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The Maltese Dental Journal



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Editorial

By Dr David Muscat

Dear colleagues,

The Dental Profession has implemented the Covid guidelines and we have braved the summer. It is rather unfair that we have been excluded from the 50% reduction in electricity bills.

In this issue I have asked a few dentists to contribute articles as we have not been able to organise many events this year.

On the 18th September 2020 the DAM arranged a free online International Congress with MOI (Masters of Implantology, Goethe University) for its paid-up members who wished to attend.

The front cover is by the accomplished artist Jacqui Agius, entitled 'Aerial View of Mdina' from a photo taken by her son, professional photographer Michele Agius, brother of our colleague Dr Andrea Agius.

Best regards,

David

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

St Apollonia Celebration: The Early Years

By George E. Camilleri

Oral historical evidence attributes the origin of the celebration of the feast of St Apollonia (February 9th) to the outings organised by dentist Mr Anthony Ciappara (is-Sur Nin) for children from the orphanages.

The first documentary evidence of participation by dental surgeons is from the Times of Malta which stated that on Saturday February 7th 1948 a number of dental surgeons and dentists attended Mass in the Hamrun Parish Church followed by lunch at the Riviera Hotel, Ghajn Tuffieha. Two group photographs probably dating to 1947 (Fig 1) and 1948 (Fig 2) were possibly related to the St Apollonia event.

The activity as far as dentists were concerned seems to have died down until 1957 when members of the Association organised a lunch at the

Golden Bay Hotel (Figs 3 & 4). Dental students (Class 1957 and Class 1960), myself included, were invited.

The event seems to have lapsed again until 1966 when Mass was celebrated at St Francis Church Valletta.

I remember that the side altar of Sts Cosmos and Damian was used and a painting of St Apollonia put up. In January 1975 I, as Dean of Dental Surgery, received a letter from Mr Ciappara deploring that the custom had been discontinued (Fig 5).

I forwarded the letter to the Association who agreed to organise the event. Mass was held at University Chapel, Msida by Fr M. Jaccarini SJ followed by a reception hosted by Associated Products.

Continues on page 5.



Figure 1: John J. Mercieca, Thomas Demajo, John Camilleri (back), John Bartolo (front), Edwin Galea, Anthony Ciappara (back), Carmelo Floridia, Egidio Lapira, Victor Salomone (back), Vincent Diacono (front), Anthony Demajo, Walter Bartolo, Joseph Lapira, Joseph J Mangion, Louis Caruana, Guido Caruana.



Figure 2: Registered Dentists - Back row L to R: John Camilleri, John Agius, Joseph Lapira, Anthony Ciappara, Carmelo Floridia. Sitting L to R: Bartolo John, Demajo Pascal, Egidio Lapira, Caruana Louis, Bartolo Walter. Squatting: Diacono Vincent

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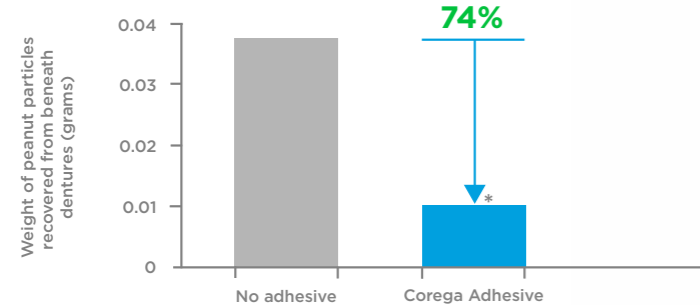
You can be confident in the knowledge that you've given your patients specially made and well-fitting dentures. However, your denture-wearing patients can have concerns around denture retention and trapped food, making it difficult for them to emotionally adjust to living with dentures. They may not tell you, but more than 1 in 3 denture wearers admit to skipping social activities because they are conscious of their dentures.¹

Up to **29%** skip eating out in public,¹ **86%** experience food trapping under their dentures and **55%** experience denture movement.²

These everyday challenges can hold your patients back from living life to the fullest.

Maintain your patients' confidence and satisfaction with their dentures by recommending Corega Ultra Fresh denture adhesive.

Corega adhesive reduces food entrapment vs. no adhesive use (p<0.0001) in well-fitting dentures⁴



Randomised, blinded, 3-way crossover study to evaluate denture adhesive use against no adhesive use. Subjects with well made and well-fitting maxillary and mandibular dentures completed the study. Food entrapment was quantitatively measured by collecting and weighing residue from beneath the dentures after subjects chewed and swallowed 32 grams of peanut test meal. *p<0.0001.

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Corega Ultra Fresh denture adhesive - Offering your patients reassurance for everyday life



Help your patients eat, speak and smile with confidence with Corega Ultra Fresh denture adhesive cream and Corega 3 Minutes denture cleansing tablets.

¹vs. no adhesive

References: 1. P&G News. Denture Wearers Embrace New Smile Yet Avoid Popular Foods. <http://news.pg.com/press-release/pg-corporate-announcements/denture-wearers-embrace-new-smile-yet-avoid-popular-foods>. Accessed September 2013; 2. GSK Data on File; Canadian Quality of Life Study, 2005; 3. Munoz CA *et al.* *J Prosthodont.* 2011;21(2):123-129; 4. Fernandez P *et al.* Poster presented at the IADR 2011, Poster 1052.

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St Apollonia Celebration: The Early Years

Continues from page 3.

Professor J. J. Mangion was keen that the feast be celebrated annually by the Association and at the 1976 Annual General Meeting he proposed an amendment to the regulations "that the following addition be made to the functions and duties of the Secretary:

"He will be responsible to organise the commemoration of the Foundation Day of the Association by means of a religious and social function about St. Apollonia's Day annually in the first half of February".

This seems to have had the desired effect and In 1977 and 1978 the Mass and reception were held at the University Chapel, Msida and in 1979 the Mass at the Onorati Chapel, Valletta followed by a reception at the Casino Maltese.

The following year (1980) Mass was held at the new offices of the Federation of Professional Bodies at Paceville, and a dinner at the Hotel Phoenicia, Floriana (Fig 6).



Figure 3: L to R: Jos Ciappara, Anthony Ciappara, John Mercieca, Thomas Demajo, Mrs Demajo, Mary Galea.



Fig. 4: Standing L to R: Charles Olivieri Munroe, George Camilleri, George Manara, Joseph J. Mangion, Tony camilleri, Ms Ciappara, John Bonello. Squatting: Ronald Delia, Herbert Messina Ferrante, Carmen Attard, Sydney Joslin



Fig.6: Dinner at Hotel Phoenicia. L to R: George Camilleri, (?), Ms Messina Ferrante, John Mercieca, Beatrice Mangion, Herbert Messina Ferrante, Joann Camilleri, Thomas Demajo.

A BEGINNERS GUIDE TO DENTAL PHOTOGRAPHY

By Dr Josef Awad



I am a general dentist with special interest in cosmetic dentistry and occlusal rehabilitation.

For over 15 years I have been very passionate about photography, some of my work has been used to promote hotels, events, brands, and magazines.

In this article I will give an overview of photographic equipment and discuss the fundamentals of exposure. Specific shooting techniques will not be covered in this article and may be discussed in a followup.

EQUIPMENT

Camera Body

Any camera that is capable of using interchangeable lenses (most commonly DSLR, or mirrorless systems), and has the ability to shoot in manual exposure.



Macro Lens

The 100mm macro lens is ideal for most kinds of dental photography, I would always recommend using the same lens brand as your camera system as this will provide the best autofocusing experience.



Macro Flash

A ring flash is the most versatile flash system for dental photography. Twinflash setups will produce more aesthetically pleasing results however are limited to anterior regions of the mouth.



CAMERA BODY

The camera body houses the image sensor and processing units. The sensor detects photons of light and converts them into an electrical current which can be stored on our cameras as data. Image sensors are divided into pixels, these represent each unit of the sensor that can detect light. When relating to image quality, the number of pixels (megapixels) is of little importance when compared to the quality of pixels.

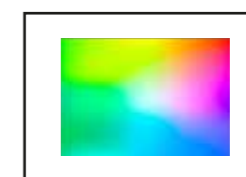
Pixel quality is more closely related to the size of each pixel on the sensor. Larger pixels will yield a wider range of colour and tonality.

Therefore a larger sensor will pick up far more information than a smaller sensor, even if the number of megapixels are the same.

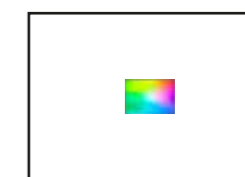
Smartphones are restricted to use small sensors due to space requirements. Manufacturers attempt to overcome these limitations using advanced software techniques. Although smartphone images can sometimes look impressive they are not very accurate at



Full Frame Sensor
(higher end dslr/mirrorless)



APS-C Sensor
(entry level dslr/mirrorless)



Smartphone Sensor

differentiating subtle differences in colour and therefore they are not ideal for dental photography.

The camera systems of choice today are Canon and Nikon. They support the largest variety

of lenses and equipment on the market. Other brands however are quickly catching up.

Both entry level and high end DSLR (or mirrorless) Camera systems are very effective for dental photography.

MACRO LENS

When it comes to camera lenses the selection can be vast and very daunting. Different lenses will provide a unique image outcome. Fortunately for dental photography our needs are very specific and selecting the right lens is very straight forward.

The ideal properties of a lens to be used in dental photography are:

1. To create a true to life image with as little distortion as possible Lenses are classified by their focal length, which is a measure of how strongly a lens converges or diverges light. Focal length is measured in mm, this is normally marked on the exterior of each lens. The smaller the number the more wide angle the lens is considered while the larger the number the more telephoto (zoomed in). Wide angle lenses tend to make close objects appear further away and because of this they introduce distortion into the image. For this reason wide angle lenses

should never be used for dental photography as they will create a distorted image that is not true to life. Typically lenses above 50mm show minimal distortion and can be used. The most commonly used focal length for macro photography is 100mm.

2. To be able to focus as close as possible to a subject (macro) An important built in property of a lens is its minimum focus distance. For a lens to be considered macro it should normally have a minimum focus distance of 30cm or less. The smaller the distance the closer the lens can approach the subject and the more magnified the image. This can be especially useful for taking small detail shots of single teeth, margins, texture and so on.

3. To have good optical quality Lenses have multiple glass elements inside them that are used to focus light into a sharp image. The lenses that tend to have the best optical properties are known as prime lenses. These are lenses that only have one focal length (eg: 100mm), in contrast to a zoom lens which will have a range of focal length (eg: 18-125mm).

Continues on page 8.



A BEGINNERS GUIDE TO DENTAL PHOTOGRAPHY

Continues from page 7.

MACRO FLASH

The quality of an image is directly related to the quality of light in the scene. The number of lighting options for dental photography can be vast, however for the sake of this article we will discuss 2 of the most commonly used systems.



1. Ring Flash

The ring flash is the most versatile flash in dental photography. It has the quickest setup time and is useful for both anterior and posterior shots. A ring flash tends to be more powerful than twin flashes which can be useful in situations where very high apertures are being used (f32). The ring flash can evenly light up the scene however can make an image appear flat.



2. Twin Flash

A twin flash is the setup of choice for anterior aesthetic work. Twin flashes create a softer beam of light especially when coupled with a diffuser. This creates a realistic 3D appearance and brings out more detail. A twin flash can be more difficult to setup, and may require other accessories like a flash trigger, bracket and diffusers.

EXPOSURE

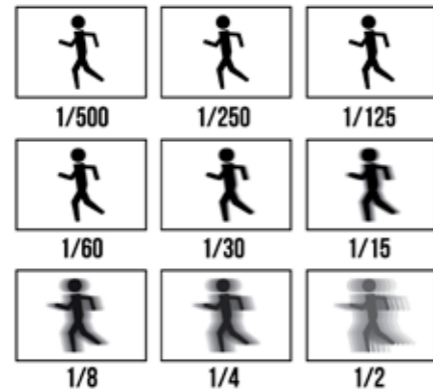
Exposure determines how bright or dark an image will appear. The different components of exposure are explained below:

1. Shutter Speed
2. Aperture
3. ISO
4. White Balance
5. Flash exposure compensation

Shutter speed

A camera sensor is normally hidden behind a frame known as a shutter. In order for light to enter the sensor the shutter must open and close to create a capture. The longer the period of time the shutter is open, the greater the amount of light that will reach the sensor.

Although slower shutter speeds will allow more light, they may also increase motion blur. Shutter speed is measured in seconds and is normally denoted as a fraction, the smaller the fraction the shorter the duration of the exposure.



While shooting dental photography our light source will normally come from a flash. Most flash systems will shoot a burst of light with a duration that is between 1/300 and 1/1000 of a second. Since all the light that we are capturing will be coming from the flash any shutter speed that is slower than this duration range will be sufficient to capture a sharp image.

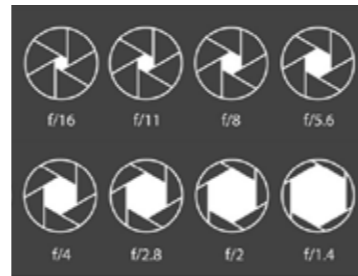
My recommendation is a shutter speed between 1/100 and 1/200 of a second.



APERTURE

All camera lenses have an internal ring with an adjustable diaphragm. The size of the diaphragm is referred to as the aperture which is denoted with the symbol *f*.

A smaller *f* number indicates a greater opening of the diaphragm while a larger *f* number will indicate a smaller opening.

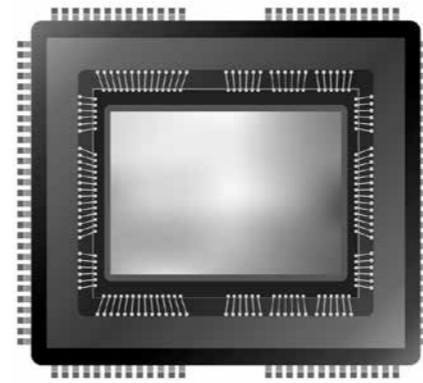


A wider opening will allow more light to pass through the lens however it will also reduce the amount of area in focus known as the depth of field. This is a disadvantage in dental photography as using lower *f* numbers will reduce the amount of teeth that appear sharp and in focus.

On the other hand using very large *f* numbers such as f32 will heavily reduce the amount of light entering the lens. This leads to a greater amount of teeth being in focus however with a deteriorated image quality, often leading to a very soft image.

One of the advantages of shooting with a flash is that any limitation of light can be compensated by a higher flash power – most camera systems will do this automatically.

In order to maintain the best balance between image quality and depth of field I would recommend an aperture between *f*16 for full face and *f*22+ for intra oral shots.

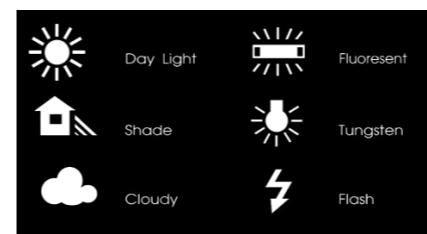


ISO

Iso is a property related to the image sensor within the camera. A sensor will normally operate as a setting known as a native ISO, this refers to a clean signal that is sent from the camera sensor to the camera processor.

Modern cameras allow us to amplify the signal from the sensor which increases its sensitivity to light. As the ISO is increased the sensor will pick up more light and the exposure will increase, this however results in a degradation of picture quality.

In order to maintain the highest possible image quality the ISO should be kept at the native ISO, for most camera systems this is ISO 100.



WHITE BALANCE

This is an instruction that allows the camera to distinguish how warm or cool a certain image is. If the colour of your photo appears too blue/yellow/green/purple, this is most likely an issue of white balance.

Since we are using direct flash photography the white balance should always be set to flash.

FLASH EXPOSURE COMPENSATION

In the past a photographer would have to measure the amount of light in a scene and set the brightness of the flash manually. Today this can be done automatically through a setting known as TTL (through the lens).

The camera will make an assumption of how much flash power is required by assessing the brightness in the scene.

This is accurate most of the time however if the camera becomes confused it may take incorrect measurements, this will lead to an image being too dark or too bright.



The Flash Exposure compensation should be set to 0.

If a camera is consistently giving dark exposures it may be thinking that there is more light in the scene than there actually is. In this case we can move the exposure compensation up (right) 1 or 2 stops and try again. If an image is too brightly exposed, the compensation can be moved down (left) to darken the exposure.

RECOMMENDED SETTINGS

	Full face image	Full smile	Close-up detail
Shutter speed	1/160s–1/200s	1/160s–1/200s	1/160s–1/200s
Aperture	f10–16	f22	f22+
ISO	100	100	100
White balance	Flash	Flash	Flash
Flash	TTL mode	TTL mode	TTL mode

TROUBLE-SHOOTING

Image too Dark

- Increase flash exposure compensation
- Reduce the *f* number
- Move closer to the subject

Image too Bright

- Decrease flash exposure compensation
- Increase the *f* number
- Move further away from the subject

Image is Blurry

- Use a flash
- Set the shutter speed between 1/150 – 1/200 seconds

Colour does not look natural

- Set white balance to flash

All information provided here is from my own personal experience. If any there is anything you wish to discuss please contact me on awad.josef@gmail.com

MANAGING LOSS OF INTER-OCCLUSAL SPACE WHEN RESTORING THE ANTERIOR WORN DENTITION

By Dr Nicola McArdle BChD MFDS RCS MSc Aesthetic and Restorative dentistry (Manch)

Patients with worn dentitions walk through our practices on a daily basis, however they often walk out untreated or only treated when their dentition becomes severely compromised.

In the majority of these patients tooth surface loss (TSL) is followed by dentoalveolar compensation ensuring that occlusal contacts are maintained in order to sustain the efficacy of their articulatory system.

The resulting apparent lack of inter-occlusal space can pose a challenge to the restorative dentist, especially when the TSL hasn't occurred across the whole dentition.

When such cases are not intercepted at an early stage, full mouth rehabilitations are often required in order to protect the remaining tooth structure with the aim of restoring function and sometimes facial appearance.

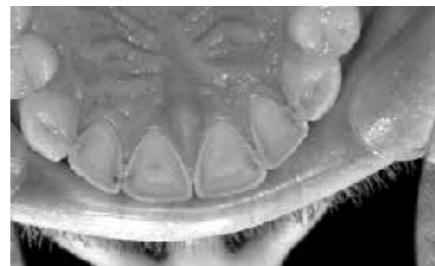
When planning these rehabilitations, insufficient restorative space is the most common challenge we face on a regular basis. Opening the vertical dimension of occlusion (OVD) is usually indicated and sometimes mandatory.

The primary indications for changing the OVD are:

- harmonizing dentofacial aesthetics
- providing adequate space for the restorative material
- improving incisal and occlusal relationships (Calamita et al., 2019)



Intervening early can avoid advanced wear and the need for full mouth rehabilitations



Most patients exhibiting significant TSL are keen to improve their smile and often ask for longer front teeth.

As teeth wear, some people lose their overbite and gradually develop an edge to edge occlusal relationship (from a class I to a class III occlusion).

According to Gross et al, to gain a noticeable improvement in facial appearance, the OVD must be increased by at least 5mm.

With up to a 5mm increase in OVD, the patient him/ herself would gain an inner confidence boost but a lay observer would not perceive the change (Gross et al., 2002).

If patients decline an ortho-restorative approach, a restorative option that would develop some overjet (OJ) and overbite (OB) can be proposed to give the patient a better functioning occlusion while improving their smile.

In order to do so, adequate restorative space is critical, and the specific amount depends upon the type of

restorative material proposed as well as aesthetics and phonetics (Mohindra and Bulman, 2002). Irrespective of the material of choice, restorations require between 1–2mm of space. The only way we can gain that space is by grinding down teeth or increasing the OVD.

If space is limited and not sufficient to accommodate the adequate bulk for the restorative material of choice, one must consider re-establishing the patient's vertical dimension or altering the opposing occlusion.

INCREASING OVD, REQUIRES A REORGANISED OCCLUSION WHERE RCP = ICP AROUND RAP

Using mounted study casts, one can judge if the OVD can be maintained or if it needs increasing, in which case one must decide which of the following concepts should be considered in the treatment planning.

1. Orthodontics
2. Maintaining existing VDO and conforming to ICP



Bite registration in ICP (or MIP) and CR



Facebow registration

3. Reorganise the occlusion by increasing the OVD with restorations in centric relation (CR)
4. Minimal prep vertical (arbitrary)
5. Facial Proportion
6. Dahl concept

Study casts accurately mounted in centric relation (CR), are critical in assessing these spatial constraints and treatment planning these rehabilitations. It is imperative that before attempting to restore such cases, one would have mastered the skill of taking an accurate CR.

Centric relation (CR) or retruded axis position (RAP) being defined as the position of the condyles in their most superior position in the fossa where the bone is braced, the position is reproducible and the muscles most relaxed. Mounted models must be verified against clinical records (Davies and Grey, 2001).

ORTHODONTICS

Orthodontic appliances are more appropriate when other aspects of the occlusion need addressing such as anterior crowding. Sufficient inter-occlusal space can be created by a combination of relative vertical and horizontal bodily movements and a change in the axial inclination of the dentition.

Otherwise a localised bite-raising Dahl appliance can create the necessary space required. Patients may decline an orthodontic option however it is always worth consulting our orthodontic colleagues when considering all treatment options (Evans 1997).

MAINTAINING EXISTING VDO AND CONFORMING TO ICP

One approach is to conform to the existing intercuspal position

(ICP) and create the necessary space by further occlusal reduction of the already worn teeth or their opposing dentition.

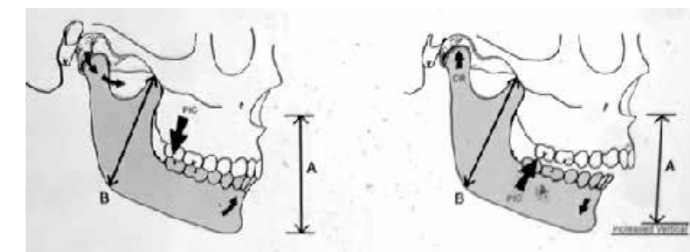
Most materials require 1–2mm of space so grinding these teeth down can be very destructive and counterintuitive especially when the surfaces have already been compromised by the pathological wear itself.

Occlusal reduction of these surfaces may lead to a lack of axial height and thus insufficient retention and resistance for conventional extra-coronal restorations.

Surgical crown lengthening can be considered to achieve more axial height, however this procedure together with the loss of coronal tissue can present its own complications.

Sometimes when restoring worn upper anterior teeth, it can be justified however to reduce the opposing lower anterior dentition. This is especially the case in elderly patients who could benefit from a more even, flat occlusal plane.

This would create a more harmonious anterior guidance which is less steep and kinder to their articulatory systems. Trimming the lower incisors may also be the best alternative in patients over the age of 65 given that the Dahl effect may take a very



Seating the condyle in CR maintains B but creates space for anterior restorations where B = contracted length of the elevator muscles

long time or not come into effect at all (Hemmings et al., 2000).

ELIMINATE RCP-ICP HORIZONTAL SLIDE

Another method that can be used to create space for our restorations involves reconstruction of the occlusion to the retruded contact position (R P). RCP is also a place our patients visit from time to time.

The vertical seating of the condyle into centric relation can be used to increase the vertical dimension for anterior teeth without increasing the contracted length of the elevator muscles. When condyles are seated in CR, the mandible moves downward while the condyle moves upwards. This causes an increase in vertical dimension in the anterior dentition without a change in muscle length.

In some patients, when casts are mounted in CR, the horizontal slide from ICP to RCP could be around 2–4mm. This position of the mandible gives a definite physical stop to work to accurately and if there is a reasonable vertical slide, there is often sufficient space to restore the worn dentition without the need of much tooth preparation.

Therefore, if a slide from ICP to RCP is present, the clinician needs to decide whether to restore the case in a conformative approach around ICP, or in a reorganized manner by making an occlusal adjustment that brings RCP and ICP the same around RAP (Davies, 2004).

The occlusion is adjusted until the vertical component is eliminated leaving just the horizontal component so that the patient is permanently in RAP. This also eliminates the RCP to ICP slide making RCP and ICP the same and allowing the condyles to move upwards and backwards in RAP. $ICP = RCP$ or $RCP-ICP=0$.

Continues on page 12.

MANAGING LOSS OF INTER-OCCLUSAL SPACE WHEN RESTORING THE ANTERIOR WORN DENTITION

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We have 3 options when altering the vertical dimension (VD):

1. Build the VD at the point of initial contact (POIC).
2. Build the new VD less than the POIC with the joint in centric relation. This can provide the extra space required without increasing the contracted length of the elevator muscles.
3. Build the new VD more than the POIC with the joint in CR. This would provide you with the extra space required but would also increase the contracted length of the elevator muscles.



An increase in OVD is not required in all these scenarios



Premature contact in CR on tooth 47



Equilibration on models by means of a lecron carver



Anterior space gained



Models articulated in CR



RCP



ICP

MINIMAL PREP VERTICAL (ARBITRARY)

An alternative approach is to reorganise the occlusion with the aim of selecting the OVD that requires the least amount of tooth preparation to satisfy both aesthetics and function.

The amount of opening can be observed by measuring the amount of missing tooth structure present and by approximating how much occlusal thickness the new restorations will require (Bishop et al 1996).

This involves arduous treatment planning with the dental technician to estimate that arbitrary position on the articulator that ensures the minimum tooth tissue loss by minimising the amount of tooth preparation required when making the crown/onlay preps.

However, this still results in restorations being placed on multiple unaffected teeth and to date I have only justified this treatment of choice in patients with multiple posterior restorations that were heavily restored and required changing in the first place. Restorations can be made in composite resin, metal or ceramic (Nohl et al., 1997) as long as the

central fossae are raised by 1-1.5mm on the occlusal surfaces providing shallower cusp angles. Raising the occlusal central fossae raises the bite for posteriors which in turn creates space for the anterior restorations.

Due to the geometry of the jaw, every 1mm increase between the molars results in a 3mm vertical opening anteriorly.

For instance if a full mouth rehabilitation is done using zirconia, 1.5mm of clearance would be needed for the upper and lower restorations respectively i.e. 3mm in total.

With no tooth preparation whatsoever on the molars, this relays to a threefold increase in the vertical anteriorly resulting in almost 1cm (9mm) of space between the upper and lower incisors!

In order to close this space and achieve contact anteriorly, you would need to provide very bulky and long crowns which not only compromise

aesthetics but may also affect speech. Hence why 'minimal preparation' and not 'no preparation' is often preferred (Edelhoff & Sorensen, 2002).

An innovative approach many clinicians are adopting is the 3-STEP technique developed in 2005 by the University of Geneva.

This technique achieves the most predictable aesthetic and functional outcomes while ensuring maximum preservation of tooth structure. It is a structured approach to full-mouth additive rehabilitation with the goal of temporarily restoring the worn compromised dentition at a new OVD, implementing directly bonded posterior composite restorations.

A full-arch maxillary or mandibular splint is made at the tentative correct opening. With a stable posterior support, the anterior teeth can then be subsequently restored easily using exclusively adhesive techniques.

Continues on page 14.

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MANAGING LOSS OF INTER-OCCLUSAL SPACE WHEN RESTORING THE ANTERIOR WORN DENTITION

Continues from page 12.

Once the anterior contacts are re-established, the replacement of the posterior provisional resin composites can commence.

Due to the presence of the provisional posterior composites, the full-mouth rehabilitation can be planned in a quadrant-wise approach requiring fewer appointments and since the contralateral part of the mouth guarantees a stable occlusion, patients feel comfortable throughout the treatment (Vailati and Belser, 2008).

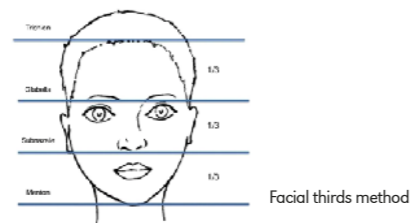
FACIAL PROPORTION

Among the most commonly accepted techniques to determine the OVD, is that of facial proportions. Some clinicians regularly refer to the principle that the face is divided into three parts in the horizontal plane and ideally these three parts should be equal.

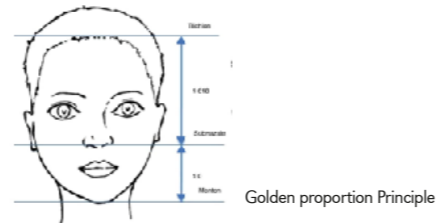
Throughout history a mathematical proportion known as the golden proportion, or phi which equates to 1.618, has been used to measure and analyse facial aesthetic qualities in the population.

With recognition of this golden proportion principle, these relationships can be used to help determine the lower facial height and OVD. In 1928, Turner and Fox (Turner and Fox, 1928) recommended that the OVD should be determined according to the external appearance of the face, with reference to the harmony between the lower third and the other thirds of the face.

In 1930, Willis developed the Willis caliper to help determine if the distance from the outer corner of the eye to the labial commissure was equal to the distance from the base of the nose to the chin (Willis, 1930).



Facial thirds method



Golden proportion Principle

THE DAHL CONCEPT

Before the late 1990s, still perhaps oblivious to the detrimental effects of such treatment on the pulp, TSL was nearly always treated by excessive crown preparation using a turbine drill. In 1962, Declan John Anderson indicated that 'occlusal changes could be achieved without causing patient problems' (Anderson, 1962).

Sadly this publication remained hidden in the archives for some time until Bjorn Dahl proposed the concept of creating space for the treatment of localised anterior tooth wear by separating the posterior teeth with an anterior bite plane for 4-6 months (Dahl et al, 1975).

'Passive eruption (60%) of the posterior teeth and intrusion (40%) of the anterior teeth, would allow the re-establishment of the proper occlusion while maintaining the anterior space', (Dahl and Krogstad). Anderson's work viewed alongside with that of Bjorn Dahl, made a fundamental change in the way that we now treat tooth wear (Poyser et al., 2005).

The creation of inter-occlusal space significantly reduces the amount of tooth preparation required on already compromised teeth. With the appearance and the predictability of bonding modern composites, nowadays we can also opt for provisional or direct composite which can act as a fixed Dahl appliance (Wirsching, 2015). When managing worn mandibular incisors one may consider the placement

of direct composite restorations either as fixed Dahl appliances or as the definitive restorations.

Any preparation for full coverage extra-coronal restorations could result in deleterious affect on the pulp.

However, it is imperative to splint them together and to ensure that they are hitting the palatal surface of the maxillary opposing teeth at 90 degrees to prevent drifting. Once the Dahl effect has taken place they can be separated and polished to ensure adequate hygiene and contacts.

When applying the Dahl Concept:

- Models should be mounted in RAP
- A thickness of material should be placed on the incisal/occlusal aspect of those teeth where the creation of inter-occlusal space is necessary. There should be no mucosal-borne component.
- The thickness of this material placed should directly relate to the amount of interocclusal space that is required. This will determine the increase in the OVD as measured at that particular site in the mouth.
- The occlusal bite platform should be constructed to ensure that occlusal forces are directed along the long axis of the teeth. When restoring the worn upper anterior dentition, ensure that the occlusal plane of the palatal aspect of the Dahl appliance hits the opposing lower incisors at 90 degrees forcing them down their long axis otherwise it may lingualise these teeth. The lower incisors should be temporarily

- splinted together to prevent drifting until the space required is attained.
- Stable inter-occlusal contacts should be provided.
- The appliance should not impede the movement of the discluded teeth.

There are three types of Dahl appliances:

1. Traditional Dahl appliance
2. Prototypes
3. Adhesive bridgework

THE CLASSIC DAHL APPLIANCE

Bjorn's first Dahl appliance was made of Nickel Chromium and was in the form of a removable partial chrome denture with a palatal bite platform.

Nowadays we tend to prefer the fixed version to ensure compliance. The fixed anterior bite plane can be cemented with glass ionomer cement and should have a purchase point for ease of cementation.

It acts as an occlusal splint and some patients report that they feel more comfortable in their joints and muscles however chewing can be hard and all patients should be warned of this prior to its cementation.

A bite plane which is 3mm thick at front would result in the molars to be out of contact by circa 1mm hence the upper molars would erupt by 0.5mm and the lowers by 0.5mm. The Dahl should stay in place until all canines and posterior teeth are holding shim stock.

The occlusion tends to re-establish after about six months on average but it can take up to a period of 18-24 months (Table 1).

The compliance with which a removable appliance is worn will greatly influence the speed at which the space is created (Cousins et al., 1969), (Dahl and Krogstad 1982), (Hemmings et al., 2000) and (Redman et al., 2003)



A removable cobalt-chromium partial bite-raising appliance

AGE in years Average	TIME in months
20-30	1.5
30-40	3
40-50	4-6
50-60	6-9

Table 1 Average time taken to get full contact (for space creation to occur) according to patient's age

PROTOTYPES

This procedure in which the provisional restorations act as a Dahl appliance is common practice. When restoring the anterior worn dentition, study casts are mounted around RAP and a diagnostic wax up is set at an increased vertical for the anterior worn dentition leaving the molars out occlusion.

It is recommended to equilibrate the provisional restorations to verify that they are in CR. Leaving the anterior prototypes deliberately high will allow the molars to overerupt in time.

Once they do come in contact, the prototypes can then be replaced with definitive restorations. Minimal preparation with just a finish line on the palatal aspects of the upper worn anteriors is generally required.

Personally I prefer lab made prototypes ensuring that the lower incisors are hitting the uppers at a 90 degrees ramp. While waiting for the Dahl effect to take place, one should monitor phonetics and lip position. Lips tend to relax and speech can improve dramatically during this prototype phase.

ADHESIVE BRIDGEWORK

If pre-operative assessment reveals limited space available for the metal framework, resin-bonded bridges (RBB) can be bonded high in occlusion at an increased vertical dimension and left to 'bed in' until they achieve the 'Dahl effect' (Dahl and Krogstad, 1982). The patient should be pre-warned of occlusal changes and the possibility of the temporary difficulty in speech and chewing.

Treatment should ideally be held in two stages. The first phase is to provide a fixedfixed prototype RBB high in occlusion bringing the rest of

the dentition out of contact. This will result in relative axial movement as a result of alveolar compensation.

Once the occlusal contacts reestablish, and space is created, the prototype can be replaced by a definitive RBB of the cantilever type.

It is important that the temporary bridge is not a cantilever as this could result in rotation or drifting of the abutment tooth and prevent intrusion of the opposing tooth (Briggs et al., 1993).

It is also imperative to avoid high static and dynamic contacts that are on the pontic only.

The contact should instead be on the retainer wing or shared between the natural teeth and pontic, as should the guidance in excursions. Minimal adjustment of the pontic and opposing teeth would achieve this.

Continues on page 16.



Definitive RBB made on a model from an impression taken after the Dahl effect has taken place



Definitive RBB after bonding

MANAGING LOSS OF INTER-OCCLUSAL SPACE WHEN RESTORING THE ANTERIOR WORN DENTITION

Continues from page 15.

When not to use Dahl:

- Advanced /unstable perio
- Worn posteriors
- Heavily misaligned arches
- Stepped occlusion
- Large ortho discrepancy
- Anterior open bite
- Joint disease

CONCLUSION

The prevalence of TSL is on the rise and the eventual failure of restorations placed to manage this problem is likely to be a significant issue in years to come. Planning a rehabilitation for these patients can be daunting for us clinicians, however if left untreated there can be cause for negligence such as in cases of undiagnosed caries or periodontal disease and may equally start subjecting us to litigation.

As with all complex cases, more often than not, there is more than one solution. One must always evaluate the OVD when diagnosing wear cases and intervene before it is too late.

The OVD should not be considered a static reference, but rather a 'dynamic concept providing the dentist with an opportunity to improve facial beauty' (Calamita et al., 2019).

Finally, I wanted to share a list of internationally known educators who have highly influenced my restorative skills over the years:

- Professor Paul Tipton (UK)
- Stephen Davies (Manchester UK)
- Stephen Phelan (USA)
- John Kois (Seattle USA)
- Linda Greenwall (UK)
- Professor Trevor Burke (UK)

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ESSENTIALS OF PERIODONTAL PLASTIC SURGERY

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Private practice in Valletta

RIGHT CELLS, RIGHT PLACE, RIGHT TIME

In the article preceding this one, I discussed setting of goals with the patient to correctly manage expectations when treating recession.

If we decide to go ahead with some form of mucogingival surgery, (otherwise known as periodontal plastic surgery) we need to be even more careful about what we promise to the patient. Will we aim to: cover the root surface, reduce hypersensitivity, smoothen the gingival contours, increase tissue thickness, increase sulcular depth, remove fraenal attachments, provide keratinised tissue?

And if yes, how likely are we to reach each of these individual goals. Periodontal plastic surgery requires the operator to draw on a "library" of procedures documented in the literature and apply the right techniques to the given biological situation.

While some situations are clear-cut and call for a well-described procedure to be used, sometimes it is necessary to think out of the box, use knowledge of the biology, and create a customised operation. In a broad sense, you need to put the right cells in the right place at the right time – how you achieve that is up to you.

When planning any form of periodontal plastic surgery which will aim to cover root surface, one of the first questions I ask myself is: Where will it get a blood supply?

There is no way to get around the fact that the root surface is avascular and does not offer any nutrition for tissue placed on top of it. The larger the surface area which we are trying to cover, the bigger is the challenge of getting tissue to grow and indeed flourish on the root surface.

THE FREE GINGIVAL GRAFT

One of the most simple and effective periodontal procedures is the free gingival graft (or free mucosal graft) (1). While it was originally intended for use around natural teeth, it offers an effective way to provide a width of keratinised tissue around implants or on an edentulous ridge for future implants to emerge through.

A split thickness dissection is carried out at the recipient site, typically from the mucogingival junction moving apically; to produce a periosteal bed. Fraenal attachments are automatically removed in this process and there is a local increase in the sulcus depth.

An appropriately sized piece of palatal mucosa is harvested by sharp dissection and sutured onto the recipient bed. The main aims are to increase the keratinised tissue height and thickness on the recipient area. Some root coverage can sometimes be observed even if there was no deliberate aim to do so; this phenomenon is known as coronal creep.

The donor site will heal by secondary intention and is typically sore and uncomfortable for about one

week. The procedure is highly predictable with very few failures observed. Free gingival grafts work very well because the full area of the grafted tissue is placed on a periosteal bed and therefore has a good chance of survival.

The grafted tissue is normally paler than the surrounding tissue and for this reason, the procedure should not be the first choice in aesthetically important areas. The procedure has been recently re-described with some refinements to produce a more aesthetic overall result (2).

PEDICLE FLAPS

There are several pedicle flap designs, with the main ones being the lateral pedicle, the split papilla and the coronally advanced flap. The overall principle is that pedicle flaps work by mobilizing a piece of tissue near to the receiving site so that it can be sutured over the receiving site while maintaining a good part of its original blood supply.

The pedicle is normally mobilized through split thickness dissection, and the donor area is left covered with the remaining thickness, which can then re-epithelialize during healing. The recipient site must be prepared – often the area needs to be de-epithelialised where there is existing tissue coverage, and where root surface is to be covered, this must be carefully debrided to remove plaque and any resin remnants.

Continues on page 20.

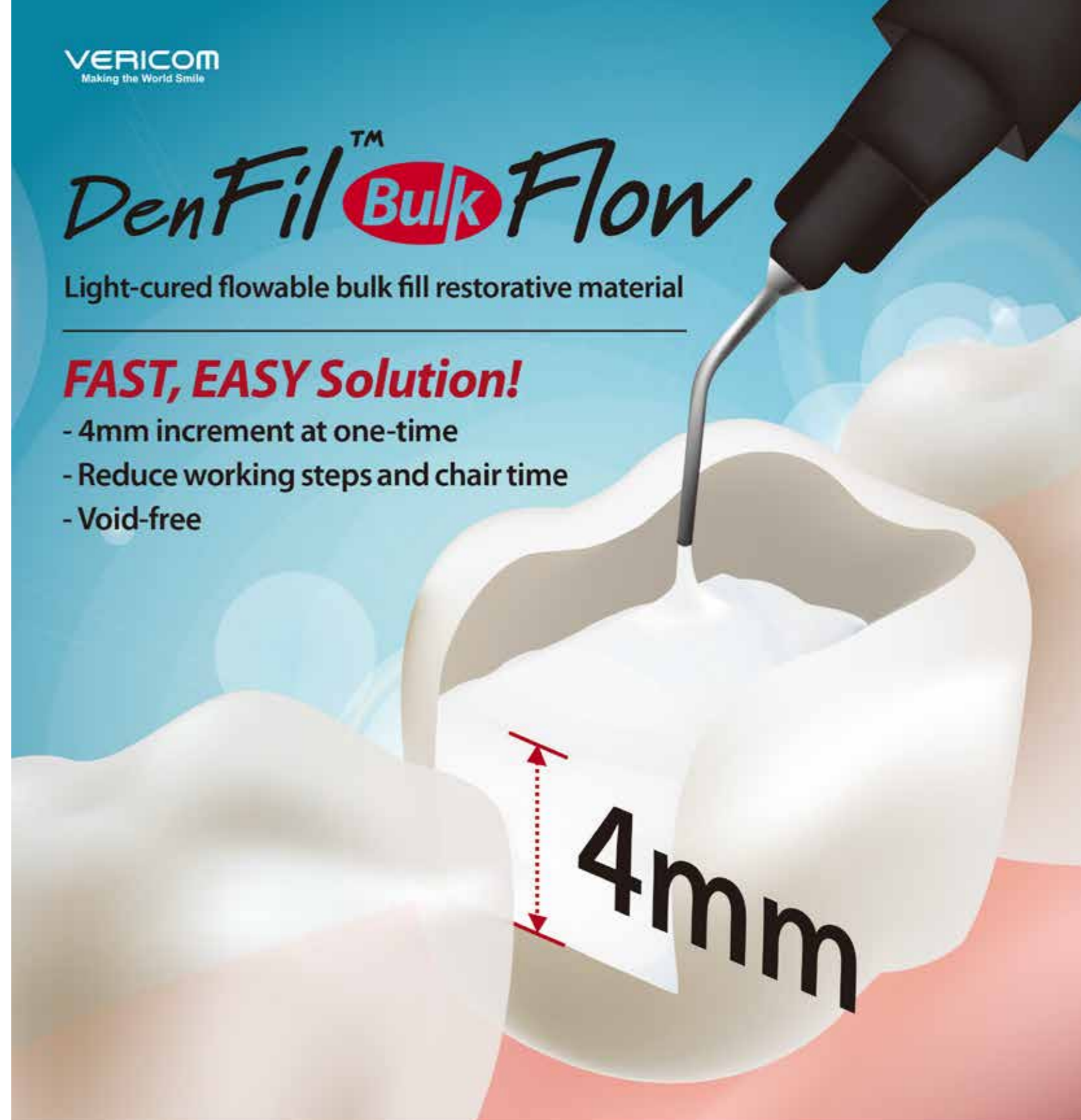
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Continues from page 18.

All pedicle flap procedures can be modified by the use of an interpositional free connective tissue (CT) graft (3). Dense submucosal connective tissue from the palate is harvested and placed between the pedicle flap and the recipient bed, which may include root surface (4).

The main objective of interpositional connective tissue (CT) grafting is to increase the thickness of the tissue, thereby altering the biotype. Thicker tissue is associated with improved root coverage success (5). In addition to this, because the epithelial type is governed by the underlying connective tissue, palatal connective tissue placed underneath mucosa will encourage the overlying mucosa to become keratinised.

In the lateral pedicle flap (6), thick tissue overlying a tooth is moved to an adjacent tooth. A typical application of this procedure is to move thick keratinized tissue overlying an upper first premolar to cover the canine root where this is prominent and has suffered some recession. By extending the flap distally, the operator can control where the exposed split thickness area will be left after the operation, ideally choosing the tooth where the buccal tissue is at its thickest and therefore most able to heal predictably without further recession.

The split papilla flap (7) is basically two lateral pedicles, one taken from each side of a recession defect, which are sutured together ("zipped up"). Apical to the recession defect, tissue is removed by means of a V-shaped incision, which can be used to remove fraenal attachments. Usually this design results in the

suture line directly overlying the root surface to be covered and many operators will use an interpositional CT graft beneath it.

The coronally advanced flap is a versatile operation. It was originally designed for single defects where there was availability of keratinised tissue apical to the defect which could be moved to cover the root surface (8).

First, a new gingival margin is surgically defined and a flap raised from this point apically. The papillae are then de-epithelialised and the flap mobilized coronally through the use of a periosteal release. The flap is then sutured into place. If no keratinized tissue was available apical to the defect, the procedure could be used too, provided that an interpositional CT graft was applied (9).

Zucchelli and De Sanctis described a modification of the coronally advanced flap in 2000 (10), enabling it to be used to cover multiple adjacent recession defects.

In this operation, surgically defined papillae are raised split thickness, followed by full thickness dissection to the mucogingival junction and split thickness periosteal release – giving rise to the aide-memoire "split-full-split".

No relieving incisions are used to minimize interference with lateral blood supply. Interestingly the authors found that in situations where there was no keratinized tissue and interpositional CT grafts were not used, the area seemed to keratinize by itself. Notwithstanding this finding they still recommend the use of interpositional CT grafts to increase tissue thickness and maximize root coverage outcome where the tissue is thin or where there is no keratinized tissue (11, 12).

TUNNEL CT GRAFT PROCEDURES

If you want to cause as little damage as possible to the blood supply of the flap, then you should avoid performing any incision at all! With this in mind, the tunnel procedure aims to further diminish blood supply interruption by leaving out the principal coronal incision normally used to define a flap.

Instead, microsurgical blades and instruments are used via a careful incision in the gingival crevices and possibly also through a single vertical incision well away from the gingival margin (13).

This is usually used for multiple defects, typically the lower anterior teeth. The buccal tissue can thus be lifted away from the periosteal bed without cutting through the papillae at any point.

The procedure is quite delicate and should really be attempted only after one has some experience performing other types of periodontal plastic surgery.

An interpositional CT graft can be threaded beneath this tunnel to increase the tissue thickness and cover the root surface. The CT graft may end up being exposed buccally as the papillary tissue is long and narrow, as defined by the original morphology around the recession. This does not appear to be a problem as it will readily epithelialize.

SOFT TISSUE PROCEDURES AROUND IMPLANTS

The importance of keratinized tissue around the transmucosal part of dental implants is the subject of some debate. Those who suggest it is important cite poor seal of non-keratinised tissue, microbial ingress and subsequent inflammation and bone loss.

Alternatively the lack of sulcular depth could contribute to poor plaque control and development of peri-implant disease (14). A common-sense viewpoint would uphold the utility of immobile keratinized tissue around the implant but at the same time some studies show no differences in bone loss around implants emerging through keratinized or non-keratinised tissue provided that the patient is able to keep the surface clean (15).

With this in mind, it can be tricky to decide on whether or not to intervene in specific cases. Some operators will place free gingival grafts on edentulous ridges to augment the keratinized tissue even before the implants are placed.

In sites where aesthetics are at a premium, tissue augmentation with connective tissue grafts at the same time as implant placement has been frequently suggested, but the reason for doing this is more to do with bulking out the tissue than with having keratinized tissue around the implant (16).

In a situation where an implant is emerging through healthy mucosa, it could be argued that a free gingival graft should be done as a preventative measure to reduce the risk of peri-implant disease developing. Finally, some will advocate free gingival grafts or connective tissue grafts as one of the steps in the management of peri-implant disease (17).

Clearly much of this has a weak evidence base and until such time as better evidence being available, we must treat each case on its own merits and carefully discuss with the patient, the evidence on which we suggest treatment.

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Continues on page 22.

ESSENTIALS OF PERIODONTAL PLASTIC SURGERY

Continues from page 21.

CASE 1



A 45-year-old female professional presented with recession which was causing aesthetic concern and sensitivity of the teeth. The cause was an incorrect brushing technique and the patient received detailed instructions on atraumatic plaque removal which included the use of an electric toothbrush with a pressure sensor.



Composite restorations had been placed in cervical areas of maxillary canines to alleviate sensitivity. Some keratinised tissue was available apical to all recession defects.



Removal of the composite restoration to present tissues with root surface after surgical coverage.



Initial incision defines the new papillary architecture. The height of the recession defect defines the height of papilla to leave out of the surgical papillae.



The surgical papillae are dissected split thickness from the underlying base and the residual papillae are de-epithelialised to provide a nutrient bed for the surgically defined papillary tips. The flap is then raised full thickness up to the mucogingival junction and then split thickness more apically to provide coronal mobility for tension-free closure.



Small CT grafts harvested from the palate are sutured using resorbable sling sutures to the exposed root surfaces of 11 and 13.



The flap is displaced coronally, held in place using continuous sling sutures then each papilla is closed with a single interrupted suture. Slings are arranged mesially and the single suture is placed distally for optimal aesthetics.



Ten days postoperative sutures are removed.



Three months postoperative root coverage is satisfactory however the tissues still need time to turn over to eliminate the local unevenness.



Five years postoperative review. Healthy marginal conditions with aesthetics and tissue contours satisfactory to clinician and the patient's aesthetic aspirations.



Extraoral view of the same completed case, also showing the result from the treatment of the left side.

CASE 2



Lower incisors with Miller type III (some loss of papilla height) recession. There is near-absence of keratinised tissue on the buccal aspect of the teeth and the tissues are extremely thin. The sulcus is shallow as a result and there is a fraenal attachment on the midline that is more coronal than the receded gingival margin.



Split thickness dissection just above the periosteum showing very thin alveolar bone around the teeth.



Harvest of an epithelial and CT graft from the palate.



Graft near the carboid template used to define the harvest.



Graft suture to recipient bed



Immediate post-op. Note no sutures apically to prevent lip pull from lifting graft off the recipient bed.



Three months post-operative showing good graft adhesion, increase in keratinised width and thickness, increased sulcular depth, which aids satisfactory self-performed plaque control.



Five-year post-operative showing maturation of graft in recipient bed and stable attachment around the teeth.

Continues from page 24.

ESSENTIALS OF PERIODONTAL PLASTIC SURGERY

Continues from page 23.

CASE 3



A general dentist noted initial recession on tooth 31 in this 28-year-old female patient. Although the recession was minimal, the soft tissues were paper thin and the roots of the teeth could be seen through the tissues.



Lateral views show the adaptation of the thin gingivae around the thin alveolar housings of the incisors. Such tissue arrangements are extremely prone to progression of recession.



Periapical radiograph confirms that interdental bone levels are consistent with health or a minimal amount of horizontal bone loss.



Access through a midline fraenectomy incision and careful sharp dissection just supra-periosteal. Additional access through the gingival margins.



Tunnels to the left and right extent to the mesial aspect of the lower canines bilaterally. The probe, lifted coronally, shows the displaceable tissues and the extent of the incision.



Graft harvest from the palate of sufficient length to augment the tissues from mesial 33 to mesial 43. This is attached to a suture and then threaded through the tunnel created.



Sutures are a combination of 5/0 polyglactin resorbable and 6/0 polydylene monofilament non-resorbable. The peripheral sutures (below the mesial of both canines) are holding the graft tissue at its extremities. Crossed sling sutures hold the graft and marginal tissues coronally at the lateral incisor sites and mattress sutures hold the graft around the midline. The fraenectomy incision is closed with the resorbable suture and some exposed connective tissue is visible in the middle of the incision.



Five months post-operative photo shows buccal gingival tissues of a thickness consistent with health. Coverage of the (minimal) recession on 31 has been achieved.



Volumetric thickening of the tissues around the lower incisors in previously concave areas.

CAN WE MAKE ENDO SIMPLE?

By Maria Lessani BDS (B'HAM), MFDS RCPS (GLAS), M CLIN DENT (EASTMAN), MRD RCS (EDIN)
Specialist in Endodontics

ENDODONTOLOGY

- A branch of dental science concerned with study of form, function, *health* of, injuries to and *disease* of the dental pulp and periradicular region and their treatment.
- Endodontic treatment;
 - pulp therapy (save the pulp)
 - RCT (non-surgical)
 - Surgical endodontics



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ENDODONTICS

- Aim
 - Remove the cause of disease
 - Gain healing (clinical, radiographic, histological)



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GERM FREE RATS

The effects of surgical exposures of dental pulps in germ-free and conventional laboratory rats.
Kakehashi S, Stanley HR & Fitzgerald RJ
Oral Surg Oral Med Oral Path 1965;20: 340-9.



CONVENTIONAL RATS
Pulp necrosis
Apical granuloma
Abscess

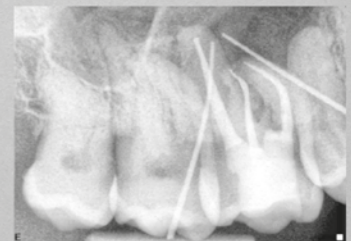


GERM FREE
Repair
Dentine bridge formation
Healing

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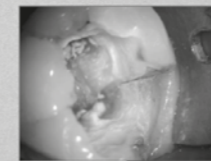
EXAMINATION

- TTP - inflammation of PDL
- TTPalp - inflammation of periosteum
- Sinus tract / s - trace with GP, if 2 suspect fracture
- Referred pain (pay attention to the history of pain)



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SPECIAL TESTS



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IMAGING

- Digital radiographs
- Software - revealer function
- CBCT
- Radiologist report



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Continues on page 26.

CAN WE MAKE ENDO SIMPLE?

Continues from page 25.

DIAGNOSIS



- AAE
- ESE
- WHO
- What has changed



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PULP DIAGNOSIS



- Normal Pulp
- Reversible pulpitis
- Symptomatic irreversible pulpitis
- Asymptomatic irreversible pulpitis
- Pulp necrosis
- Previously treated
- Previously initiated therapy

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TREATMENT TO SAVE THE PULP

- Indirect pulp capping
- Direct pulp capping
- Partial pulpotomy

Vital pulp therapy in vital permanent teeth with cariously exposed pulp: systematic review
Agarwal & Limsworn JOE 2013; 581-7.

Direct pulp capping versus RCT in young permanent vital teeth with pulp exposure to caries: a systematic review
Brodan et al. Am J Dent 2016; 201-7

A review of criteria for the evaluation of pulpotomy outcomes in mature permanent teeth.
Zanini et al.
JOE 2016; 1157-74.

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PARTIAL PULPOTOMY



Vital pulp therapy for mature teeth
Swift et al.
Endo Topics 2003; 49-56.

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APICAL DIAGNOSIS



- Normal apical tissues
- Symptomatic apical periodontitis
- Asymptomatic apical periodontitis
- Chronic apical abscess
- Acute apical abscess
- Condensing osteitis

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PULPITIS DIAGNOSIS



- History
- Examination
- Special tests
- Cannot examine pulp status directly
- Limitation of special tests

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MINERAL TRIOXIDE AGGREGATE (MTA)



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CONCEPTS

- Factors relating to favourable outcome
- Chemo-mechanical instrumentation of the root canal system
- Reciprocation
- Reciprocation with NiTi and its evolution
- Obturation of the root canal system

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DIFFERENT TYPES OF PULPITIS

WHICH ONES PULP THERAPY

- Reversible
- Irreversible
- Reversible pulpitis
- Symptomatic irreversible pulpitis
- Asymptomatic irreversible pulpitis

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PULPITIS - NEW PROPOSAL

- Mild pulpitis
- Moderate pulpitis
- Severe pulpitis

Minimally invasive endodontics: a new diagnostic system for assessing pulpitis and subsequent treatment needs

Wolters et al. IEJ 2017

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RCT



- Randomised controlled trials
- Root canal treatment
- Root canal therapy



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SUCCESSFUL RCT

- Outcome (historically success & failure studies)
- Success
- Clinical (No: pain, sinus tract, TTP, TTPalp, swelling)
- Radiographic (PDL space, bone WNL)



2-yr review

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Continues on page 28.

CAN WE MAKE ENDO SIMPLE?

Continues from page 27.

REPORTS ON TREATMENT RESULTS

94.96% Partial pulpotomy (Ovler, 1978, 1993)

86-96% rate of success of conventional root canal treatment. (Sjogren et al., 1990, Ng et al. 2011)
42% - 75% of the previously root treated teeth healed after retreatment. (Sjogren et al., 1990, Ng et al. 2011)

60% of success by surgical retreatment. (Allen, 1989)
31% Microsurgery (Kim et al., 2001)

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FACTORS AFFECTING OUTCOME

- Presence of a Periapical Lesion (20%)
- (+/- culture)

- Length of root filling (10%)
- Taper of root filling
- Presence of voids
- Previous RF (10%)

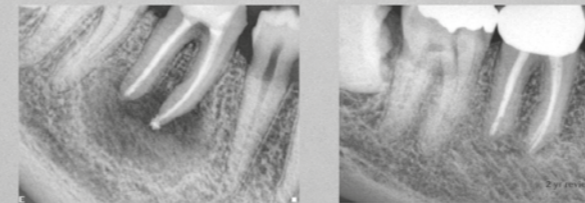
- Coronal seal
- Post preparation

We
can
Control
These!

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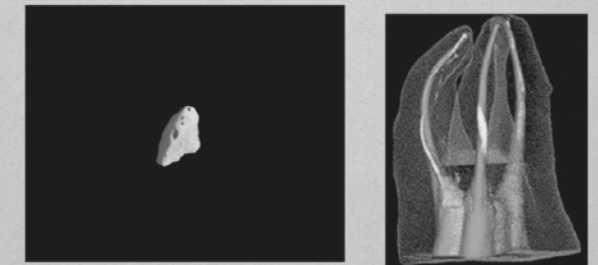
CURE DISEASE?

- Mechanical instrumentation and debridement is not enough.



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CHEMO-MECHANICAL PREPARATION



Undebrided canal (Green)

Courtesy of Dr O Peters, USA

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MOST QUOTED STUDY ON ENDO OUTCOME

- Ng et al. 2011
- 10 factors for primary tx
- 11 factors for re-treatments

Ng et al. 2011

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PROGNOSTIC FACTORS IDENTIFIED

1. Preop lesion
2. Size of the lesion
3. Presence of sinus tract
4. Patency
5. Prep as close to apical terminus
6. Extrusion - Long root filling
7. Perforation
8. Flare up (inter-appointment)
9. Coronal seal
10. Not using CXD 2%
11. With RE-ROOT cases: use of EDTA as penultimate rinse

Ng et al. 2011

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CONCEPTS

- Factors relating to favourable outcome
- Chemo-mechanical instrumentation of the root canal system
- Reciprocation
- Reciprocation with NiTi and its evolution
- Obturation of the root canal system

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Figure 3. Diagram of removing tooth lesion with curing of restorative using the TR.

- 0 - None
 - 1 - Inadequate
 - 2 - Questionable
 - 3 - Adequate
 - (max score 18)
- Dental update 2005

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OBJECTIVE OF ENDODONTIC TREATMENT

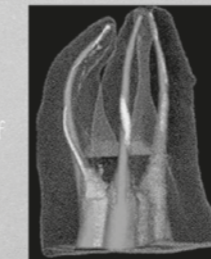
During RCT:

CHEMO mechanical preparation
Rubber dam, Sodium hypochlorite, inter-appointment dressings, aseptic handling of instruments and material

Obturation of the RC system

Undebrided canal (Green)

Courtesy of Dr O Peters, USA



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ROLE OF IRRIGANTS

- Eliminate microorganisms
- Soft tissue dissolution
- Debris removal (made by instrumentation)
- Lubrication
- Smear layer removal

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Bystrom and Sundqvist (1983,1985)

0.5% NaOCl solution was more effective as an antibacterial agent than saline solution.

There was no difference between antibacterial effect of 0.5% and 5% NaOCl.

The combined use of EDTA and 5% NaOCl solution was more efficient than the use of NaOCl solution alone.



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OTHER IRRIGANTS

- Orstavik and Haapasalo (1990)

The effect of endodontic irrigants were tested on bacteria in bovine dentine specimen experimentally infected with Enterococcus faecalis, Streptococcus sanguis, E. coli, or Pseudomonas aeruginosa.

Iodine potassium iodide appeared more antibacterially potent than NaOCl.



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Continues on page 30.

CAN WE MAKE ENDO SIMPLE?

Continues from page 29.

SMEAR LAYER



- Composed of organic/inorganic debris compacted into the surface of dentinal tubules by action of the instruments.
- Ethylene diamine tetraacetic acid (EDTA)



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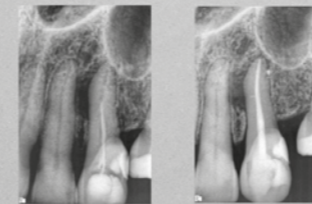
IRRIGATION - SUMMARY



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LENGTH

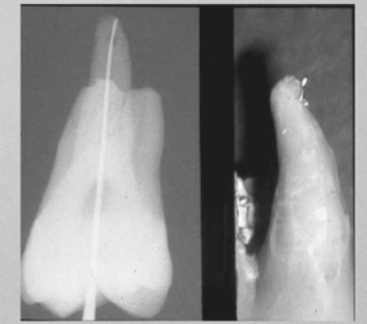
- Does it matter?



World Cup 2018

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RADIOGRAPHS ALONE?



- IN the canal and OUT of the canal concept
- Cannot measure length- You can!

Courtesy of
Professor PJ Lumley

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MORE THAN 1 VISIT?

Bystrom and Sundqvist (1985)
The bacteria surviving instrumentation and irrigation rapidly increased in number in the period between appointment when no intra canal medication was used.
Sjogren et al. (1991)
The 7-day dressing with calcium hydroxide paste efficiently eliminated bacteria which survive chemo-mechanical preparation.

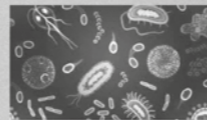
One visit versus multi visit??
Moreira MS et al.
JOE 2017; 864-70.



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COMPLEXITIES

- Patient factors e.g. MH
- Tooth factors e.g.
 - Anatomy
 - Pulp status
 - Access
 - Previous RCT

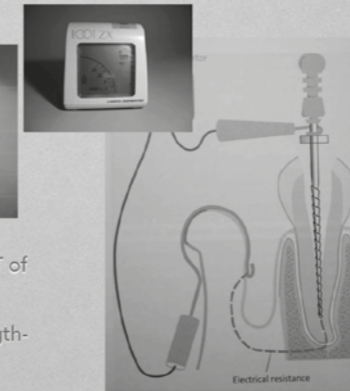


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APEX LOCATOR ALONE?



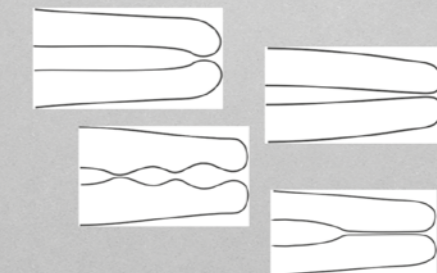
- IN the canal and OUT of the canal concept
- Cannot measure length- You can!



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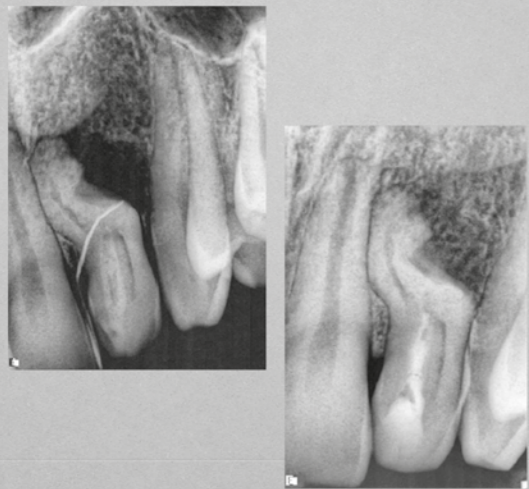
TACTILE? PAPER POINTS?

Types of constriction



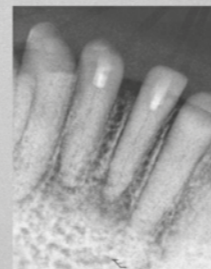
Prof Dummer

Courtesy of Prof Lumley
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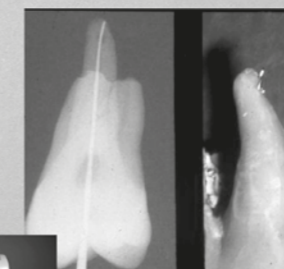
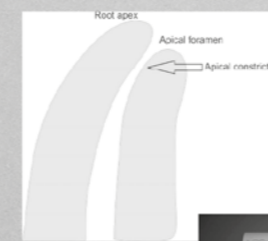
APPLY SIMPLE PRINCIPLES TO COMPLEX SCENARIOS



94 year old
Undergoing Chemotherapy
Long term bisphosphonates
Cannot be in the dental chair longer than 15-20 mins
Cannot lie back

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BEST PRACTICE



Courtesy of
Professor PJ Lumley

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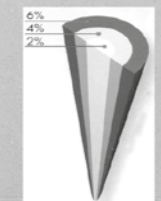
PATENCY

- Apex locator can be used accurately if the canal is patent
- Prevent blockage
- Loss of working length
- Minimised role of recapitulation for some operators.



TAPER

- 2% (K files, K flexo-files.. ISO)
- 0.02mm increase per 1mm
- 4% = 0.04mm per mm
- 6% = 0.06mm per mm



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Continues on page 32.

CAN WE MAKE ENDO SIMPLE?

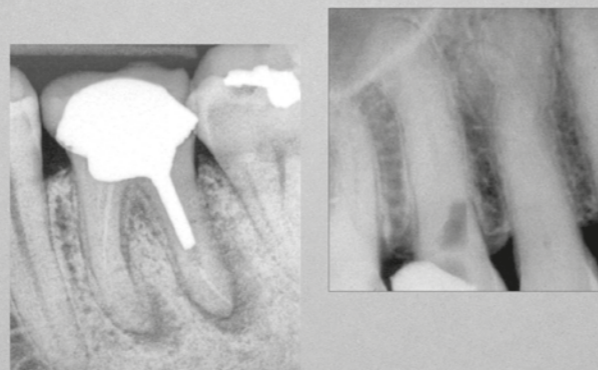
Continues from page 31.

MECHANICAL PREPARATION

- Concept e.g. Crown-Down
- Manipulation of the instrument
- If hand e.g. BF, WW, reverse BF
- If in a motor e.g. Rotary, Reciprocation

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ERRORS



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CONCEPTS

- Factors relating to favourable outcome
- Chemo-mechanical instrumentation of the root canal system
- Reciprocation
- Reciprocation with NiTi and its evolution
- Obturation of the root canal system

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HAND FILES IN RECIPROICATION

Clockwise or counterclockwise

Roane JB

JOE 1984; 349-53.

- Watch winding
- Wiggle wiggle
- Roane Technique



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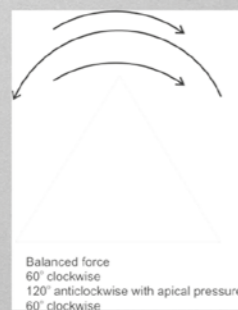
BALANCED FORCE TECHNIQUE

The "balance force" concept for instrumentation of curved canals.

Roane JB

JOE 1985; 203-11

- Published protocol
- Angles
- Interpretations



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CONCEPTS

- Factors relating to favourable outcome
- Chemo-mechanical instrumentation of the root canal system
- Reciprocation
- Reciprocation with NiTi and its evolution
- Obturation of the root canal system

ENDOCLINIC

Continues on page 34.

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CAN WE MAKE ENDO SIMPLE?

Continues from page 32.

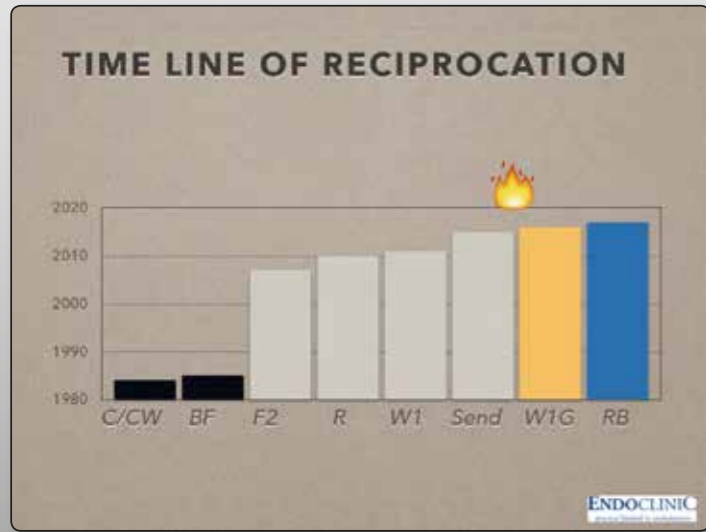
RECIPROICATION WITH NICKEL-TITANIUM INSTRUMENTS & ITS EVOLUTION

- Yared & NITI
- F2
- Reciproc, Reciproc Blue
- Wave one, Wave one gold
- Sendoline

RECIPROC

WAVE ONE

HEATED NITI WIRE



R25 RECIPROC BLUE

NiTi wire + blueheat treatment

White calibration rings
11 mm handle (silver coloured nickel plating)
Coloured silicone stopper (ISO color coding)
Active length: 16mm
3 lengths: 21, 25, 31mm

HELP YOUR PATIENTS ON THEIR JOURNEY TO OPTIMAL GUM HEALTH FOR IMPROVED ORAL CARE

RECOMMEND PARODONTAX COMPLETE PROTECTION – WITH 8 SPECIALLY DESIGNED BENEFITS FOR HEALTHIER GUMS AND STRONGER TEETH

4X
greater plaque removal*¹

48%
greater reduction in bleeding gums*¹



*Compared to a regular toothpaste following a professional clean and 24 weeks' twice-daily brushing.

Reference: 1. Data on file, GSK, RH02434, January 2015.


CHMLT/CHPDX/0007/19

Continues on page 36.


CAN WE MAKE ENDO SIMPLE?

Continues from page 34.

RECIPROC® Clinical Procedure




► Ensure you have achieved a straight line access to the root canal entrance.


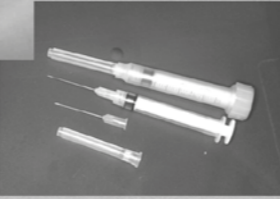



Move the instrument in a slow in-and-out pecking motion. The amplitude of the in-and-out movements should not exceed 3 mm. Only very light pressure should be applied. The instrument will advance easily in the canal. One in-and-out movement = 1 peck. Remove the instrument from the canal after 3 pecks.

In this way, continue root canal preparation with RECIPROC® until approx. 2/3 of the working length has been reached

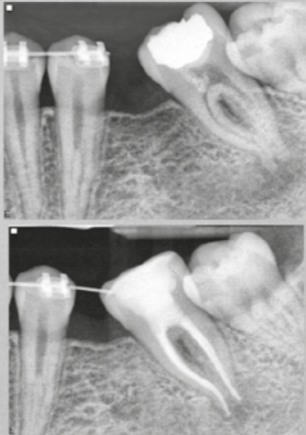



CHEMO-MECHANICAL


QUESTIONS

- Post op pain
- Bioceramic sealers
- Debris in the isthmus
- Irrigate & Activate





RECIPROC® blue Compatible Motors

VDW motor settings for RECIPROC blue are the same as RECIPROC / RECIPROC ALL.



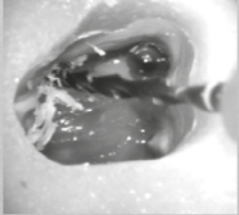
VDW SILVER® RECIPROC® VDW GOLD® RECIPROC® VDW CONNECT Drive®




CUTTING EFFICIENCY

User Evaluation

More than 75% of the testers confirmed that RECIPROC® blue has the same cutting efficiency as RECIPROC®



Endodontists in six countries tested the RECIPROC® blue files in plastic blocks and extracted teeth.




SOME CASES






CONCEPTS

- Factors relating to favourable outcome
- Chemo-mechanical instrumentation of the root canal system
- Reciprocation
- Reciprocation with NiTi and its evolution
- Obturation of the root canal system



OBTURATION OF THE ROOT CANAL SYSTEM

- Length
- Taper
- Density
- Tapered GP
- Heated techniques
- Tapered GP and Bioceramic sealers

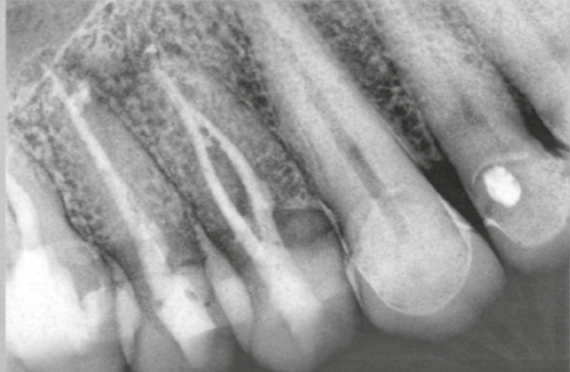
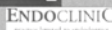
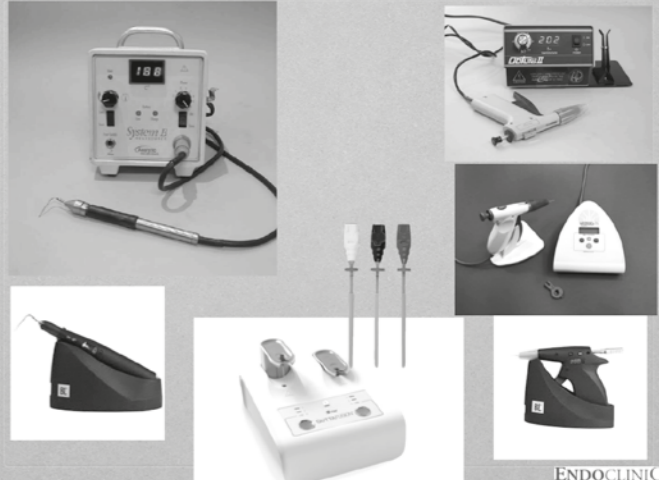
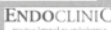
SOME CASES




SOME CASES




WARM OBTURATION

Continues on page 38.

CAN WE MAKE ENDO SIMPLE?

Continues from page 37.

SEAL OF ROOT CANAL

ACTIVE HYDROLYTIC TECHNOLOGY

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WHEN I OBTURATE I NEED..

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POTENTIALLY NOW..

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REVIEW LESIONS

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TAKE HOME MESSAGE

ASEPSIS AND K.I.S.S. (KEEP IT SIMPLE SILLY!)

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MAIN PRINCIPLES

- Eliminate the aetiology
- Aseptic Techniques
- Preserve vitality of the pulp
- If not saveable, then RCT
- If fails, Re-RCT, +/- Endo Surge
- vs XLA
- Implant debate!

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