is distinguished by a flat and white plaque with a uniform surface.

The non-homogenous type is subdivided into speckled or erythematous (referred to as erythroleukoplakia), nodular, and verrucous. The classification's significance stems from the presumption that the clinical type and the likelihood of malignant transformation are correlated, with the non-homogeneous type carrying a higher risk (van der Waal, 2015).

As per the current definition of OL, a provisional diagnosis of OL can be made given that other known diseases or disorders have been excluded. Such a provisional diagnosis should be confirmed or modified following a diagnostic biopsy.

Microscopically no pathognomonic features exist for OL. The features consistent with OL can range

from hyperkeratosis to various degrees of epithelial dysplasia (Warnakulasuriya et al., 2021). In the reported case, a provisional clinical diagnosis of OL was made based on the appearance of the lesion and the predisposing factors present.

The appearance of the lesion fits the classical presentation of OL which is that of a unilateral white homogeneous plaque that cannot be rubbed off. The associated risk factors of tobacco and alcohol use as well as the gender suggested an increased probability of OL.

BIOPSY AND HISTOLOGICAL DIAGNOSIS

Following a thorough clinical examination, a long-standing lesion should be biopsied for histological examination to reach a definitive diagnosis. Histological examination is the gold standard for diagnosing oral lesions as it provides information that would not be available based on the clinical diagnosis alone.

The histological diagnosis can support or alter the clinical diagnosis. Regardless, the histological diagnosis trumps the clinical diagnosis due to the ability to view lesions microscopically (Soyele et al., 2019).

However, pathologists may encounter difficulties in achieving an accurate diagnosis. This may be due to histological overlap between different lesions, sampling errors, or a sample that is not representative of the entire lesion (Chen, Forman et al., 2016; Soyele et al., 2019).

Histologically the lesion was reported as "Epithelial acanthosis and hyperkeratosis with underlying pigment incontinence, suggestive of previous lichenoid inflammation". This appearance



Figure 1. Intra-oral photograph showing a white plaque on the left buccal mucosa close to the vestibule measuring 2.5 x 1 cm

was not consistent with OL.

The microscopic presentation showed a band-like lymphocytic infiltrate which although it is recognised as a possible finding in OL, it is not typical (van der Waal, 2015).

Furthermore, the presence of Civatte bodies, pigment incontinence, and lymphocytes in the superficial lamina propria and the basal layer suggested an alternative disorder. Civatte bodies which are the result of damaged basal keratinocytes, along with pigment incontinence and lymphocytes are not diagnostic of any particular disease but are suggestive of an inflammatory process such as seen in OLP and oral lichenoid lesions (OLL) (Pranay, Kumar, & Seema, 2013).

Therefore, the initial clinical working diagnosis of OL was tentatively discarded given the supposedly more reliable histological features, which were more suggestive of OLP.

ORAL LICHEN PLANUS

Oral lichen planus is a prevalent chronic inflammatory condition, affecting approximately 0.2- 5% of the global population.

It is more prevalent in females between the 4th and 8th decades of life. Although common, the aetiology and pathogenesis of OLP are unknown. Six clinical presentations of OLP are recognised:

reticular, atrophic, erosive, bullous, papular, and plaque.

The characteristic features of OLP are the symmetrical distribution and white striations that may or may not be present on a background of erythema. Plaque-like OLP, which is more common in patients who smoke, may be misdiagnosed as OL due to a similar clinical presentation. In contrast to OL, plaque-like OLP is typically found on the dorsal surface of the tongue (Mueller, 2017). Given the clinical appearance of the lesion and the histological examination suggesting a lichenoid inflammation, plaque-like OLP was included in the differential diagnosis.

Establishing a diagnosis of OLP relies on meeting specific clinical and histological features. (Rotaru, 2020). The clinical appearance did not contain any reticulation and no symmetry was present.

Furthermore, the three classical microscopic features of OLP which are epithelial hyperkeratinisation, a band-like lymphocytic infiltrate in the connective tissue, and liquefaction degeneration of the basal cell layer were not all present (Ismail, Kumar, & Zain, 2007). Therefore, since the clinical and histological criteria were not met a diagnosis of OLP was not adequate.

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However, other lesions share some of the histological characteristics of OLP, these include oral lichenoid lesion (OLL) and cinnamon stomatitis (Muller, 2019, Rotaru, 2020).

ORAL LICHENOID LESIONS

When one or several of these criteria are not fulfilled but the lesion shows clinical and microscopic similarities to OLP, the term OLL is used (Rotaru, 2020). The three types of OLLs are contact lesions (mostly associated with dental restorations), drug-related, and graft-versus-host-disease.

The diagnosis of such lesions relies on clinical examination, patient history, and when warranted a histological examination. Unlike OLP, OLLs have an aetiological factor that when removed will result in the resolution of the lesion (Warnakulasuriya, 2018). However, no apparent triggers were present in this case.

Therefore, despite a diagnosis of OLL appearing to be the most appropriate based on the histological features, in the absence of evident aetiological factors, a definitive diagnosis of an OLL did not fit.

CINNAMON STOMATITIS

The patient reported previous use of cinnamon sweets which were placed in the area of the lesion and left to dissolve.

This was suggestive of a contact stomatitis termed cinnamon stomatitis. Cinnamon is found in many different products such as sweets, beverages, toothpaste, and mouthwash. Use of cinnamon and cinnamon-containing products is

generally safe however, prolonged intra-oral contact with cinnamon may lead to contact stomatitis.

Cinnamon stomatitis lesions can resemble lichenoid reactions and generally present with a white 'shaggy' appearance or as superficial sloughing with erythema (Muller, 2019) and share histological features with OLP (Mueller, 2017).

Along with a positive history of use of cinnamon sweets in the area, the histological features were similar to those seen in biopsies of lesions associated with cinnamon stomatitis. In such lesions cessation of use of cinnamon-containing products is both curative and diagnostic (Mueller, 2017). Therefore, a diagnosis of cinnamon stomatitis was unlikely since the habit was stopped 5 years prior as reported by the patient.

DEFINITIVE DIAGNOSIS

In a typical case, an oral mucosal lesion is biopsied to reach a definitive diagnosis, and treatment is then done accordingly (Soyele et al., 2019). However, in this case, a definitive diagnosis was not achievable due to the conflicting findings. A lack of a definitive diagnosis leads to the inability to manage the lesion in an evidence-based manner (Aguirre-Urizar et al., 2021).

Furthermore, there is a risk of under-treating the lesion especially if it is an OPMD, thus putting the patient at risk. If in this case, we assume that the lesion is not OL based on the histological findings, we risk under-management.

This is because although OLP and OLLs carry a risk of malignant transformation, at 1.37% and 2.43% respectively, the risk is far greater in OL at 9.8% (Aguirre-

Urizar et al., 2021; Giuliani et al., 2019; Rotaru, 2020).

The decision to completely excise the lesion was driven by the need for a thorough histological examination, which was deemed essential due to the absence of a definitive diagnosis (Parlatescu, Gheorghe, Coculescu, & Tovar, 2014). In cases of uncertain diagnosis, a 'wait and see' approach may be adopted. This entails regular recall appointments with histological examination through incisional biopsies.

Through this approach, malignant changes can be detected early to allow prompt treatment (van der Waal, 2019). Whichever treatment modality is chosen the aim is to prevent malignant transformation.

Cessation of tobacco and alcohol use is encouraged as the first step of treatment in all cases when applicable (Parlatescu et al., 2014). Furthermore, increased cooperation between dental clinicians and oral pathologists along with continued education to refine diagnostic skills should be encouraged to reach more accurate diagnoses in challenging cases of oral lesions (Soyele et al., 2019).

CONCLUSION

Lesions without a definitive diagnosis present a unique challenge to the dental clinician. These lesions must be managed according to the presenting signs, medical history, and histological features.

Management must not overlook that the absence of dysplasia and malignancy at the time of biopsy does not eliminate the risk of future malignant transformation in OPMD (van der Waal, 2019). Furthermore, clinicians should keep in mind that histological examination is not

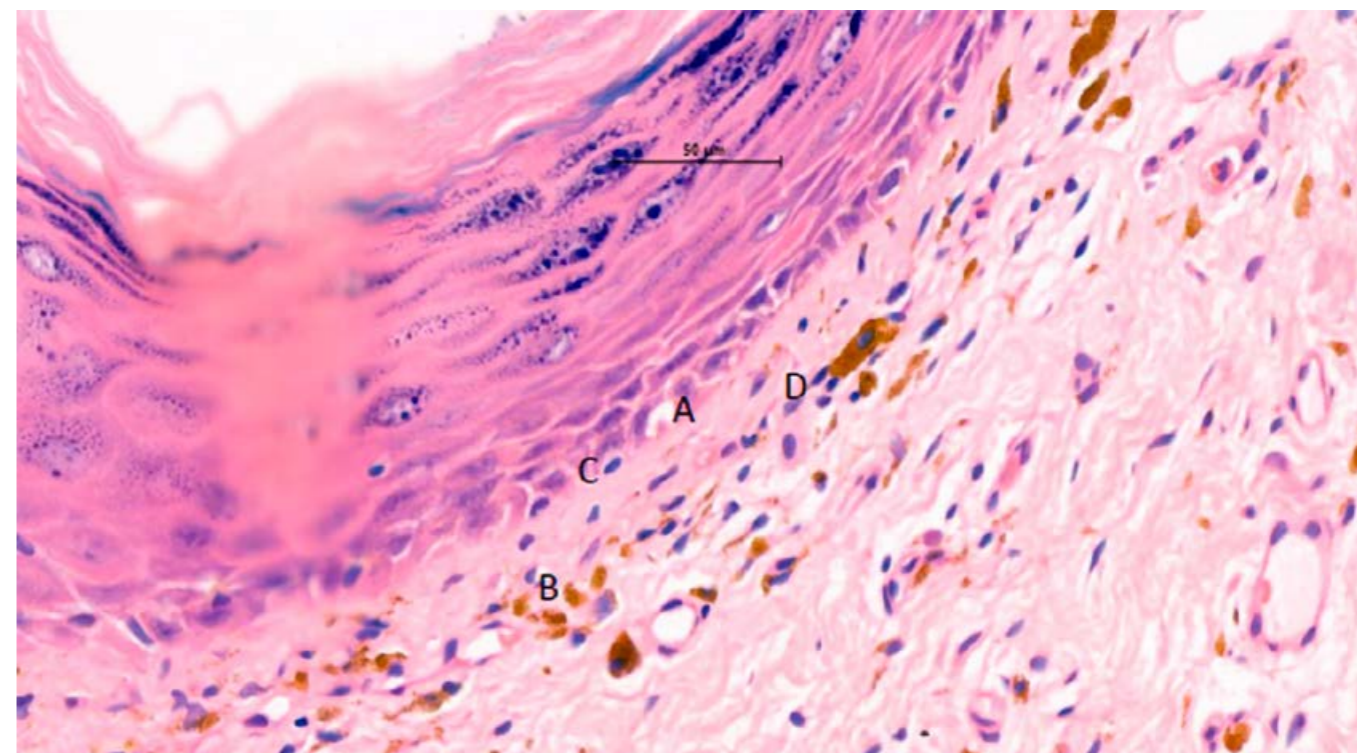


Figure 2. A photomicrograph of the biopsy specimen showing A) Civatte bodies, B) pigment incontinence, C) lymphocytes in the basal cell layer, and D) lymphocytes in the superficial lamina propria. H&E stain.

infallible (Chen, Forman et al., 2016).

Therefore, it may be necessary to shift from a histology-only diagnosis to a more holistic one to avoid under-management. This is particularly relevant for OPMD, as they may be misdiagnosed as other disorders due to shared clinical and histological features (Mortazavi et al., 2019).

Such challenging cases are best managed by increased cooperation between the dental clinician and oral pathologist along with continued education (Soyele et al., 2019).

Based on the case report, future research should focus on the development of more precise diagnostic tools for distinguishing between different OPMDs. This could involve exploring advanced imaging techniques or molecular biomarkers to improve diagnostic accuracy and reduce the need for invasive procedures.

Additionally, there is a need for further research on refining the risk assessment of potentially malignant oral lesions, taking into account not only histological features but also clinical and patient-specific factors. This could lead to the development of more comprehensive



Figure 3. Intra-oral photograph showing the left buccal mucosa 7 months after incisional biopsy procedure

risk prediction models to guide personalized management strategies.

PATIENT'S CONSENT

Informed consent was obtained prior to the incisional biopsy and any subsequent procedures. The patient was provided with a clear explanation of the biopsy, its potential risks, and the purpose of the procedure. The consent process ensured that the patient understood the necessity of the biopsy to establish a definitive diagnosis and

plan appropriate treatment. The patient was also informed about the possibility of future follow-up appointments and the potential need for further diagnostic or therapeutic interventions based on the histopathological findings. The patient was also informed about the confidentiality of his medical information and the potential use of de-identified data for educational or research purposes.

Continues on page 30

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DIAGNOSTIC CHALLENGE OF A WHITE ORAL LESION

EMBRACING A HOLISTIC APPROACH TO PREVENT UNDER-MANAGEMENT

Continues from page 29

A copy of the signed consent form is retained in the patient's medical record for documentation purposes.

ACKNOWLEDGEMENTS

I express my sincere gratitude to Dr. Adam Bartolo for his invaluable guidance during the entire composition of this case report.

Furthermore, I extend my appreciation to Dr. Gainza and Dr. Betts for their assistance whenever sought. ■

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THE BLUE M EVENT WITH BART ENTERPRISES AT THE ROYAL MALTA YACHT CLUB

The event involved a lecture by Dr Minas Leventis on Topical Oxygen Therapy in modern implantology and Oral Surgery: New strategies to enhance healing and control the bacteria. Blue M was also introduced by Mr John Biljedorp.

Oxygen plays a pivotal role in wound healing, exerting disinfectant and antibacterial properties at molecular and cellular levels. Oxygenation enhances cellular metabolism, collagen synthesis, neurovascularisation, and managing pathogenic bacteria.

Blue M restores normal levels of oxygen in pockets, bleeding gums and wounds, which can result from extraction, oral surgery and implant placement, chemotherapy or dentures.

The gel releases oxygen, creating a high oxygen pressure which aids in restoring the micro environment for a healthy oral cavity. One ml of gel is applied at each location-the size of a pea. It is left on the site as long as possible. A maximum of 5mls a day to be used.

Blue M also produce fluoride free toothpaste as well as an oral foam . The oral foam may be use to clean orthodontic appliances as well as clear aligners, retainers and night guards. 🦷



THEBART MEDICAL B FORM DELUXE AUTOMATIC VACUUM MOULDER

An appraisal by Dr David Muscat

I use this machine mainly to make night-guards, sports-guards and bleaching trays as well as for splints and preformed moulds for temporary bridges.

This machine has a built in motor and a colour LCD display.

It is a fully automatic thermoforming process and boasts an infra-red temperature sensor so as to maintain consistency.

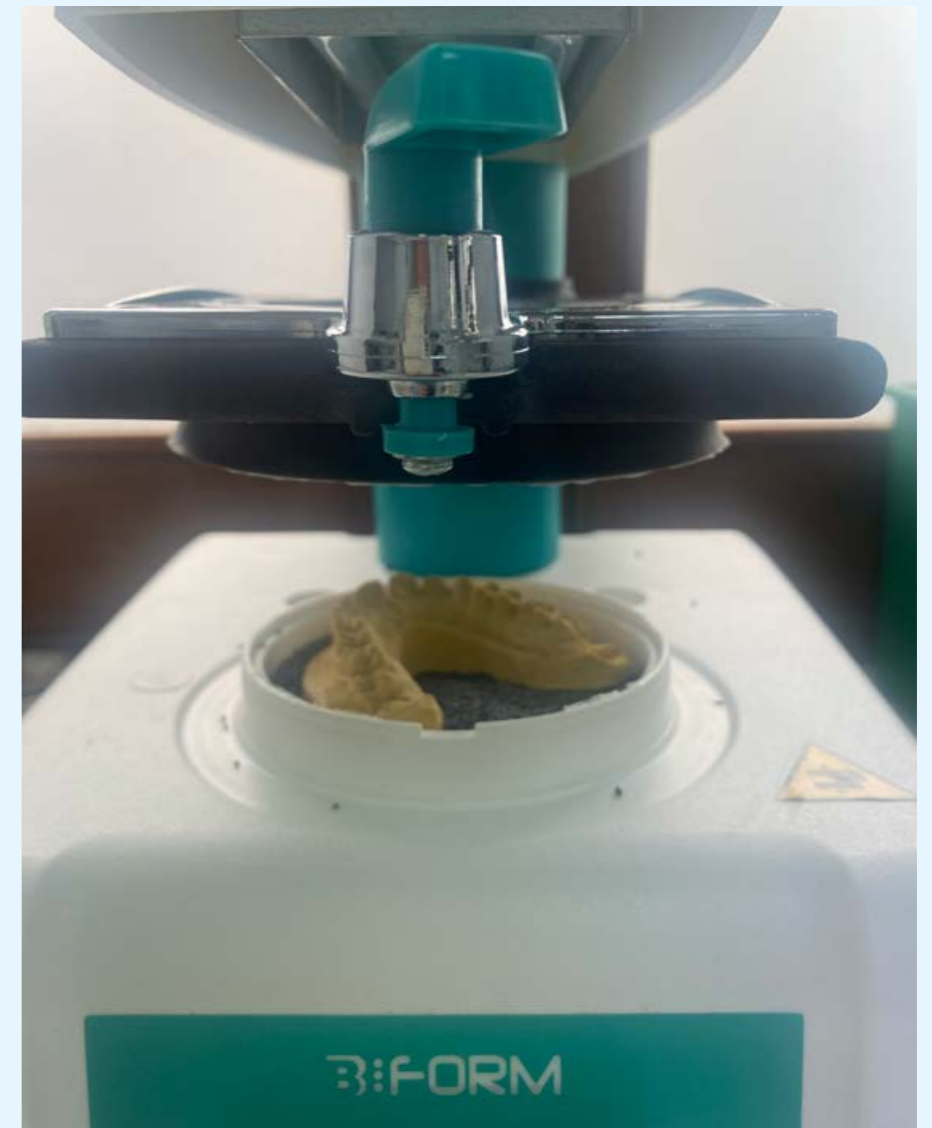
All available thermoplastic sheet materials are supposedly suitable for use. The most important factor here is to first produce a very good, flat and small plaster model to work with. The base must be smooth and one must remove undercuts and round off sharp edges. I cannot stress the importance of a suitable model more.

The model must be low and horseshoe shaped so use a lower tray also for upper impressions.

There is a loss of 20 per cent of the thickness so for a night-guard use a 3mm thickness sheet.

Cover the parts of the model not to be involved with stainless steel granules. It is important to position the model properly in the well so that the teeth to be covered are just above the 'line' that is read by the laser.

A point to note is that the heated beads tend to stick to the hot molten plastic and with each guard made you will unfortunately inevitably lose some of the metal beads as they stick to the plastic.



You need to be very careful where you operate the machine as the heated filament gets extremely hot and this can burn anything like plastic or paper nearly when you are ready and move the filament sideways to retrieve your model and appliance.

Otherwise once you get used to it is rather a good addition to one armamentarium but one needs

to exercise care and diligence in its operation and handling.

For 'tooth whitening trays' for some reason, this is not listed on the menu so one needs to use the 'ghost aligner 1mm' setting. When making hard splints use need to calibrate the temperature as otherwise the melted plastic may stick to the stone model. 🦷

OVERVIEW AND HISTORY OF DENTAL BONDING AGENTS

By Dr Amanda Tabone BChD

The development and regular use of adhesive materials has begun to revolutionize many aspects of restorative and preventive dentistry. With the aid of dental bonding agents a strong bond between dental materials and tooth structure is created, this strengthens the tooth and increase retention, hence reduces microleakage.

This concept also changed the attitudes towards cavity preparation since with adhesive materials, it is no longer necessary to produce large undercuts thus conserving tooth structure.

Simply explained bonding may be achieved by one of two mechanisms. Mechanical attachment or chemical adhesion.

MECHANICAL ATTACHMENT

Micromechanical bonding is achieved by etching with 37% phosphoric acid.

Acid etching in enamel

Acid etching demineralises the enamel prism core and/or prism peripheries resulting in a myriad of small undercuts into which resins can gain ingress, set and form a mechanical lock by creating resin tags.

Acid etching in dentine

Acid etching (or Conditioners) in dentine helps remove the dentine smear layer which is about 3-15µm thick. This is formed during

cavity preparation and extends over the whole prepared surface of dentine and into the dentinal tubules forming smear plug.

These acids are capable of dissolving or at least solubilising the smear layer, exposing the underlying dentine to the bonding agent, aiding in forming the hybrid layer.

Chemical adhesion is done through priming.

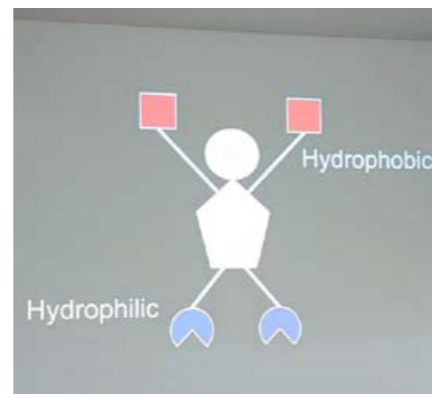
This stage is designed to change the chemical nature of the dentine surface and to overcome the normal repulsion between the hydrophilic dentine and the hydrophobic resin.

The priming agents are di-functional coupling agents and this molecule has three main parts:

- Hydrophobic part -M- Methacrylate Group: This part of the molecule polymerizes with the composite resin during the curing process.
- Linking group -R
- Hydrophilic part- X-This part interacts with the calcium in the hydroxyapatite of tooth enamel and dentine, creating a strong chemical bond. This reactive group may be an amino group, a phosphate group, a 4-META group or a HEMA.

BONDING

The bonding agent is usually an unfilled fluid resin which is able to



flow over and wet the primed surface to complete the formation of an effective bond. Curing of the bonding agent is activated by light for single component materials or chemically for two component materials.

The surface layers of the unfilled resin polymerised by a free radical mechanism remain soft and unpolymerised due to the inhibiting effect which oxygen has on the polymerisation mechanism. This allows for further polymerisation with the resin.

HISTORY OF DENTAL BONDING AGENTS

Dental bonding agents, have evolved significantly over the years, leading to the development of several "generations" of bonding systems.

These generations are classified based on the technological advancements and the approach to bonding with tooth structures.



The DAM team of dentists at Voco Cuxhaven, Germany

1st Generation (1950s-1960s), published by Buonocore, where early attempts at bonding involved materials that primarily adhered to enamel with minimal dentine adhesion. A weak acidic monomer, like NPG-GMA (N-phenylglycine glycidyl methacrylate) was used. This presented with a very weak bond strength (around 2-3 MPa), poor durability and high rates of restoration failure.

2nd Generation (1970s), these adhesives attempted to bond to the smear layer and phosphate ester monomers like Bis-GMA (bisphenol A-glycidyl methacrylate) were introduced. The bond strength improved slightly (4-6 MPa), but adhesion to dentine was still weak and unpredictable due to the presence of the smear layer which prevented effective bonding to dentine.

3rd Generation (1980s) where a two-step process of etching and

priming was introduced. Mild acids and primers penetrated the smear layer. Bond strength improved (8-15 MPa) but was still inconsistent, especially with dentine. Issues with sensitivity due to inadequate sealing of dentine were reported.

4th Generation (Early 1990s) – Total-Etch Systems. This generation involved separate etching with phosphoric acid, rinsing, and then applying primer and bonding agents.

Here the smear layer was completely washed away and the concept of hybrid layer formation was introduced, where the bonding agent penetrated the demineralized dentine, creating a resin-dentine interface. In most cases this hybrid layer is thought to be 2-10µm thick.

This concept provided strong micromechanical bonding to both enamel and dentine, significantly improving the bond strength (18-25 MPa), leading to better longevity

and reliability of restorations. However this procedure is very technique-sensitive and over-etching could lead to post-operative sensitivity. It also requires multiple steps (3-bottle system) making the procedure time-consuming.

5th Generation (Mid-1990s) – This generation is a simplified Total-Etch System where the primer and bonding agent were combined into a single bottle, hence simplifying the application process. Still bond strengths were comparable to the 4th generation (18-25 MPa).

6th Generation (Late 1990s – Early 2000s) – Introduced self-etching primers that combined the etching and priming steps. It is typically a two-step systems where the self-etch primer was applied first, followed by the adhesive.

Continues on page 36

OVERVIEW AND HISTORY OF DENTAL BONDING AGENTS

Continues from page 35

It reduced sensitivity due to less aggressive etching of dentine but still achieved a good bond strength to dentine (15-20 MPa). However presented with weaker bond strength to enamel compared to total-etch systems.

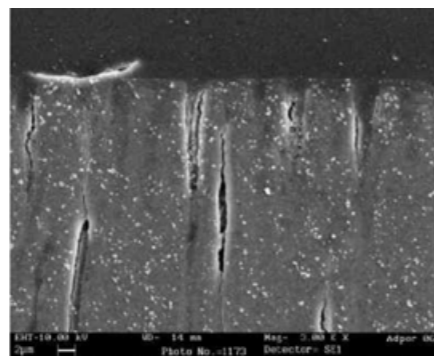
7th Generation (2000s) – Single-Step Self-Etch Systems. This system combined all steps (etching, priming, bonding) into a single bottle, creating a one-step application. This provided convenience and ease of use and also reduced post-operative sensitivity.

Since etching is completed at the same stage as priming and bonding, when applying the sixth and seventh generation, the exposed smear layers are constantly surrounded by primer and bonding and cannot collapse.

So in these generations the smear layer was maintained, dissolved and exploited as hybrid layer, formed between dentine and resin. Not resin, neither dentine but HYBRID from both substances.

However studies showed that the seventh generation bonding agent managed to obtain a deeper penetration into dentinal tubules than sixth generation bonding agent, hence an improvement in bond strength in dentine resulted. But still a lower bond strength to enamel remained, so this generation is not ideal for bonding to uncut enamel.

8th Generation (Universal Adhesives – 2010s to Present) Known as “universal” or “multi-mode” adhesives.



Sixth generation bonding penetration length (SEM picture)

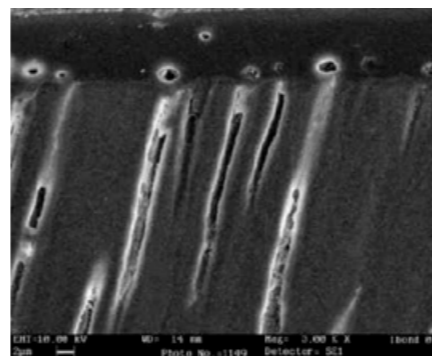
In 2010, VOCO America introduced VOCO Futurabond DC as 8th generation bonding agent.

These are compatible with different restorative materials, including composites, ceramics, and metals.

Previously, it was a challenge to make the strength in self etching agents similar to total etching agents, because there is no rinse after etching so it cause sensitivity to teeth and the lower acidity of etching decrease the bond strength.

But now in the 8th generation, the addition of nano-fillers with an average particle size of 12nm increases the penetration of resin monomers and the hybrid layer thickness, which in turn improves the mechanical properties of the bonding systems which produce better enamel and dentin bond strength, stress absorption, and longer shelf life.

In this generation a sheer bond strength of over 30MPa is achieved. Also these new agents from self-etch generations have an acidic hydrophilic monomers like MDP (10-Methacryloyloxydecyl dihydrogen phosphate) and can be easily used on the etched



Seventh generation bonding penetration length (SEM picture)

enamel after contamination with saliva or moisture.

It is an all in 1 step, so they limit the number of bottles to one like the 7th generation, however they should not be confused with single-bottle seventh-generation self-etch adhesives that are incompatible with self-cure and most dual-cure resins and cements. The latter are more susceptible to hydrolysis and bond degradation.

Over the decades, dental bonding agents have evolved from weak, unreliable systems to versatile, high-performance adhesives. Each generation has brought improvements in bond strength, ease of use, and clinical outcomes.

Although newer generations of dental bonding agents have made the process more user-friendly by reducing the number of steps and streamlining the procedure, the need for multiple applications persists in many cases to ensure optimal bond strengths.

This trade-off between ease of use and achieving the best results remains a consideration for clinicians aiming for long-term restorative success. ■

WHO GLOBAL ORAL HEALTH MEETING: UNIVERSAL HEALTH COVERAGE FOR ORAL HEALTH BY 2030

26–29 November 2024 – Bangkok, Thailand

On the road to 2025 UN High-level Meeting of the UN General Assembly on the Prevention and Control of NCDs

BACKGROUND

The World Health Organization (WHO) will convene the first WHO global oral health meeting to accelerate progress towards universal health coverage (UHC) for oral health by 2030.

The meeting will be hosted by the Government of the Kingdom of Thailand from Tuesday 26 to Friday 29 November 2024, in Bangkok, Thailand.

The overall goal of the WHO global oral health meeting is to reaffirm political commitment by Member States based on the resolution on oral health in 2021 (WHA74.5) and to accelerate and scale up national efforts to prevent and control noncommunicable diseases (NCDs), with a focus on oral diseases to achieve UHC for all by 2030. Furthermore, the WHO global oral health meeting contributes to the preparatory process leading to the 4th UN High-level Meeting of the UN General Assembly on the prevention and control of noncommunicable diseases (4th UNHLM on NCDs) in 2025.

The WHO global oral health meeting will comprise a 3-day technical meeting with WHO, national oral health leads, national UHC programme leads and invited experts.

This will then be followed by a half-day high-level segment inviting health ministers and senior leaders from non-State actors to discuss and reaffirm their commitments to support the implementation of the Global oral health action

plan 2023–2030 and national oral health roadmaps. A number of side events will take place in the margins of the meeting.

It is anticipated that the meeting will be attended by around 400 participants in person.

PURPOSE

In the preparatory processes leading up to the 4th UNHLM on NCDs to be held in 2025, the WHO global oral health meeting aims to:

- Strengthen the capacity of ministries of health to fulfill the commitments they made in the World Health Assembly’s 2021 resolution on oral health (WHA74.5); and
- Accelerate implementation of the Global oral health action plan 2023–2030 as part of broader NCD and UHC agendas.

OBJECTIVES

- Reaffirm Member States commitments to the implementation of Global oral health action plan 2023–2030.
- Discuss the 6 strategic objectives, 100 actions, 11 global targets and monitoring framework of the Global oral health action plan 2023–2030.
- Convene governments, UN agencies, multilateral and funding agencies, civil society organizations, people affected with NCDs, academia, philanthropies, and foundations to identify synergies in supporting the implementation of the Global oral health action plan 2023–2030.

EXPECTED OUTCOMES

- National oral health roadmaps aligned with the Global oral health action plan 2023–2030.
- Bangkok declaration on oral health endorsed by the Member States, reaffirming commitment to oral health and informing WHO Director-General’s report for the 4th UNHLM on NCDs in 2025.
- Global coalition on oral health formed, including a platform of commitments from Member States and partners to support the implementation of the Global oral health action plan 2023–2030.
- Meeting report developed with recommendations outlining the potential for countries to achieve UHC for oral health.

VENUE

Centara Grand and Bangkok Convention Centre Central World, Bangkok, Thailand

DATE AND TIME

The meeting will start at 09:00 (ICT) on 26 November and end at 13:30 (ICT) on 29 November.

LANGUAGE

The working language of the meeting is English, with interpretation of plenaries provided in all official UN languages.

The concept note and provisional agenda are accessible in the links under “Related” on the WHO web page. Additional information, including the meeting logistics, and working documents will be made available shortly. ■



THE ITI STUDY CLUB

The ITI Titanium-Zirconium Study clubs special joint event was held at The Bridge Lounge Bar at The Barcelo Fortina Tigne Sliema on 19 June 2024. This was well attended. Some participants brought cases and treatment planning was discussed. The cases were presented as history, photos, models and scans .

Activity on each table was led by a host who presented their case in turn. Different clinicians presented different treatment alternatives. Treatment planning and discussion were carried out according to the principles of ITI and the SAC classification.

THE ITI study club is a great club to join and well worth the subscription. Contact Dr Edward Sammut or Professor Arthur Cortes to join.

The ITI Study Club is celebrating its 10th Anniversary this year . Dr Edward Sammut was the very first ITI Study Club director in Malta. 🇲🇹



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