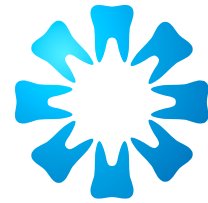


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SADA

THE SOUTH AFRICAN
DENTAL ASSOCIATION

Sir John Talbot, Earl of Shrewsbury



Sir John Talbot, Earl of Shrewsbury:

Forensic Dentistry. The first recorded case of identification through the teeth was that of Sir John Talbot, Earl of Shrewsbury, who was killed in the Battle of Castillon in 1453. The identification, strangely enough, was by the absence of a tooth!



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Our Front Cover for this Issue...

Teeth have on occasion been central to historical, social and humorous events. The Front Cover in 2019 will reflect some of these Famous Teeth.

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Forensic Dentistry. The first recorded case of identification through the teeth was that of Sir John Talbot, Earl of Shrewsbury, who was killed in the Battle of Castillon in 1453. The identification, strangely enough, was by the absence of a tooth!

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Opportunity beckons

SADJ October 2019, Vol. 74 No. 9 p475 - p476

WG Evans



Perhaps it was the decline in the use of dental amalgam... or is it the demise of that old and (previously) trusted familiar... that heralded an unprecedented explosion in dental technology?

The profession in the USA in 1991 recorded the use of amalgam in 50% of restorations placed, compared with the 75% level of fifteen years earlier. The gradual fading of amalgam from the dental scene has continued. The material is now banned in Norway and Sweden and in 2018 the European Union placed strict limitations on its use.

Standing in the wings were the composites, now firmly established as acceptable restorative materials. Certainly some controversy continues... a 2013 research paper reported no difference in performance between amalgam and composite restorations over a two year period.

Then a 2014 Cochrane review study came through with the disappointing news that composites were 89% more likely to fail than amalgams! Later that study was criticised as having poor evidence.

The pressures of the profession in requiring effective replacement for amalgam has resulted in a response by our chemical and materials colleagues in effecting continuous enhancements in the range and performance of composites. It has been estimated that in 2015 alone, some 800 million composite restorations were placed worldwide.

So the Class of 2019 in South Africa, due very soon to take the final hurdle before graduating, will emerge from our Dental Schools with scant experience of and little knowledge about, amalgams, that old stalwart that served our dental population for so many years.

But this is certainly not the only sea-change in the profession for even within the period of the undergraduate curriculum which the current graduating Class has

followed have there been remarkable developments in Dentistry.

Start with the patient...modern dentistry evokes a very different emotional response from patients... no longer are they effectively subservient to the dentist, meekly accepting promises on the outcome of treatment.

Emotionally, the patient now has the opportunity to participate meaningfully in his/her treatment planning... and to visualise quite accurately the projected outcomes of various treatment alternatives... digital imaging is the key.

Virtual design software has found a fertile ground in dentistry and has proven a boon in ensuring patient participation and, ultimately, satisfaction.



We may turn our attention to the Velscope... an instrument which uses special light emission to assist in the early detection of oral diseases, including cancer. No pain, no invasive procedures... what an advantage.

Now consider digital radiology... radiation exposure is some 70% reduced... and it is quicker with enhanced viewing facilities... then there is Invisalign, listed as one of the principal advances in dentistry, and in the right case a truly effective tooth aligner method, much favoured by patients who appreciate the almost unseen appliance.



Lasers in dentistry have opened doors to quick and painless surgery with enhanced healing and with considerable potential for multiple applications. Whilst dental implants are hardly new, the developments in design and versatility are impressive. The use of temporary anchorage devices have revolutionised many aspects of orthodontics.

The dream has been to develop the technique of growing new tissue and structures. The Columbia Tissue Engineering and Regeneration Medicine laboratory reports success in growing a tooth replete with periodontal membrane and alveolar bone, using a scaffold inserted into an extraction socket... and the new tooth grows in nine weeks. Downside... NOT in humans! At least, not yet.

Most of these advances, hailed as most relevant, have enjoyed exposure in the pages of this Journal. Of course there are many other contributions made by technology in the advancement of Dentistry.

Our new graduates will have two distinct opportunities, firstly to explore and to exploit the several advances made in their profession... but secondly and perhaps more relevant... the opportunity to actually contribute to the development of this now exciting profession.

By shrugging off the restraining cloak of dependence on amalgam, the profession has invited innovation and incentive... the manufacturers, the inventors, the researchers have not been slow to grab the opportunity. To them our appreciation.

If there is a message that the profession may consider offering to our neophyte colleagues it may be CARPE DIEM... grasp the day... an incredible profession awaits you!

And of course... every best wish as you face the final hurdles!

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3. Kim K, Lee CH, Kim BK, Mao JJ. Anatomically shaped tooth and periodontal regeneration by cell homing. Jnl Dental Research. 2010; 89(8): 842-7.

The South African Dental Association: Dental Amalgam Position Statement



SADA supports the call for a gradual/phased reduction in the use of dental amalgam as a restorative material. Furthermore, SADA recognises and supports the need for more research on suitable alternative restorative materials which would favourably compare to dental amalgam.



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The recent advent in South Africa of "Shopping Mall Orthodontics" has prompted the Association to raise professional concerns about the practice. A press release to this effect follows.

The South African Dental Association responds to "getting your teeth straightened at a shopping mall"

The dental profession has a warning

SADJ October 2019, Vol. 74 No. 9 p477 - p478

KC Makhubele



The South African Dental Association (SADA) "strongly discourages" the practice of do-it-yourself or direct-to consumer orthodontics because of the potential for harm to patients.

This year SADA has recognised the need, as South Africa's leading advocate for oral health care, to take steps to educate patients and the public about the potential pitfalls of self-managed or inadequately managed orthodontic treatment.

This policy supports the importance of appropriately trained dental professionals being in charge of diagnosing, planning and treating patients to ensure the safe delivery of appropriate care.

The oversight of treatment coupled with the responsibility of the dental professional for the treatment is fundamental. Furthermore, the patient should have the option to consult with or contact the treating practitioner should the need arise, without any barriers existing to prevent this from happening.

Currently in shopping malls, the public may find shops offering an at-home aligner service which patients can use without ever seeing a dentist or an orthodontist in person - they just take pictures of their teeth, bite down on a mould, and get aligners in the mail.

Alternatively, they might have a scan done in order to have the aligners fabricated. It is also important who decides and approves the final treatment plan and whether or not there is continued monitoring during the course of treatment, as well as recourse and access to the treating practitioner.

With conventional aligner therapy, the practitioner takes the records and then instructs and designs the treatment in conjunction with the company. Aligners are only fabricated once the practitioner has approved the plan.

This is not always the case with some of the companies where the aligners are fabricated after a setup by a software company which is on occasions outside of the country. This in itself may violate certain regulations.

The Association "believes that supervision by a HPCSA registered dentist or specialist is necessary for all phases of orthodontic treatment including oral examinations, periodontal examinations, radiographic examinations, study models or scans of the mouth, treatment planning and prescriptions, periodic progress assessments and final assessments with stabilizing measures."

The lack of one-on-one professional care can often lead to unsatisfactory results. Dentists and orthodontists, on the other hand, are trained professionals who can treat teeth effectively and safely.

While dental care and specialty treatments may seem expensive, the consequences of low-cost, unsupervised dental solutions may cost more in the long run. The damage can be "irreparable" if not done correctly, and may lead to loss of teeth and supporting bone.

Moving teeth is a medical procedure and needs personal supervision by an orthodontist or the dentist. Please be wary of any suggestions to move teeth with rubber bands, dental floss or other objects ordered on the Internet.

Khomi C Makhubele: Chief Executive Officer, SADA

Moving teeth without a thorough examination of the overall health of the teeth and gums could result in the permanent loss of teeth, which may result in expensive and lifelong dental problems.

The South African Dental Association (SADA) has filed a complaint with the Health Professions Council of South Africa (HPCSA) raising concerns over aspects of marketing and direct-to-consumer sales of plastic teeth aligners. The ruling of the regulator in this regard is presently awaited.



It was reported to the Regulator that these direct-to-consumer suppliers who were taking digital scans of a patient's mouth for the purpose of having a dentist or orthodontist approve of a treatment plan being formulated overseas for correcting a malposition of the patient's teeth fell squarely within the definition of the practice of dentistry. The patient is then provided with a supply of aligners to wear.

It is also of concern that the business model does not involve establishing or facilitating a dentist-patient relationship between its "affiliated" dentists and its customers. Rather, a customer's legal and commercial relationship is exclusively with the commercial establishment. Members of the public are considered "customers" and not even "patients".

In the United States, the Federal Court recently ruled that an entity's acts of taking digital scans of a patient's mouth for the purpose of having a dentist or orthodontist approve of a treatment plan for correcting a malposition of the patient's teeth falls squarely within the definition of the practice of dentistry.

The American Dental Association (ADA) filed a Citizen Petition with the Food and Drug Administration underscoring concerns about direct-to-consumer orthodontic aligners.

The SADA took these actions out of concern for consumer safety and customer recourse should negative outcomes from this direct to consumer dentistry product occur.

SADA considers it our duty on behalf of the public to make the relevant regulator aware of what is occurring so they can consider whatever actions they deem appropriate. Bottom line - with orthodontics or any dental treatment - it's best to just leave it to the professionals.

For more reference on what the rest of the world thinks about this and what they are doing read more below:

California signs law protecting patients from do-it-yourself orthodontics:

<http://www.wboc.com/story/41179335/california-gov-gavin-newsom-signs-direct-to-consumer-ortho-patient-protections>.

British Orthodontic Society and the Oral Health Foundation announces plans for a national campaign to warn patients about the risks of DIY orthodontics:

https://www.nature.com/articles/s41415-019-0871-9?fbclid=IwAR1ZEoEy_Cc07w5QsjB5Wf7hTIGrRR5hxL1iBylEBOCo5lcQv3fyOe-85rQ.

Hindenburg Research on SmileClub Direct:

<https://hindenburgresearch.com/smiledirectclub:-moving-fast-and-breaking-things-in-peoples-mouths/>.

Doctors and Consumers file a putative class action against SmileDirectClub:

<https://www.nashvillepost.com/business/health-care/article/21088962/doctors-consumer-file-class-action-against-smiledirectclub>.

Customer complaints about SmileDirectClub:

<https://www.bloomberg.com/news/articles/2019-08-22/a-tooth-straightening-startup-runs-into-resistance>.

University of Utah Health

- Don't do Teeth Straightening yourself:

https://healthcare.utah.edu/healthfeed/postings/2015/09/091415_diy.braces.php?utm_source=ksl&utm_medium=widget&utm_content=Rumor&utm_campaign=healthfeed.

Relationship between cranial base flexure and sagittal jaw relationships

SADJ October 2019, Vol. 74 No. 9 p479 - p484

MD Nyakale¹, MI Khan², MPS Sethusa³, AK Seedat⁴

ABSTRACT

Introduction

Flexure of the cranial base plays a crucial role in the study of the craniofacial complex. The outcome of orthodontic treatment can be predicted if growth and flexure of the cranial base is understood.

Aim

The aim of this study was to determine the relationship between cranial base flexure and sagittal jaw relationships in a sample of Black South African subjects.

Methodology

A sample of pre-treatment lateral cephalograms of 300 patients with a mean age of 17.72 years was divided into three equal groups according to gender and skeletal classification.

Age differences were tested using the Kruskal-Wallis test. Cranial base flexure differences were first tested using ANOVA and further evaluated using Student's *t*-test.

Results

Age distribution was similar in all three in all classes of sagittal jaw relationship. Class II subjects demonstrated a significantly larger cranial base flexure when compared with Class I and Class III subjects respectively.

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Author contributions:

- Mandla D Nyakale:** Planned and carried out the research and consulted with the co-authors throughout the research - 50%
- Mohamed I Khan:** Assisted with planning and guidance throughout the process of the research -25%
- Mosimane PS Sethusa:** Assisted with co-supervising and statistical analysis of the data - 15%
- Abdul K Seedat:** Assisted with proof reading of the research - 10%

ACRONYM

CBF: Cranial Base Flexure

Conclusion

In this study sample, a larger cranial base flexure is a feature of Class II sagittal jaw relationship whilst both Class I and Class III sagittal jaw relationships are associated with smaller cranial base flexures. There were no significant differences between the Class I and Class III sagittal jaw relationship samples.

Keywords

Cranial base flexure, skeletal classification, sagittal jaw relationship.

INTRODUCTION

Flexure of the cranial base occurs when the anterior and posterior limbs flex or extend relative to each other in the midsagittal plane about a vertex located at sella turcica.

Cranial Base Flexure (CBF), measured as the inferior angle, has been the subject of research as it affects the relative positions of the two limbs of the cranial base, thus influencing a wide range of spatial relationships that exist between the cranial base and the face.¹

The cranial base plays a key role in craniofacial growth by helping to integrate the anatomically and functionally different patterns of growth in various adjoining regions of the skull, such as components of the brain, the nasal cavity, the oral cavity, and the pharynx.² Architecturally, the cranial base provides a platform on which the brain grows and around which the face develops.

The maxilla is attached to the inferior surface of the anterior limb of the cranial base, while the mandible articulates with the posterior limb. From this geometric arrangement of the jaws, it may be reasonable to assume that variations in growth and flexure of the cranial base may influence the individual jaw positions and the relationship of the jaws to the cranial base and also to one another.³

It has been hypothesized that the opening of CBF will displace the mandible more distally towards a Class II sagittal jaw relationship tendency whilst closing of CBF will displace the mandible more anteriorly towards a Class III sagittal jaw relationship.⁴ A study by Hopkin, Houston and James demonstrated that CBF increased significantly from skeletal Class III through Class I up to Class II subjects.⁵

The role of CBF and its potential interaction with, and its contribution to, normal development of sagittal jaw relationships is both a frequently addressed and a clinically relevant topic in orthodontics and craniofacial biology.⁶

Brodie⁷ stated that successful treatment of sagittal jaw malrelationships depends significantly on the growth of the patients' craniofacial complex. Baccetti and co-workers⁸ reported that orthopaedic treatment of Class III malocclusion with maxillary expansion and face mask therapy can have favourable long-term results when the patient's pre-treatment cephalometric measurements exhibit a more pronounced obtuse CBF.

They concluded that a more acute CBF is an unfavourable sign in the long term prognosis of orthopaedic treatment of Class III malocclusion. Cranial base flexure may also provide a clear advantage with easier patient selection, thus allowing the clinician to predict what the final outcome of treatment would be before it may be initiated.

For example, growing patients who exhibit favourable pre-treatment CBF values may have more stable results after early orthopaedic treatment with a combination treatment of maxillary expansion and face mask appliances, while others could benefit from treatment later in life with orthodontics and orthognathic surgery.

Very few studies have been conducted to determine whether this relationship between CBF and sagittal jaw relationships exists in Black subjects. This study was aimed to determine the relationship between CBF and sagittal jaw relationships in a sample of Black South African subjects. The objectives of this study were:

1. To determine the reference norm values of the CBF of Black South African patients.
2. To determine whether there are gender differences for CBF.
3. To determine correlations between CBF and sagittal jaw relationships.

MATERIALS AND METHODS

Permission to conduct this research using the hospital records was obtained from the Head of the Department of Orthodontics and also from the Dean of the School of Oral Health Sciences Sefako Makgatho Health Sciences University, South Africa.

Pre-treatment lateral cephalograms were selected from the patient records in the Department of Orthodontics, Sefako Makgatho Health Sciences University. The selected lateral cephalograms were assessed visually by the principal investigator and later re-assessed by the supervisor.

Lateral cephalograms which satisfied the following inclusion criteria were selected for this study:

1. Lateral cephalograms of Black patients of South African origin. Race and citizenship were verified by referring to hospital files.

2. Pre-treatment lateral cephalograms of patients with no history of orthodontic treatment or orthognathic surgery.
3. Lateral cephalograms of good quality and acceptable standards without any image distortions. The selected lateral cephalograms were carefully assessed by the principal investigator to ensure that the images had been taken with the teeth in centric occlusion.
4. Lateral cephalograms of patients aged between 12 and 24 years (CBF becomes relatively stable from 14 to 18 years in males and 12 to 16 years in females).⁹

The pre-treatment lateral cephalograms of three hundred (100 Class I, 100 Class II and 100 Class III) with an equal number of males and females, that met the selection criteria were selected for this study.

The lateral cephalograms were scanned to transform their analogue images into digital formats using an EPSON V700™ scanner (Seiko Epson, Nagano, Japan), and the images were then displayed on the LCD SVGA computer monitor (Axper, Inc.) with a 32 bit colour quality.

The lateral cephalometric images were then stored numerically on a separate computer storage software programme (Microsoft Picture Package®) in tagged image file formats (jpeg). The digital image resolution was set at 120 dots per inch (dpi) with a 64-bit gray-scale image acquisition depth.

The digitised images consisted of a 1280 X 1024 pixel matrix which gave a pixel size of 1.3 mm. The lateral cephalometric images were individually transferred into the digital cephalometric analysis software programme (Orthview®, Orthotek, Netherlands) for tracing and analysis (Figure 1).



Figure 1. Orthview® cephalometric analysis programme.

This method of analysis was chosen for its precise reproducibility of the measurements and its significantly higher speed when compared with the performance of the manual tracing method.¹⁰⁻¹³

All the linear measurements were taken in millimetres and all the angular measurements were taken in degrees to the nearest two decimal places.

Table 1. Descriptive summary of age for the total sample.

Sample	Number	Mean age in years (\pm SD)	Median age in years	Range in years
Class I total	100	17.33 \pm 4.61	16.5	12 to 24
Class II total	100	16.38 \pm 4.42	15.0	12 to 24
Class III total	100	16.46 \pm 4.86	15.0	12 to 24
Total sample	300	16.72 \pm 4.63	15.5	12 to 24
<i>p</i> -value*			0.255	
SD = Standard deviation	* <i>p</i> <0.05 is considered statistically significant.			

Table 2. Gender comparisons of the mean ages in the three classes of sagittal jaw relationship.

Sample	Number	Mean age in years (\pm SD)	Median age in years	Range in years
Class I Males	50	16.92 \pm 4.62	16.0	12 to 24
Class I Females	50	17.74 \pm 4.61	18.5	12 to 24
<i>p</i> -value			0.449	
Class II Males	50	16.22 \pm 4.19	15.0	12 to 24
Class II Females	50	16.54 \pm 4.68	15.0	12 to 24
<i>p</i> -value			0.812	
Class III Males	50	16.98 \pm 5.02	15.5	12 to 24
Class III Females	50	15.94 \pm 4.68	14.0	12 to 24
<i>p</i> -value*			0.314	
SD = Standard deviation	* <i>p</i> <0.05 is considered statistically significant.			

Table 3. Descriptive summary of CBF values for the total sample.

Sample	Number	Mean CBF in degrees (\pm SD)	Median CBF in degrees	Range in degrees
Class I total	100	126.55 \pm 6.28	126.45	108.5 to 140.7
Class II total	100	128.31 \pm 6.51	128.45	113 to 149.6
Class III total	100	125.91 \pm 5.33	126.25	112.4 to 136.8
<i>p</i> -value*			0.015*	
SD = Standard deviation	* <i>p</i> <0.05 is considered statistically significant.			

Table 4. Comparison of mean CBF values between Class I, II and III subjects.

Sample	Number	Mean age in years (\pm SD)	Median age in years	Range in years
Class I total	100	126.55 \pm 6.28	126.45	108.5 to 140.7
Class II total	100	128.31 \pm 6.51	128.45	113 to 149.6
<i>p</i> -value		0.041*		
Class I total	100	126.55 \pm 6.28	126.45	108.5 to 140.7
Class III total	100	125.91 \pm 5.33	126.25	112.4 to 136.8
<i>p</i> -value		0.450		
Class II total	100	128.31 \pm 6.51	128.45	113 to 149.6
Class III total	100	125.91 \pm 5.33	126.25	112.4 to 136.8
<i>p</i> -value*		0.005*		
SD = Standard deviation	* <i>p</i> <0.05 is considered statistically significant.			

Table 5. Gender comparisons of the mean CBF values between the three classes of sagittal jaw relationship.

Sample	Number	Mean CBF in years (\pm SD)	Median CBF in years	Range in degrees
Class I males	50	125.42 \pm 7.05	123.95	108.5 to 140.7
Class I females	50	127.69 \pm 5.21	126.55	117.1 to 140.3
<i>p</i> -value		0.070		
Class II males	50	127.28 \pm 6.49	127.2	113.0 to 143.8
Class II females	50	129.33 \pm 6.43	128.9	115.6 to 149.6
<i>p</i> -value		0.115		
Class III males	50	148.10 \pm 4.29	124.4	112.4 to 127.9
Class III females	50	126.74 \pm 4.95	127.9	116.7 to 134.4
<i>p</i> -value*		0.359		
SD = Standard deviation	* <i>p</i> <0.05 is considered statistically significant.			

Cephalometric tracing and analysis was carried out by the principal examiner who plotted the landmarks on the digital image in a pre-determined sequence using a mouse-driven cursor (Figure 2).

Cephalometric tracing and analysis were completed immediately after plotting the last landmark on each cephalogram. The Wits appraisal¹⁴ was used to classify the sagittal jaw relationship, and was measured and recorded for each lateral cephalogram. The CBF value for each lateral cephalogram, represented by the N-S-Ba angle¹⁵ was also measured and recorded. Each lateral cephalogram was measured twice and the mean of the two measured values was used in calculating the results of this study.

In order to minimise investigator fatigue, only 10 lateral cephalograms were traced per day over a period of 30 days, by which stage all the selected lateral cephalograms had been traced and measured. The two main parameters which were of particular importance in this study were: cranial base flexure (represented by N-S-Ba angle) and skeletal classification (represented by Wits appraisal).

All statistical tests were performed on the SAS programme (SAS Institute Inc. Cary, NC), and the level of statistical significance was set at 5%. Intra-examiner and inter-examiner reliability were tested by randomly selecting and re-measuring 10% of the total sample, and the results analysed using the Student's *t*-test and the Pearson Correlation Coefficient.

Class and gender differences with regards to age were tested using Kruskal-Wallis test. ANOVA was first used to test for any significant CBF differences between the three classes of sagittal jaw relationship. This was followed by pairwise comparison of three classes of sagittal jaw relationship using a Student's *t*-test.

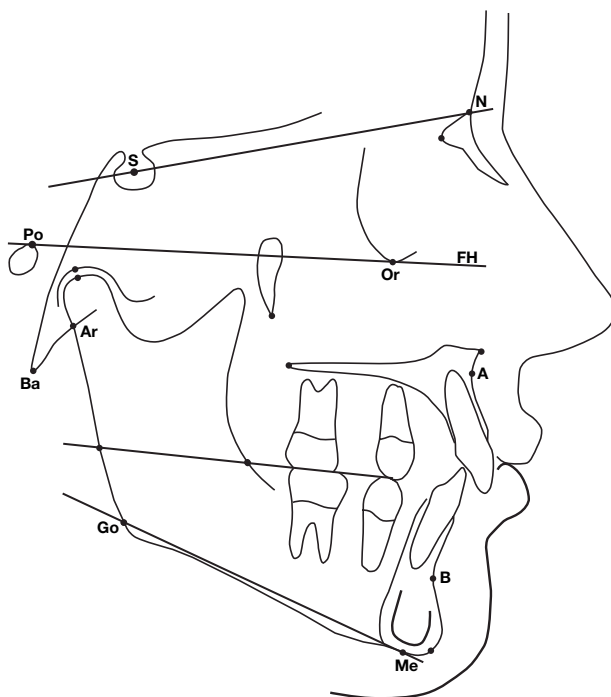


Figure 2. Cephalometric landmarks and their interpretations.¹⁶

RESULTS

Table 1 summarizes descriptive statistics for the total sample with regards to age. The mean age for the total sample was 16.72 ± 4.63 years (range = 12 to 24 years). The mean ages for Class I, II and III samples were 17.33 ± 4.61 years (range = 12 to 24 years); 16.38 ± 4.42 years (range = 12 to 24 years) and 16.46 ± 4.86 years (range = 12 to 24 years) respectively.

The normality of the distribution of age could not be confirmed statistically, thus a non-parametric analysis of variance known as the Kruskal-Wallis test was used to investigate whether there were any significant age differences. The results of the Kruskal-Wallis test showed no statistically significant age differences between the three classes of sagittal jaw relationship ($p > 0.05$) (Table 1).

When the median ages of male and female subjects were compared in the three classes of sagittal jaw relationship, the results of Kruskal-Wallis test also showed no statistically significant differences ($p > 0.05$). The sample was further tested to determine the presence of any significant gender differences with regards to age in each class of sagittal jaw relationship (Table 2).

Table 3 summarizes descriptive statistics for the total sample with regards to CBF. The largest mean CBF value was found in skeletal Class II ($128.31^\circ \pm 6.51^\circ$) subjects, while the smallest mean CBF value was found in subjects having skeletal Class III ($125.91^\circ \pm 5.33^\circ$) patterns.

The normality of the underlying distribution of CBF was substantiated statistically, thus a parametric ANOVA was used to test for any significant CBF differences. The results of ANOVA showed statistically significant CBF differences between the three classes of sagittal jaw relationship ($p < 0.05$).

Table 1. Descriptive summary of age for the total sample.

	Name	Definition
Ar	Articulare	The point of intersection of the dorsal contour of the mandibular condyle and the temporal bone.
Ba	Basion	The anterior border of the foramen magnum.
S	Sella	The centre of the pituitary fossa.
Na	Nasion	A cephalometric landmark on the bony profile at the junction of the frontal and nasal bones.
Point A	Point A	The deepest point in the bony concavity of the premaxilla below the anterior nasal spine.
Point B	Point B	The deepest point in the profile curvature of the mandible.
Go	Gonion	The point on the angle of mandible where the posterior and lower borders meet.
Me	Menton	The most inferior point on the bony chin.
U1	Upper molar	Mesiobuccal cusp tip of maxillary first permanent molar.
Pre	Premolar/ primary molar	Cusp tip of mandibular first premolar or first primary molar.

In recognition that the ANOVA tests revealed significant differences, the three classes of sagittal jaw relationship were paired and compared for statistical difference using a Student's *t*-test (Table 4). These results showed that the mean CBF value of Class II subjects was significantly larger in comparison with the mean CBF values of the skeletal Class I and Class III subjects respectively ($p < 0.05$).

The results of a Student's *t*-test showed no statistically significant differences between the mean CBF value of skeletal Class I subjects and the mean CBF of skeletal Class III subjects ($p > 0.05$). From the results of this study, we have established a reference norm value (Class I) for this sample to be $126.55^\circ \pm 6.28^\circ$ (Table 3).

Table 5 summarizes the gender comparisons of the mean CBF values amongst the three individual classes of sagittal jaw relationship. When the mean CBF values of the male and female subjects were compared in three classes of sagittal jaw relationship, the results of a Student's *t*-test showed no statistically significant differences ($p > 0.05$).

DISCUSSION

It has been previously demonstrated that during growth, CBF becomes relatively stable from 14 to 18 years in males and 12 to 16 years in females.^{9,18,19}

In the present study, the total sample age ranged from 12 years to 24 years because it represented the age distribution of patients who sought orthodontic treatment at Medunsa Oral Health Centre, University of Limpopo. The mean age in this study was similar to that of studies by Klocke et al.¹⁹ and Hayashi²⁰ who also selected their samples from their respective populations. From the geometric arrangement of the cranial base and the jaws, we expected CBF to increase significantly from skeletal Class III, via Class I up to Class II subjects.⁵

The results of this study demonstrated a significantly larger CBF in the skeletal Class II sample, when compared with the CBF values of Class I and Class III samples ($p < 0.05$) respectively (Table 4). Similar findings were reported by Sayin and Türkahraman²¹ and also by Tanabe et al.²² This finding was expected because, as the cranial base flattens out, the mandible, which articulates with the posterior limb of the cranial base, becomes distally positioned towards a Class II sagittal jaw relationship tendency.¹⁶

The results of the present study showed no statistically significant difference ($p > 0.05$) between Class I and Class III subjects with regards to the CBF values (Table 5). Similar findings were reported by Anderson and Popovich²³ and by Alves et al.¹⁶ who also found no statistically significant CBF differences between Class I and Class III samples. Previous growth studies²⁴ have demonstrated that the cranial bases in Class I and Class III subjects grow and flex in similar manners.

Flexure of the cranial base has also been shown to record great variability in the mean values of more than 8° amongst Class I and Class III subjects.^{25,26,27} This large

variability explains why a statistically significant difference with regards to the mean CBF values between Class I and Class III subjects was not found in this study.

CONCLUSION

The reference norm value of the CBF of Black South African subjects in our sample has been established ($126.55^\circ \pm 6.28^\circ$). This study found no statistically significant gender differences with regards to CBF in this sample. The results do suggest that a larger CBF is a feature of Class II sagittal jaw relationship while a smaller CBF is associated with both Class I and Class III sagittal jaw relationships.

This study suggests that there is definitely a relationship between CBF and sagittal jaw patterns. The authors recommend that further research on this topic be undertaken on a multicentre level using a larger sample size of Black South African subjects in order to determine whether or not similar results will be found in other parts of South Africa.

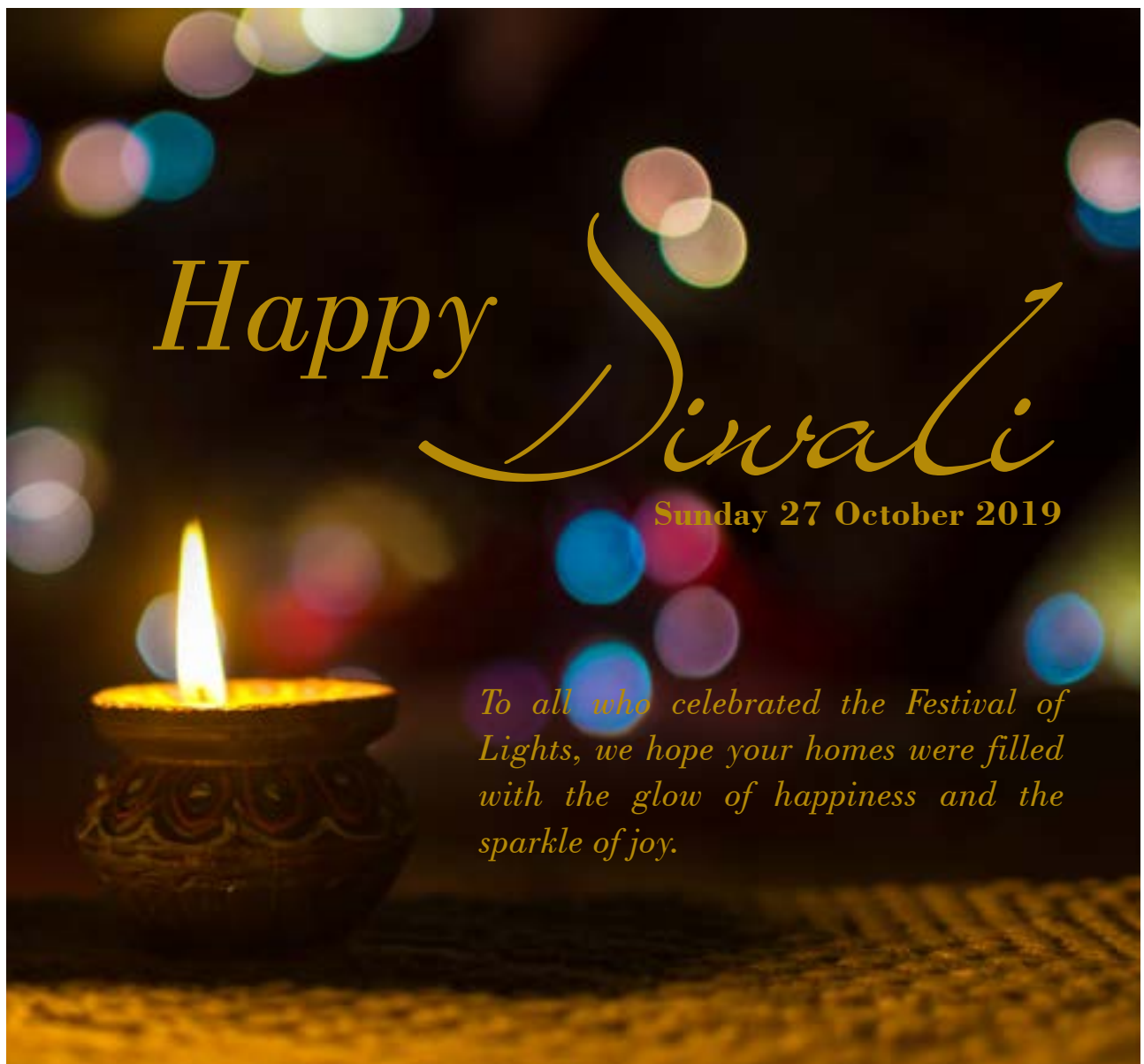
Acknowledgements

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The evolution of sialendoscopy in clinical practice

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ABSTRACT

Sialendoscopy is a relatively new technique first described by Katz et al. in 1991.¹ The technique of sialendoscopy entails using semirigid endoscopes to cannulate and view the interior of salivary ducts and to manage obstructions within these ducts.

This technique provides a minimally invasive alternative to the traditional very invasive techniques of salivary gland excision. It can be used as a diagnostic instrument and as a therapeutic intervention for various causes of salivary duct obstruction.

The objective of this research report was to assess the outcomes of sialendoscopy, performed over a 10-year period from 2008 and 2018 in a private practice setting in South Africa.

The outcomes of sialendoscopy as a therapeutic intervention were compared for different aetiologies of salivary duct obstruction. A therapeutic sialendoscopy was deemed successful if after the obstruction was treated, the patient remained asymptomatic at follow up and if no complications ensued during sialendoscopy.

The success rate in this study was 73.3%. The cases that were considered failures were due to excessive bleeding, abscess formation and failure of calculus retrieval. Despite our small sample size, it appears that sialendoscopy offers good outcomes for both the diagnosis and the treatment of the majority of cases of salivary ductal obstruction and that it is the gold standard for the first line management of this pathology.

Keywords

Sialendoscopy, sialadenectomy.

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INTRODUCTION

Sialendoscopy is a relatively new technique and before its advent, distal salivary gland obstructions were removed *via* an intraoral excision.¹

The technique has evolved over the years and is now used across the world. The technique of sialendoscopy entails using semi-rigid endoscopes to cannulate and view the interior of the salivary ducts.

These endoscopes can be used as diagnostic as well as interventional tools as they have a hollow working channel that allows the passage of stone baskets, drills and fiber-optic lasers to fragment and remove calculi. Salivary duct obstruction is however not confined to salivary calculi alone, for obstructions may be caused by polyps, mucous plugs and strictures as well.²



Figure 1. A stone basket with ensnared calculus.

Long term results of sialendoscopy are to be judged on:

1. Its ability to avoid gland resection with its concomitant complications.
2. Whether its results are long lasting.
3. Whether it has fewer and less severe complications than sialadenectomy.^{3,4}

LITERATURE REVIEW

Sialendoscopy is associated with complications. However, these are minor complications in comparison with those encountered with sialadenectomy, which may be severe. Facial nerve injury is the most serious followed by Frey's Syndrome, lingual nerve injury and hypoglossal nerve injury.

Facial and neck scarring are significant complications of the procedure.²

As with any new procedure it seems that there is a definite learning curve. According to Steck et al. failure to cannulate ducts and failure to remove stones appear to be the most common problems encountered in the first cases performed by surgeons. The complication rates are higher in the first 50 cases than seen in subsequent cases.⁵

According to Bowen et al. sialendoscopy is a safe and effective alternative to open surgery with low rates of major complications. Experience of options to overcome the tedious steps, like dilation of the ductal meatus and well planned case selection, are key to success.

The ultimate aim of sialendoscopy would be to diagnose and treat salivary duct obstruction quickly and efficiently without the need for general anaesthesia. This efficiency can only be attained with experience.⁶

Luers et al. concluded that it required 30 cases to improve skills to a level adequate to achieve satisfactory operation times, but true proficiency ensued after the first 50 cases. In this study the average operative times were 39 minutes and there was a significant improvement after the 10th case and then again after the 30th case.⁷

Traditionally the old gold standard in diagnosing salivary duct obstruction was the sialogram. It has been superseded by ultrasound, CT (computerized tomography) scan and MRI (magnetic resonance imaging) scanning. The advantage of sialography is that it can show the salivary ductal system beyond a calculus.

None of these investigations offer the simultaneous diagnostic and therapeutic intervention that is possible with sialendoscopy.

METHODS

Study design

This is a record review of the files of patients who underwent sialendoscopies in a private practice setting in South Africa. Adult patients of all age groups were included. The duration of the study was from 2008 to 2018.

The variables extracted from the clinical records were as follows:

1. Age
2. Sex
3. Unilateral vs Bilateral Disease:
4. Type of gland
5. Radiological findings vs Sialendoscopy findings
6. Complications
7. Duration of follow up
8. Further treatment required
9. Successful sialendoscopy was defined as:
 - a). Identification of a cause of obstruction, from a diagnostic point of view.
 - b). A symptom-free patient on follow up, from a therapeutic point of view,

RESULTS

Demographics

There were 39 patients in the original sample. 24 were excluded due to lack of consent. Of the remaining 15 cases, six were male and nine were female. Eight were parotid duct obstructions and seven were submandibular duct obstructions. There were two cases with bilateral sialadenitis, thus for 15 patients, 17 glands underwent sialendoscopy.

Investigations performed

Sialograms were performed in seven cases, all of which showed obstructions. Ultrasound was undertaken in four cases, three unilateral and one bilateral, showing obstructions in three out of the five glands.

One case was a failed sialendoscopic extraction of a calculus at another centre, that nonetheless had proven the existence of a calculus. The remaining three cases underwent CT scans preoperatively. Two were unilateral cases and one was bilateral. Of these four glands, CT scanning showed pathology in two.

Sialendoscopy found pathology in all the cases investigated with sialograms. In one case ultrasound showed a false positive as sialendoscopy did not find a calculus as had been indicated by the ultrasound.

Sialendoscopy correlated well with a negative CT scan of bilateral enlarged parotid glands in one patient. CT scan demonstrated false positive results in two glands where no calculi were found on sialendoscopy.

Outcomes/complications

From the 15 cases four can be considered failures. Two were abandoned due to excessive bleeding and one due to the extraction basket breaking. One of the abandoned cases complicated with abscess formation and had to be converted to a submandibulectomy.

One patient with bilateral recurrent parotitis had three calculi successfully removed on one side but only debris was found on the other side. The procedure had to be repeated a second time on this side due to symptom recurrence.

The second attempt again did not show calculi and only debris was found. However, after the second sialendoscopy the patient has been symptom free.

Statistical tests performed

To determine whether there was an association between variables, Chi-square tests of independence were performed. Only 15 data points were available due to the small sample size.

Both the critical values and the p-values were calculated. Tests were carried out at a 5% level of significance. In some cases, a phi value was calculated to test correlation between variables.

Hypotheses tested

i). Whether successful sialendoscopy is associated with gender:

The test was done using a chi-square test of independence. and a p-value of 0.633533 was calculated.

This is larger than 0.05 and therefore fails to reject the null hypothesis. There is no significant proof that gender plays a role in a successful sialendoscopy.

ii). Whether successful sialendoscopy is associated with age:

The test was done using a chi-square test of independence and p-value of 0.439039 was calculated.

This is larger than 0.05 and therefore fails to reject the null hypothesis. There is no significant proof that age plays a role in a successful sialendoscopy.

iii). Whether successful sialendoscopy is associated with gland type:

Test was done using a chi-square test of independence and a p-value of 0.1855 was calculated.

This is larger than 0.05 and therefore fails to reject the null hypothesis. There is no significant proof that gland type plays a role in a successful sialendoscopy.

iv). Whether successful sialendoscopy is associated with unilateral/bilateral obstruction:

Test was done using a chi-square test of independence and a p-value of 0.359626 was calculated.

This is larger than 0.05 and therefore fails to reject the null hypothesis. There is no significant proof that whether the obstruction is unilateral or bilateral plays a role in a successful sialendoscopy.

v). Whether sialendoscopy is more successful with certain types of glands?

The two data points that had no obstructions shown in the sialendoscopy were removed, leaving 13 data points.

The data pertinent to the Parotid and Submandibular glands were subjected to a chi-square test of independence to determine whether there was a predilection for either of these glands suffering a calculus or a stricture.

A p-value of 0.260914 was calculated. This is larger than 0.05 and the null hypothesis may not be rejected. There is no significant proof that there is an association between gland type and different types of obstructions.

vi). Whether successful sialendoscopy is associated with gender:

Test was done using a chi-square test of independence and a P-value of 0.792212 was calculated.

This is larger than 0.05 and the null hypothesis may therefore not be rejected. There is no significant proof

that there is an association between gender and obstructive disease in the salivary glands. Again, the data does not contain many patients who do not present with obstructive disease. A much larger sample of the general population would need to be carried out to determine the significance of this test accurately.

vii) Sialendoscopy vs. radiology

Radiology accurately diagnosed the problem only 73.3% of the time Sialendoscopy was accurate 100% of the time in cases where there were no complications. However, there were indeed two failures which means that its accuracy was 86.7%.

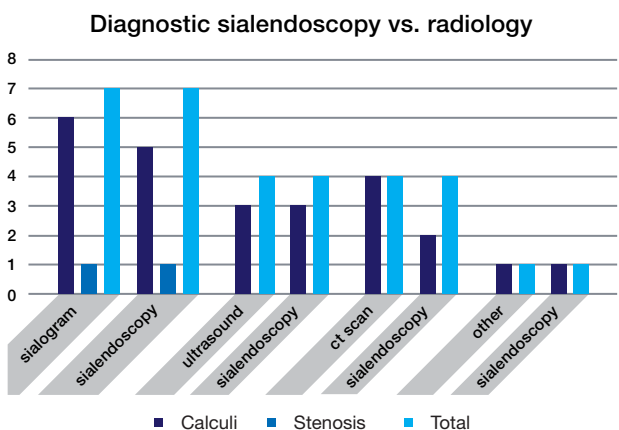


Figure 2. Diagnostic sialendoscopy vs. radiology.



Figure 3. Success rate of sialendoscopy as a management tool. In this dataset a success rate of 73.3% was recorded (only four 'failures' in the dataset of 15).

DISCUSSION

Sialendoscopy is a relatively recent tool in the management of obstructive diseases of the major salivary ducts and it is gaining popularity. Since histopathological studies have shown that salivary glands which have been excised due to sialolithiasis have normal glandular architecture,⁸ glandular preservation of the gland should be the primary goal of treatment.⁹

Papadopoulou et al. perform sialendoscopy under general anaesthesia in children under 8 years of age and under local anaesthesia for children over the age of 8. Their study was conducted retrospectively on sialendoscopies performed on children for juvenile recurrent parotitis.¹⁰

A study by Gallo et al., in which 1152 sialendoscopies were performed, showed a male to female preponderance of 52% vs 48%. Sialoliths made up 53.1% of the pathology in this sample. The majority of cases were of the submandibular glands at 55.4% and parotid gland cases accounted for the remaining 44.6% of cases.¹¹

Deenadayal et al. found in their study of 133 cases that obstruction was found bilaterally in 26 cases, 10 cases were normal, and pathology was found in a total 149 glands. 78 patients were male, and 55 patients were female.¹⁶ were paediatric cases. The age range of the study population was from 3 to 76 years. The cases were not all evaluated by ultrasound, but 54 cases were, and pathology was detected in 27 patients. Twenty two of these had calculi, four appeared to have Sjogren's disease and one had sialiectasia.¹²

Salivary duct strictures are the second most common cause of ductal obstruction. They represent 25% of obstructive cases. It is difficult to demonstrate a stricture with MRI or CT scanning. Sialography can demonstrate strictures. Dilatation of a salivary duct after applying a sialogogue can be demonstrated on ultrasound, indirectly showing a stricture.¹³

Strictures are less common in Wharton's duct than in Stensen's duct. The more distal strictures are amenable to open surgery as they are easily accessible orally.¹⁴

Koch et al. undertook in 2014 a study of 82 patients with parotid duct stenosis, treated with sialendoscopic dilatation.⁴ After an average follow-up period of 98.48 months, 50% percent of the patients reported having recurrent gland swelling but only 19.5% reported recurrent pain. Independent of the type of stenosis, a significant reduction in symptoms and improvement in the perceived quality of life after the treatment was observed.

Follow-up examinations were carried out in 20.73% of the patients and repeat sialendoscopy was performed in 12.1% of the patients.⁴ Recurrent stenoses were alleviated in every case. The glands were saved in every patient.

Long-term follow up after sialendoscopic dilatation of stenoses of Stensen's duct show that high success rates, good gland preservation rates and good patient perceived outcomes are attainable.⁴

Patient satisfaction appears good from the aforementioned data. What remains to be shown is whether normal salivary gland function continues after ductal obstruction is relieved. According to Marchal et al., the histopathologic grade of 48 submandibular glands resected due to sialolithiasis and examined by the same histopathologist did not correlate with the frequency and duration of symptoms.¹⁵

Therefore, multiple infections or prolonged duration of symptoms are not good predictors of the severity of functional loss of submandibular glands excised due to salivary calculi.

Despite the lack of evidence of a direct link between histologic findings and function, the widespread misconception is that submandibular glands with calculi must be excised as they are no longer functional.¹⁵

Some indications for sialadenectomy include:

1. Multiple failed stricture dilatations.
2. Massive or multiple intraparenchymal calculi with recurrent sialadenitis.
3. Complications during sialendoscopy procedures such as bleeding and stone basket entrapment.
4. Hilar or parenchymal calculus removal failure.
5. Persistent symptomatic sialadenitis in Sjogren's syndrome patients.
6. Patients previously treated with radioactive iodine with persistent symptomatic sialadenitis.²

CONCLUSION

Sialendoscopy offers good outcomes for both diagnosis and non-invasive treatment of the majority of cases of salivary ductal obstruction and is the gold standard for the management of this pathology.

Acknowledgements

Dr M Thandar for kindly providing patient data. I would also like to thank Katey Dudley for her assistance with statistics.

Ethics approval

The study is unconditionally approved by the Human Research Ethics Committee of The University of the Witwatersrand. The Clearance Certificate number is M111130.

Informed consent was obtained from all 15 patients included in the study

Conflict of interest

The authors declare that they have no financial or personal relationships which may have inappropriately influenced them in writing this article.

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Table 1.

Patient number	Age (Years)	Sex	Unilateral or bilateral	Submandibular	Parotid
MU1	39	Male	Left	X	
MU2	47	Male	Left	X	
MU3	35	Female	Right		X
MU4	62	Female	Left		X
MU5	44	Female	Right		X
MU6	47	Female	Right	X	
MU7	63	Female	Right	X	
MU8	35	Male	Right	X	
MU9	39	Female	Bilateral		X
MU11	40	Male	Left	X	
MU12	17	Female	Left		X
DU1	66	Male	Left		X
DU2	48	Male	Right		X
DU3	44	Female	Right	X	
DU4	37	Female	Bilateral		X

Table 2.

Patient number	Radiology findings	Sialendoscopy findings	Other treatments	Complications	Follow-up	Further treatment required
MU1	Sialogram: One calculus left wharton's duct	One calculus extracted from left wharton's duct	None	None	3 Years	None
MU2	Ultrasound: One left wharton's duct calculus	Procedure abandoned due to excessive bleeding	1. Left submandibulectomy performed 2. Incision and drainage of wound abscess	Abscess formation	1 Month	None
MU3	Sialogram: One right stensen's duct calculus	One calculus broken down with drill and extracted, right stensen's duct	None	None	Lost to follow up	None
MU4	Sialogram: One left stensen's duct stricture	Left stensen's duct stricture dilated using scope and basket	None	None	5 Years	None
MU5	Ultrasound: Two right stensen's duct calculi	Two calculi in right stensen's duct drilled and extracted	None	None	Lost to follow up	None
MU6	Sialogram: One right wharton's duct calculus	Procedure abandoned due to bleeding	None	None	Lost to follow up	None
MU7	Sialogram: One calculus in right wharton's duct	Failed extraction: basket broken	Right submandibulectomy	None	Lost to follow up	None
MU8	Failed sialendoscopy at another centre: right wharton's duct calculus identified	One calculus re-extracted from right wharton's duct	None	None	1 Week	None
MU9	Ultrasound: prominent parotid glands	No calculi found. No strictures found.	None	None	1 Week	None
MU11	CT: One left wharton's duct calculus	Left wharton's duct calculus lasered and extracted	None	None	3 Months	None
MU12	Sialogram: no calculus identified left check	Calculus found in left proximal check duct	None	None	3 Months	None
DU1	Sialogram: Left parotid calculi	Two calculi in left parotid duct	None	None	10 Months	Left parotid recurrent calculus abscess. External incision and extraction performed
DU2	CT: two calculi suspected in right parotid duct	No calculi found	None	None	1 Week	None
DU3	Ultrasound: One right wharton's duct stone	One calculus extracted	None	None	1 Week	None
DU4	CT: Bilateral stensen's duct calculi	Left parotid: Three calculi extracted Right parotid: no calculi found, debris only	None	Symptoms continued right side	1 Week	Right sialendoscopy repeated: debris found. No calculi identified

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Minimally invasive management of a labial talon cusp: Clinical review and case report

SADJ October 2019, Vol. 74 No. 9 p491 - p495

N Potgieter¹, C Davidson², I Middleton³

ABSTRACT

This case report presents the management of a rare occurrence of a labial talon cusp on a permanent maxillary lateral incisor. The buccal projection was reduced with a minimally invasive approach, with the aim of avoiding pulpal exposure during tooth preparation and thereby maintaining the vitality of the pulp. A direct resin veneer was placed to mask the remaining projection and to address the aesthetic concerns of the patient.

Keywords

Labial Talon cusp, buccal projection, maxillary lateral incisor.

INTRODUCTION

A Talon cusp (TC) is a relatively uncommon dental anomaly characterised by the presence of an additional cusp-like structure on the palatal or, more rarely, labial surface of the anterior teeth, extending from the cemento-enamel junction (CEJ).

Talon cusp development is thought to occur during morpho-differentiation when an outward folding of the inner enamel epithelium results in the subsequent development of an additional cusp-like structure comprised of normal enamel and dentine, with or without pulpal tissue.^{1,2}

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Author contributions:

- Nicoline Potgieter:** Clinical case, write up, editing and submission - 50%
- C Davidson:** Diagnosis confirmation and write up - 30%
- I Middleton:** Write-up - 20%

ACRONYMS

CEJ:	Cemento-Enamel Junction
TC:	Talon Cusp

Genetic, environmental and endocrine disturbances have all been suggested as possible aetiological factors in the development of a TC.³⁻⁸

Hattab et al.² classified TCs into three categories according to the extent of their projection from the CEJ towards the incisal edge. Later Mayes⁹ categorised TCs into three stages:

Stage 1: the slightest form, exhibiting a slightly raised triangle on the palatal surface, extending the length of the crown, but not reaching the CEJ or the incisal edge.

Stage 2: moderate form with a slightly raised triangle on the palatal surface extending the length of the crown and reaches the CEJ or the incisal edge.

Stage 3: the most severe form, with a free form cusp extending from the CEJ to the incisal edge on the palatal surface of the incisor. More recently, Mallineni et al.¹⁰ classified TCs according to the surface on which they were found.

TCs affect both the primary and permanent dentition with the latter involved more frequently.¹¹ Males seem to present with TCs more often than females and the permanent tooth most affected is the maxillary lateral incisor followed by the maxillary central incisors and canines.^{12,13}

Facial or labial TCs are reported in the literature to be a rare finding, as are also reports of TCs on mandibular anterior teeth.¹⁴⁻¹⁶

The presence of a TC is clinically significant as the grooves surrounding the anomaly exacerbate plaque accumulation making the tooth particularly susceptible to caries.

The extension of pulpal tissue places the tooth at further risk for pulpal involvement which may require endodontic treatment. Furthermore, in instances where the TC is lingually/palatally positioned, it could interfere with occlusion.

CASE REPORT

A healthy, 13-year-old girl attended together with her mother, complaining of the aesthetic appearance of her upper right lateral incisor. According to the history, no other clinical symptoms were present, except for discomfort on the upper lip adjacent to the projection. The patient was already receiving orthodontic treatment.

Upon clinical examination, a prominent labial projection and palatal indent was noted on the right lateral incisor. The mesio-distal width of the tooth was about 1mm wider than the corresponding lateral incisor. The projection extended from the cervical margin and was covered by enamel but separated from the rest of the buccal surface by deep grooves (Fig. 1).

It was also noted that there was an indentation in the upper lip corresponding to the position of the TC and that this was sensitive to palpation. Periodontal probing depths were 2-3mm around the tooth. No other clinical pathological findings were noted. A clinical diagnosis of a labial TC was made.

Radiographically, a well-defined cusp-like structure was observed, centred over the central portion of the crown of the tooth. The outline of the projection was smooth with a prominent layer of enamel covering the dentine. Root development of the tooth was almost complete and corresponded to the development of the contra-lateral lateral incisor (Fig. 2a).

A segmental Cone Beam Computed Tomography (CBCT) scan was done to evaluate the presence and extent of pulpal tissue extending into the talon cusp projection (Fig. 2b).

The option of no intervention was discussed with the patient and parent as the mere presence of a TC is not an indication for treatment. However, the mother and child insisted on treatment because of the aesthetics being important to the teenage girl. They were informed of the possible pulp exposure and subsequent pulp therapy treatment should this occur.

After informed consent was signed by the parent, anaesthesia was achieved by infiltration of local anaesthetic alongside the tooth. A rubber dam was placed and the cusp was gradually reduced up to the planned depth, without pulp exposure (Fig. 3a).

However, during preparation, it was noted that the TC extended subgingivally. The rubber dam was removed and gingival retraction cord packed was packed to displace the gingival tissue and ensure moisture control. The preparation was extended to approximately 2 mm sub-gingival into the sulcus to ensure removal of the projection in order to obtain a more aesthetic result (Fig. 3b).

The exposed enamel was etched with 34% phosphoric acid (Scotchbond Universal Etchant, 3M ESPE, St. Paul, USA) for 20 seconds and the exposed dentine

for 10 seconds. A bonding agent (Adper Scotchbond 1XT adhesive, 3M ESPE, St. Paul, USA) was applied and light-cured according to manufacturer's instructions. A combination of shade A2 and A1 Resin Nano Composite Filtek Supreme XTE (3M ESPE, St Paul, USA) was incrementally packed to complete the direct resin veneer and modified to resemble the morphology of a lateral incisor. Resin composite was also added to the palatal surface to seal a large indentation.

After final light curing, the restoration was subsequently finished and polished. The direct resin veneer was finished and polished using a yellow stripe, flame-shaped diamond finishing bur (Dentsply Sirona, Ballaigues, Switzerland; ISO 806 314 249 504 012) and the Enhance Polishing System (Dentsply Sirona, Milford, USA).

The patient and parent were very happy with the immediate post-operative result (Fig. 3c). The patient is receiving orthodontic treatment for the management of space problems as well as correcting rotations and positions of permanent teeth.

On the 18 month follow-up the 12 is asymptomatic and tests vital. Aesthetically the result is still pleasing (Fig. 4a). The peri-apical radiograph confirmed apex closure (Fig. 4b). The patient is currently undergoing orthodontic treatment for correction of angulations and space discrepancies as well as the impacted canine.

DISCUSSION

Tooth development, involving epithelial-ectomesenchymal interaction, is a highly regulated process. Disturbances occurring late in the bell stage can affect the shape and size of a tooth without necessarily influencing the cells responsible for secreting the coronal dental tissues.¹⁷

In this case report the enamel, dentine and dental pulp within the cusp-like buccal projection all appeared normal. There was however, a small discrepancy in the larger size of the tooth compared with the contralateral lateral incisor.

Although TCs can occur in the primary and permanent dentitions, more than three quarters of TCs are found in the permanent dentition. The maxillary central incisor is not as commonly affected (33%) as the maxillary lateral incisor, which occurs in 55% of cases.

The mandibular incisors are seldom affected (6%), and the mandibular canine is the least affected (4%).¹⁸ The TC is found on the lingual palatal surfaces in most cases, thus the cusp found on the labial surface is a rare finding.¹⁹

The TC is not associated with a specific syndrome but TCs have been found in patients diagnosed with Rubinstein-Taybi syndrome, Sturge-Weber syndrome, Ellis-van Creveld syndrome and Mohr syndrome.¹⁸ Another interesting finding was that identical talons cusps have been found in a pair of twins so a genetic influence is most likely.¹⁸



Figure 1. Clinical pre-operative photographs of (A) the labial view; and (B) the incisal view, note the indentation in the upper lip.



Figure 2. (A) Peri-apical radiograph of the right lateral incisor; (B) sagittal slice of the CBCT scan showing the pulp tissue extending into the TC.



Figure 3. Clinical photographs of the (A) rubberdam isolation before preparation; (B) gingival retraction cord in place after removal of the buccal projection; (C) immediate post-operative result.



Figure 4. 18 Month follow-up: (A) clinical picture; (B) peri-apical radiograph showing apical closure (orthodontic appliance also in place).

Different approaches to the management of TCs have been reported, including: step-wise periodic reduction, partial removal or full removal of cusps.²⁰⁻²³

Step-wise or periodic reduction of the cusp has been advised as it may stimulate tertiary dentine formation and possible pulp obliteration within the cusp.²⁰⁻²² The application of fluoride or desensitizing agents to cover exposed dentine have been advocated to limit sensitivity.^{20,21} The stepwise approach however is time consuming, unpredictable and will not be suitable for all cases.

With complete removal of TC, pulp exposures are often inevitable and consequently vital pulp therapy or root canal treatment is required. Maintaining pulp vitality is advantageous for long term prognosis, especially if root formation is not yet completed.^{24,25}

Vital pulp therapy procedures include direct pulp capping and partial or complete pulpotomy. The prognosis of vital pulp therapy is considered good if the pulp is healthy, which is the case with most TCs.²⁶⁻²⁸

Proper isolation, the correct use of biocompatible materials and effective coronal seal also influence the prognosis of the treatment.^{29,30} Kumar et al.²³ described a successful case where a 5 mm pulpotomy was performed using sodium hypochlorite as haemostatic agent and Mineral Trioxide Aggregate as pulp capping material. The tooth remained vital and asymptomatic with no signs of pathology at the four-year follow up.

Abbott¹⁹ described a case with a double TC, positioned both labially and palatally which interfered with occlusion. Taking into consideration that two large exposures were expected, vital pulp therapy was considered unavoidable and treatment proceeded with the full removal of both cusps and root canal treatment.

Factors including the size and location of the TCs impact on aesthetics, and interference with function should be considered when deciding on different treat-

ment options. In addition to the cusp, the presence and extension of pulp tissue into cusp, pulp status and root completion of the tooth in question should also be considered.

Procedures exposing the pulp may pose the risk of iatrogenic damage, inflammation or infection of the pulp. In addition to the factors mentioned above, any type of pulp therapy (vital or non-vital) in the anterior region remains an aesthetic challenge as most endodontic materials cause discolouration of the crown.³¹ Therefore it is advantageous if pulp exposures can be limited or at best avoided.

CONCLUSION

In this case report, the management of an uncommon labial TC is described. Conservative minimally invasive intervention resulted in successful management, resulting in an improved aesthetic outcome and an overall quality of life for this patient.

Disclosure

The authors declare no conflicts of interest related to the case reports depicted in this article.

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year provide you with all that
which brings you joy!*

Forensic dental identification of a burnt murder victim

SADJ October 2019, Vol. 74 No. 9 p496 - p497

VM Phillips

CASE REPORT

I was requested by the Victim Identification Centre in Cape Town and Dr MW of the Forensic Pathology Services to examine the burnt remains of a murdered victim who was found in the boot of a motor vehicle that had been torched.

The deceased was an adult male and had severely burnt facial features making visual recognition impossible. The police suspected that the victim was the owner of the vehicle. The examination of the victim took place at the Salt River Forensic Pathology Services Laboratory.

An oral autopsy was performed to gain access to the jaws and teeth and to facilitate dental radiographic images of all the teeth in the upper and lower jaws (Figure 1). These radiographs together with the macroscopic examination of the teeth were used to compile a Post Mortem Dental Record (Figure 2).

During the oral examination, fractures of the left maxilla and zygoma were noted as well as the left mandibular condyle and ramus that were due to perimortem trauma.

Ante mortem dental data consisting of two dental radiographs were sent by e-mail by the father of DW and

consisted of a periapical and bitewing images of the right posterior teeth (Figure 3).

These radiographs were used to compile an Ante Mortem Dental Record for a patient DW (Figure 4). No written data was obtained for this patient.

Dental comparison

The post mortem and ante mortem dental data were compared in a Comparison Chart with highlights of the concordant features (Yellow).

Table 1. Dental data comparison chart.

Post mortem data	Ante mortem data of DW
13 Present	13 Present
14 Present	14 Present
15 Present	15 Present
16 OP composite restoration	16 OP composite restoration
17 OP composite restoration	17 OP composite restoration
44 Present	44 Present
45 Present	45 Present
46 DO composite restoration	46 DO composite restoration
47 Absent	47 Absent
48 Occlusal composite restoration	48 Occlusal composite restoration

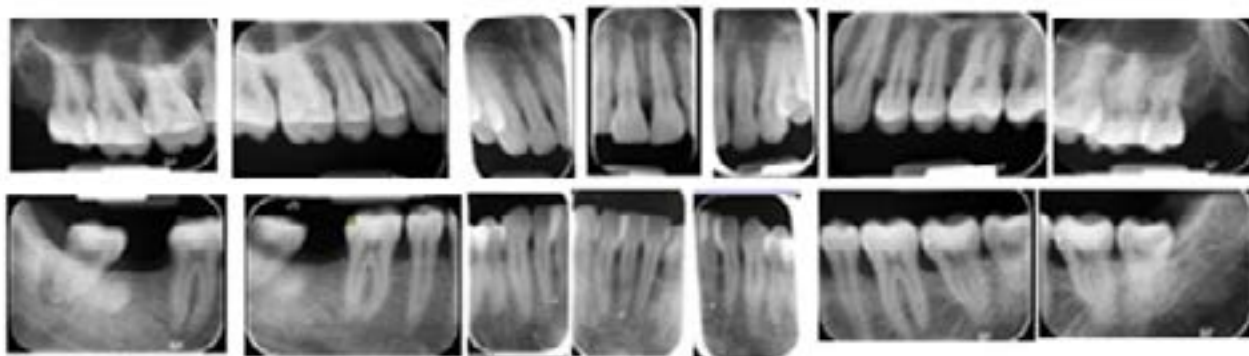


Figure 1. Post mortem dental radiographs of the teeth of the deceased showing dental restorations and a missing 47 tooth (lower right 2nd molar). Composite dental restorations are visible in the left and right maxillary and mandibular molar teeth.

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The comparison between the post mortem and ante mortem dental data showed ten (10) similar features.

The composite restorations in the upper right and lower right molars as well as the absent 47 tooth were deemed as five concordant features. The other comparative features were the teeth present in the right jaws as seen in the ante mortem dental radiographs.

CONCLUSION

The dental identification process requires 12 concordant features to make a positive identification of an individual. However, it has been shown that the radiographic images of dental restorations may be sufficient to facilitate identification and require less characteristics.

The ante mortem dental data revealed five significant concordant features i.e. the dental restorations and absent 47 tooth. This did not result in 100% identification, but there was a high degree of probability that the burnt victim was Mr DW. Subsequent DNA analysis confirmed the identification.

This case once more shows the essential role that forensic dentistry has in the identification of human remains. Despite the paucity of concordant features between the ante mortem and post mortem dental records the dental characteristics were sufficient to provide a possible identification.

The radiographic images were essential in providing comparable features and stresses the major role well documented dental records are in the forensic identification process.

Declaration

No conflict of interest declared.

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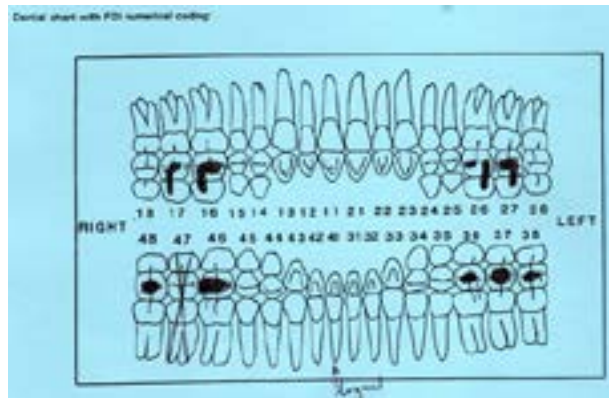


Figure 2. Post mortem dental record showing the dental restorations in the posterior teeth and the absent 47 tooth.

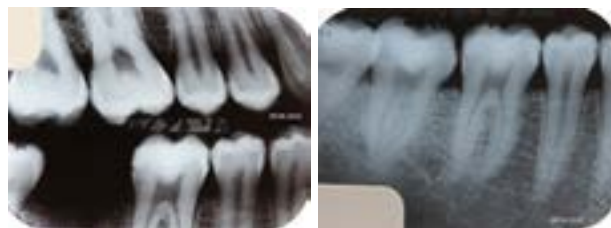


Figure 3. The ante mortem dental radiographs of DW consisting of a bitewing and periapical images of the patient's (DW) right teeth. Composite restorations are present in the 16, 17, 46 and 48 teeth. The 47 is absent.

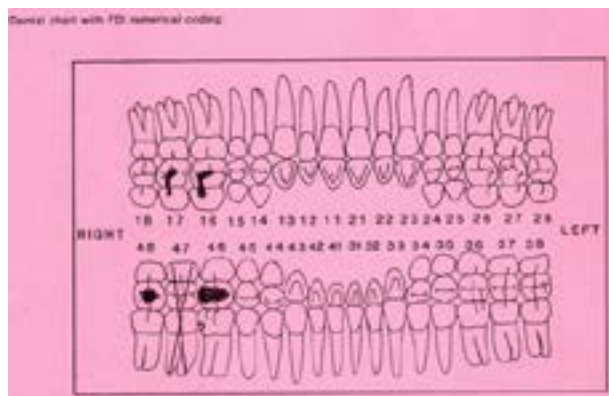


Figure 4. The Ante Mortem Dental Record of DW compiled from the ante mortem radiographic images showing the dental restorations in the 16, 17, 46 and 48 teeth. The 47 is absent.



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4.

Laser therapy as an adjunctive therapy for denture stomatitis

SADJ October 2019, Vol. 74 No. 9 p500 - p501

VV Karic¹, JL Shackleton², DG Howes³

ABSTRACT

Aim

To provide updated information about the use of lasers as an adjunctive therapy for denture stomatitis, the most prevalent oral lesion amongst denture-wearing patients.

Patients present with pain and burning sensation in the mouth, erythema, inflammation with swelling of the palatal mucosa. Normal function is disturbed, with difficulty in wearing the dentures and in eating and drinking. Ultimately the digestive system will be affected.

Prolonged conventional treatment may lead to the development of resistant *Candida albicans*.

The search for an alternative treatment modality has led to some studies which consider laser therapy as an option in the management of denture stomatitis.

Method

A literature search using "PUBMED" and "Google" was undertaken, using these key words in combination: "laser therapy for denture stomatitis", "approaches", "strategies".

Only those articles that dealt with denture stomatitis symptoms, treatment and laser therapy, were selected. Abstracts and full text articles were used to compile this short review.

Conclusion

The literature indicates that laser therapy may reduce the risk of the development of a drug resistant *Candida albicans* and could improve the prospects of treatment success for denture stomatitis. However, there remains a need for more research studies on various clinical lasers and wider laser parameters.

INTRODUCTION

Denture stomatitis is considered to be the most prevalent oral lesion amongst denture wearing patients, who may suffer severe discomfort with pain and a burning sensation in the mouth. The affected mucosa becomes erythematous and swollen, making wearing of the denture and eating and drinking difficult. Everyday oral functions are affected, leading to disruption of the digestive system. Denture stomatitis has been classified into three groups:

1. Petechiae dispersed throughout all or any part of the palatal mucosa in contact with the denture as **Newton type I**.
2. Macular erythema without hyperplasia as **Newton type II**.
3. Diffuse or generalized erythema with papillary hyperplasia as **Newton type III**.^{1,2}

AETIOLOGY

Denture stomatitis is probably multifactorial in etiology, but it has been speculated that poor oral hygiene together with continuous use of dentures could be the usual cause of this lesion.

The microorganism that is associated with denture stomatitis is known as *Candida albicans*, a fungus. Both systemic and topical antifungal drugs are used for treatment but it has been observed that prolonged administration of these medications may lead to the development of resistant *Candida albicans*. Alternative treatment modalities have therefore been sought and some studies have considered laser therapy as an option in denture stomatitis.³

TREATMENT

Some studies have confirmed that photobiomodulation could be efficient in the treatment of oral fungal infections.³

With this in mind and recognising the variation of the types of laser and their parameters, there is a need for more research studies that would perhaps narrow the selection of specific laser therapy in the management of these oral fungal infections.⁴

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Photodynamic therapy has been shown to have an antimicrobial effect on the biofilm, with the combination of laser emitted diode and erythrosine being more efficient than laser and methylene blue.⁵

Reactive oxygen species generated by photodynamic therapy promote the perforation of the cells of *Candida albicans*. Once inside the cell, oxidizing species generated by light excitation cause photo damage to internal cell organelles, resulting in cell death.

Some clinical studies exploring inactivation of oral *Candida albicans* with lasers have reported good results, although one investigation using laser as an adjunct therapy recorded only a 40% reduction in palatal candidiasis.

In comparison, a group treated with miconazole enjoyed an 80% success with reduced recurrence. This discrepancy could be due to complex multifactorial denture stomatitis or perhaps to the type of laser that was used, which may have had limited parameters.⁶

Most of the research studies have utilised lasers of the following wavelengths: 685 nm, 830 nm and 980 nm. The exposure time varied, starting with 10 seconds. The lasers that are in use for clinical dentistry today have much wider wavelengths to offer.

Further research studies of this non-invasive treatment of denture stomatitis should specify the parameters of the laser and should include investigation of the influence of low level laser therapy on the dimensional stability of denture base materials as well.⁷⁻⁹

Of relevance may be the finding that silver nanoparticle discs significantly reduced the adherence of *Candida albicans* without any effect on cell metabolism or proliferation.^{10,11} The option of the incorporation of silver nanoparticles into dental prostheses could be promising,¹¹ possibly enhanced by the use of laser therapy.

Denture stomatitis is multifactorial and complex. It is extremely important to identify predisposing factors and to arrange follow up sessions with patients to ensure compliance with oral hygiene procedures for dentures.¹²

CONCLUSION

Conventional treatment of denture stomatitis could result in resistant *Candida albicans*. Laser therapy as an adjunctive management could improve the prospects of successful treatment. Research studies investigating various clinical lasers with wider performance parameters are indicated.

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Glandular odontogenic cyst: case series and summary of the literature

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ABSTRACT

The glandular odontogenic cyst (GOC) remains a rare entity. It was initially named “sialo-odontogenic cyst” by Padayachee and Van Wyk in 1987 when they reported the first two cases. Thereafter the term glandular odontogenic cyst was suggested by Gardner et al. in 1988 and was subsequently adopted by the WHO.¹

In addition to its rarity, it has non-pathognomonic clinical and radiological features and hence can mimic other lesions. Since its recognition as an entity by the WHO in 1992, only two further cases of glandular odontogenic cyst have been seen at the authors' institution and are hereby reported together with a summary of the review articles in the English literature.

Keywords

Developmental jaw cyst, glandular cyst, recurrent cyst.

INTRODUCTION

The glandular odontogenic cyst is a rare developmental cyst.² Its clinical and radiological presentation are generally non-specific. It closely mimics other odontogenic lesions that exhibit slow, invasive growth, little cortical expansion and high recurrence rates and thus the definitive diagnosis can only be confirmed by histopathology.

Histologically, it may mimic any one of a dentigerous cyst, radicular cyst, surgical ciliated cyst, lateral periodontal cyst or a botryoid odontogenic cyst. Importantly, the features of a cystic lesion with squamous and mucous epithelial elements may cause it to be misdiagnosed as a central mucoepidermoid carcinoma.

With more comprehensive diagnostic criteria, at least 180 cases have so far been reported in the English literature.⁴ It is therefore reasonable to assume that the previous rarity of this entity may be attributable to misdiagnosis.

CASE 1

A 60-year-old man presented at the diagnostic clinic at Tygerberg Oral Health Centre with an asymptomatic swelling of the anterior mandible. The lesion caused buccal expansion and “egg shell” thinning of the bony buccal cortex.

Panoramic radiography revealed a radiolucent lesion in the anterior mandible, extending from 35 to 46. It was moderately well defined, partially corticated with a scalloped outline.

The internal structure was non-homogenous with multiple septae. There was no displacement of teeth nor root resorption. CBCT imaging confirmed a multilocular cystic lesion with perforation of buccal and lingual cortices (Figure 1).

A differential radiologic interpretation of multicystic ameloblastoma, odontogenic keratocyst and central giant cell granuloma was made.

Aspiration biopsy confirmed the presence of cystic fluid. Surgical enucleation was performed. Histopathological examination revealed a multilocular cyst lined by a non-keratinizing, cuboidal to columnar epithelium of variable thickness.

The epithelial lining demonstrated epithelial spherules, surface eosinophilic cuboidal cells (hobnail cells) exhibiting focal apocrine changes and cells with clear to vacuolated cytoplasm at the basal/parabasal layer.

Ciliated surface cells were also noted as were papillary projections of the epithelium into the cyst lumen. Mucicarmine stain was positive for mucin in goblet cells and in intra-epithelial microcystic (glandular or pseudo-glandular) spaces. The morphological features were compatible with a glandular odontogenic cyst (Figure 2).

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2. Shoayeb Shaik: Radiological images and interpretation - 20%
3. Johan Opperman: Histological sections and diagnosis - 20%
4. Christoffel J Nortjé: Overall appraisal and final editing of manuscript - 20%

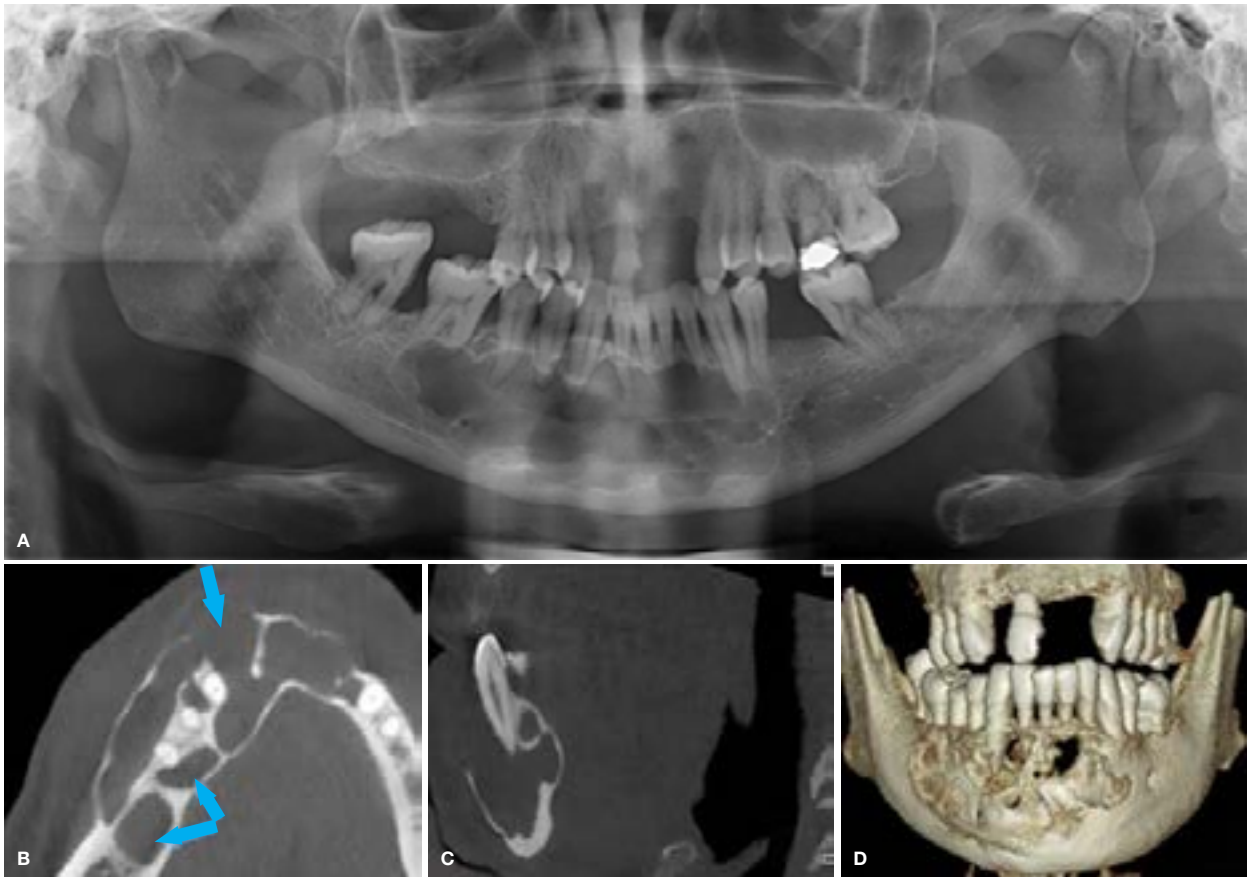


Figure 1. A: Panoramic radiograph at initial presentation;
 B: CBCT axial section demonstrating multilocularity and cortical perforation;
 C: CBCT Sagittal section demonstrating mild antero-posterior expansion and cortical perforation;
 D: CBCT 3D reconstruction.

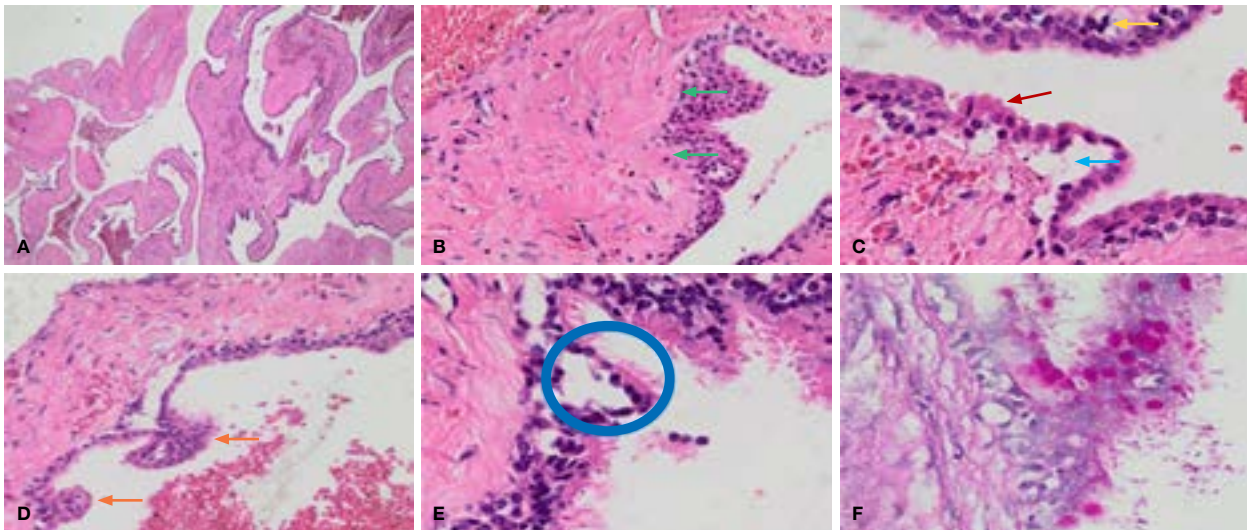


Figure 2. A: Multiple cystic spaces, lined by non-keratinizing, cuboidal to columnar epithelium (H&E X2);
 B: Cyst lining demonstrating epithelial spherules (H&EX4);
 C: Hobnail cells on the luminal surface showing apocrine changes (red arrow), clear to vacuolated cells at the basal/parabasal layer (yellow arrow) and microcystic spaces (blue arrow) (H&E x4);
 D: Papillary projections into cyst lumen (orange arrow) (H&E x2);
 E: Cilia (H&E X20);
 F: Mucous goblet cells in the cyst lining (Mucicarmine positive) H&E X20

CASE 2

A 59-year-old female presented with an expansile lesion of the anterior mandible with a five month history. The swelling extended from 33-45 and had caused bucco-lingual expansion. It was generally asymptomatic but had become painful in the past three weeks.

The associated teeth were mobile. The patient was known to be HIV positive and was already taking antiretroviral medication. A differential diagnosis of ameloblastoma or odontogenic keratocyst was made. Panoramic radiography revealed multiple missing teeth, but more importantly the missing 31 and 41 related to the cystic lesion. There was a unilocular radiolucent lesion in the anterior mandible, extending from 34 to 46.

It was well defined and exhibited a smooth outline. Its lateral and inferior borders were well corticated, but the superior border was not discernible. The internal structure was homogenous and without septae. There was displacement of teeth and root resorption (Figure 3).

Surgical enucleation was performed. Microscopic sections revealed reactive trabecular bone with an attached cystic structure lined by non-keratinizing stratified squamous epithelium of variable thickness.

An intense chronic inflammatory infiltrate was seen in the connective tissue wall. Cilia were absent, however, microcysts, mucous cells, clear cells, papillary projections and eosinophilic hobnail cells were all present.

Corrugation of the superficial layer was noted. PAS and Mucicarmine stains were positive. The morphological features were compatible with an inflamed glandular odontogenic cyst (Figure 4). A panoramic radiograph performed one year after enucleation showed no signs of recurrence (Figure 5).

DISCUSSION

Little was known about the glandular odontogenic cyst until recently. It was initially named sialo-odontogenic cyst due to the presence of mucous cells, mucin pools and eosinophilic cuboidal cells that mimicked salivary gland ducts.⁵

In 1988, Gardner et al. described it as glandular odontogenic cyst after establishing that it contained mucin elements, was lined by odontogenic epithelium and lacked salivary tissue.



Figure 3. Panoramic radiograph at initial presentation.

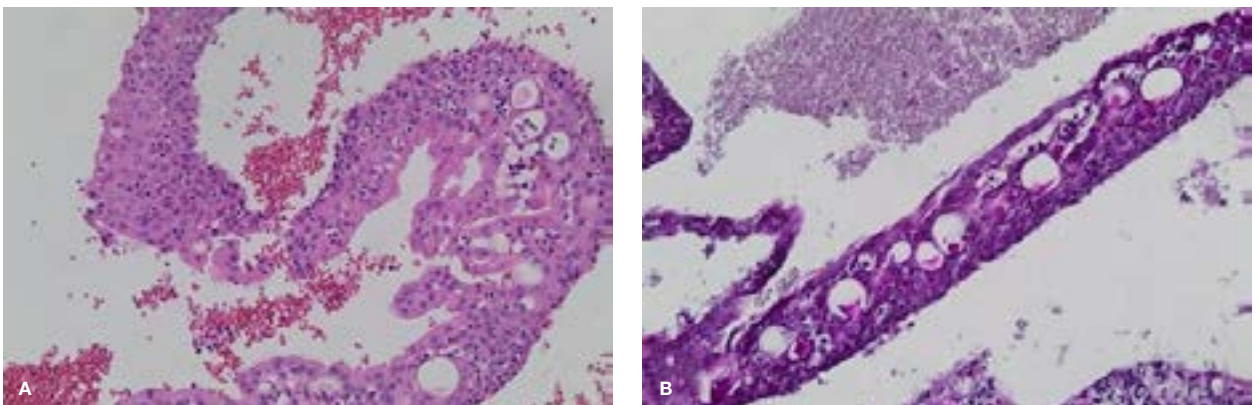


Figure 4. A: Cyst lining showing eosinophilic luminal hobnail cells, microcysts, mucous cells, papillary projections and clear cells (400 x magnification). B: PAS & D positive for mucin in microcyst (400 x magnification).



Figure 5. Panoramic radiograph 1-year post-operatively. No evidence of recurrence.

The term glandular odontogenic cyst was adopted by WHO in 1992. It is currently classified as a developmental cyst of odontogenic origin.⁶

The glandular odontogenic cyst still has the lowest incidence (0.12-0.13 %) of all odontogenic cysts.⁴ However, Ogura⁷ reported a slightly higher prevalence in a Japanese study, where 4 of 144 patients with odontogenic cysts (2.8%) had GOC. Since the recognition of this cyst by the WHO in 1992, only the two cases in this report have been diagnosed at the Tygerberg Hospital's National Health Service Laboratory.

Both cases involved the anterior mandible of patients aged 60 and 59 years respectively. This finding concurs with most published studies wherein the majority of glandular odontogenic cysts (72-80%) are reported to occur in the anterior mandible of middle aged adults, with a peak in the 6th decade.⁸ Many studies suggest equal gender distribution with a slight male predominance.^{2,4,6,7}

The present cases included one male and one female. Until recently, the microscopic diagnosis of GOC has been based on major and minor criteria.^{8,9} Currently, the diagnostic criteria outlined by WHO (2017) requires the presence of a minimum of seven of 10 specific criteria.¹⁰

Criteria for diagnosis of GOC by WHO, 2017.¹⁰

Features that must be present in all cases:

- Variable thickness of the epithelium lining the cyst, from two to three cell layers of squamous or cuboidal cells to thick stratified squamous epithelium.
- A luminal layer of cuboidal to low columnar cells (hob-nail cells) present at least focally.

Features present in most cases:

- Intraepithelial microcysts.
- Apocrine metaplasia of the luminal cells.
- Clear cells in the basal and parabasal layers.
- Papillary projections (tufting) into the lumen.
- Mucous cells.

Other additional microscopic features:

- Epithelial spheres similar to those seen in lateral periodontal cysts.
- Presence of cilia.
- Multiple cystic compartments.

GOCs have been found to be constantly negative for MAML2 gene rearrangements present in central mucoepidermoid carcinoma, suggesting the two are different entities.

However, the small number of cases tested cannot preclude the possibility that central mucoepidermoid carcinoma or even an ameloblastoma can develop from a pre-existing GOC.^{10,11}

The radiological presentation of the glandular odontogenic cyst is not pathognomonic.¹² It demonstrates characteristics of a benign but potentially aggressive tumour.¹³ It may present as a unilocular or multilocular lesion with a scalloped border and well-defined sclerotic rim.

Cortical expansion and perforation are seen in most cases. A periapical relationship with the affected teeth is seen, but in rare cases it appears as a perifollicular radiolucency.¹⁴

In common with many studies, both cases presented as well defined radiolucencies of the anterior mandible with varying degrees of cortication. However, the two lesions differed with regard to the peripheral outline, internal structure, and the displacement and resorption of dentition.

In terms of management, it has been suggested that surgical enucleation should be accompanied by adjunctive procedures due to the high recurrence rate, while post treatment follow up should continue for a minimum of three years.^{15,16}

At this point, most publications on GOC have been single case reports and short case series. There are few detailed review articles (Table 1).

Table 1. A summary of review articles of reported GOC

Author	No. of cases	Gender (M:F)	Age	Site	Radiology	Treatment	Recurrence	Follow-up
(16)	56	1.6:1	14-74 Mean 48	73.2% Mand 26.8% Max	Unilocular 53.6% Multilocular 46.4% CE 53.6% CP 39.3%	Curettage/ marsupialisation/ enucleation 80.4% Peripheral osteotomy/ resection 14.6% Conservative 5%	29.2%	Mean 2.9 years
(12)	111	1.3:1	14-75 Mean 45.7	70% Mand 30% Max	Unilocular 53.8% Multilocular 46.2% CE 88.5% CP 61%	Curettage/enucleation 83.5% Resection 17%	35.9% 0%	Mean 2.7 years
(8)	46	1:1	Mean 51	80% Mand 20% Max	Unilocular 27 cases Multilocular 14 cases 5 cases-NR CE 43 cases CP 3 cases	Enucleation/curettage	19.6%	Mean 8.75 years
(15)	169	1.2:1	12-90 Mean 48.1	73.2% Mand 26.8% Max	Unilocular 61.5% Multilocular 38.5% CE 73% CP 27%	Curettage/enucleation 88% Marginal/segmental resection 9.9%	21.6%	Mean 4.64 years

R: Right; L: Left; RL: Radiolucency; Mand: Mandible; Max: Maxilla; CE: Cortical Expansion; CP: Cortical Perforation; NR: Not Reported.

CONCLUSION

A high index of suspicion must be maintained for the timely diagnosis of GOC. Radiographic features are useful in determining the final diagnosis especially due to the non-specific clinical manifestations of this entity.

3D imaging is particularly valuable in visualizing the internal structure of the lesion and determining cortical integrity. We consequently suggest multiplanar imaging when GOC is suspected. Computed Tomography (CT) is especially important for very large or extra gnathic lesions.

Acknowledgement

Mrs. Marlise Coetzee - Administrator of Diagnostic Radiology museum at Faculty of Dentistry, University of the Western Cape.

Conflict of interest

No conflict of interest declared.

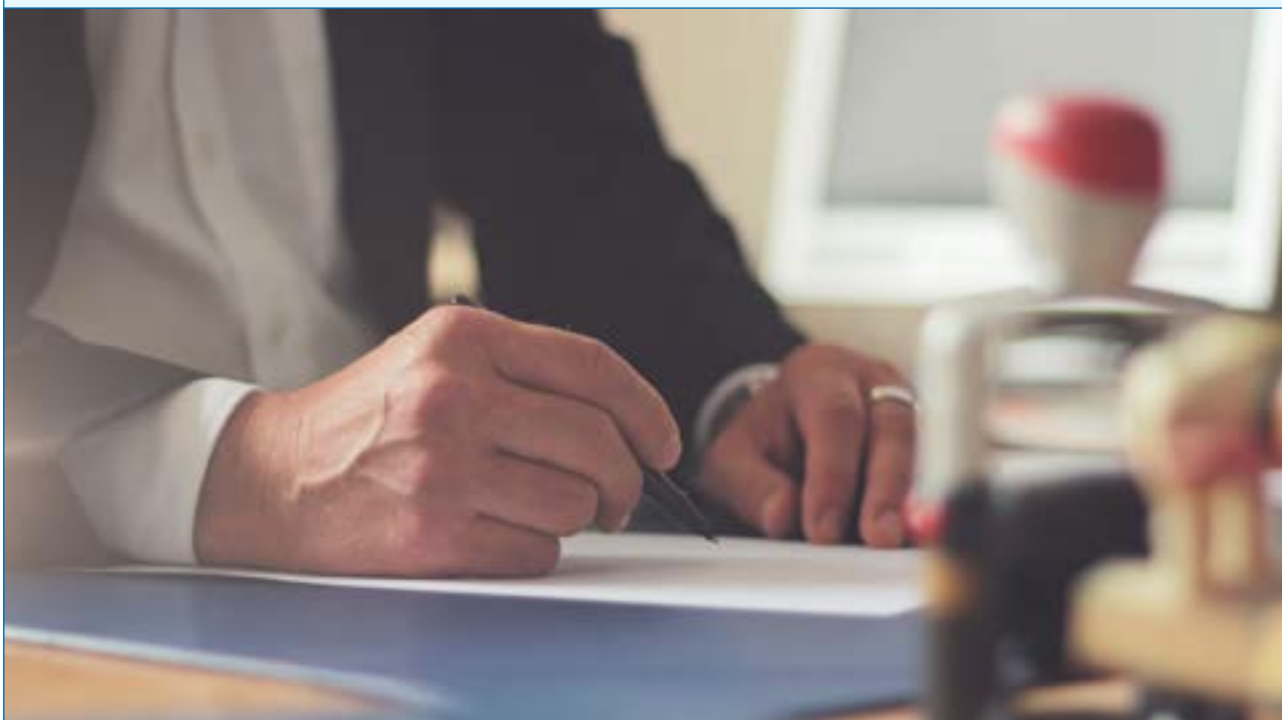
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Do the CPD questionnaire on page 515

The Continuous Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.



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Maxillofacial Radiology 175

SADJ October 2019, Vol. 74 No. 9 p508

CJ Nortjé

Below are a clinical picture and radiographs of two patients presenting with recurring draining abscesses affecting the mandible. Intensive antibiotic treatment achieved no noticeable improvement. Discuss the important radiological features and what is your diagnosis?

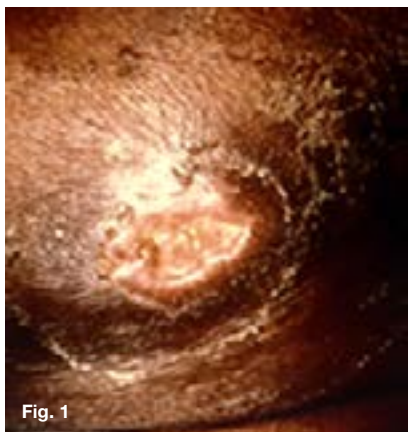


Fig. 1

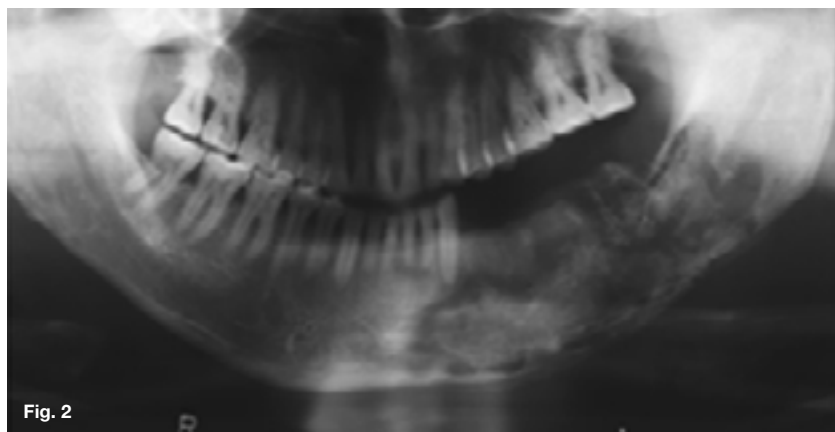


Fig. 2



Fig. 3



Fig. 4

INTERPRETATION

The upper two figures show a case in which there are facial scars of a recurring infection while the panoramic radiograph shows ill-defined multilocular radiolucencies with enlargement of the trabecular spaces, suggestive of the presence of a chronic osteomyelitis affecting the hemimandible on the left side. There are also features demonstrating the formation of sequestra. The case shown in the lower figures started after an assault which had caused a fracture at the angle of the left mandible. A tooth in line of the fracture was removed and since then a draining sinus had developed which showed signs of healing after the removal of sequestrum. In both cases a diagnosis of chronic actinomycotic osteomyelitis of the mandible was made, a rare condition found in 10% of all cervicofacial actinomycosis cases. When it occurs, the radiographic changes are not characteristic. Actinomycosis is a specific infectious disease, primarily caused by the organism *Actinomyces Israëli*. It affects men twice as frequently as women and

is most often encountered in the 20-50 year age groups. The cervicofacial type of actinomycosis is by far the most common, with pulmonary and abdominal actinomycosis occurring less frequently. However, because of its variable clinical manifestations and difficulty in isolating the causative agent, the diagnosis is often delayed. The actinomycotic infection is not a pure infection; it probably is a result of a synergism between microbes of the ray fungus group and other anaerobic microbes. Clinically, the infection has a prolonged course. The first sign is the appearance of a red to dark blue, nodular infiltration, often located within the skin of the submandibular area or angle of the jaw. Untreated, the infection spreads along anatomical planes, producing a hard infiltrate with simultaneous occurrence of draining abscesses. The exudate may contain small yellow granules, termed "sulphur granules", which consist of colonies of actinomyces which tends to be diagnostic. Enlargement of regional lymphnodes is seldom observed and the general status of the patients is unimpaired.

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What's new for the clinician: excerpts from and summaries of recently published papers

SADJ October 2019, Vol. 74 No. 9 p509 - p512

Compiled and edited by V Yengopal

1. Is it advisable to extend curing times beyond the manufacturer's recommendation?

M Par, I Repusic, H Skenderovic, et al. Clin Oral Invest. (2019) 23: 3777-88.

The development of high-irradiance light-emitting diode (LED) curing units has led to the shortening of time recommended for light-curing of composite materials for direct restorations.¹ This has been used as a marketing tool to appeal to the practitioner's demands for time saving. Concerns about whether the curing time recommended by manufacturers is sufficient for adequate polymerization at the restoration bottom have been raised due to the evidence of inferior cure produced by adhering to the manufacturer guidelines regarding layer thickness, curing unit irradiance, and curing time.¹

Additionally, it has been noted that the curing time advertised by manufacturers is usually the minimum time required for a sufficient cure in controlled laboratory conditions and may not necessarily be optimal for the more complex clinical setting.¹ Clinically, this has often led to fracture of the restoration and sensitivity and other adverse effect in the patients.

The simplest way a practitioner can overcome these issues is by extending the curing time beyond manufacturer recommendations; this approach has been shown to improve the degree of conversion and microhardness at the bottom of the composite layer.¹ Also, extended curing time may help to mitigate the effect of spatial heterogeneity of the curing unit beam, thus producing more uniformly cured restorations.¹

However, curing with high-irradiance units for extended time raises concerns regarding possible overheating of the dental pulp. Par and colleagues (2019)¹ from Croatia investigated radiant energy, microhardness, and temperature rise in eight composite materials at layer thicknesses of 2 mm and 4 mm. A blue and a violet-blue LED curing

unit were activated for the longest curing "program" available (30 s), delivering radiant energies which exceeded

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ACRONYMS

LED:	Light-Emitting Diode
MW:	Monowave
PET:	Polyethylene Terephthalate
PW:	Polywave
TEC:	Tetric EvoCeram
TECBF:	Tetric EvoCeram Bulk Fill
MH:	Vickers MicroHardness

most of the manufacturer recommendations. The null hypotheses assumed no effect of composite material, curing unit, and layer thickness on (1) radiant energy, (2) Vickers microhardness (MH), and (3) temperature rise at the bottom of the composite layer, (4) no correlation between radiant energy and MH and (5) no correlation between radiant energy and temperature rise.

MATERIALS AND METHODS

Four conventional and four bulk-fill resin composites were investigated. Detailed composition and manufacturer recommendations for curing time are shown in **Table 1**.

To evaluate the effect of pigment additives used for the adjustment of shade, composites Tetric EvoCeram (TEC) and Tetric EvoCeram Bulk Fill (TECBF) were investigated in two different shades. These composite types also contained additional photoinitiators besides camphorquinone/amine. Composite specimens were light-cured using either a blue or a violet-blue curing unit. The blue curing unit is also known by the name "Monowave" (MW), while the violet-blue is referred to as "Polywave" (PW).

To determine the radiant energy delivered to the bottom of 2 mm and 4 mm-thick composite layers, the light intensity which passed through the mould aperture was measured by integrating sphere (IS, Gigahertz Optik), and real-time monitoring of the light transmittance during light-curing of composite specimens was performed using a charge-coupled device array fibre spectrometer.

Table 1. Manufacturer information about the composite materials investigated.

Material (abbreviation)	Composition	Filler load (wt%/vol%)	Manufacturer's Min curing time
Tetric EvoCeram (TEC A2)	UDMA, Bis-GMA, Bis-EMA, ytterbium trifluoride	76/54	20 s for < 1000 mW/cm ²
Tetric EvoCeram (TEC A3)			10 s for > 1000 mW/cm ²
Grandio (GRA) A3	Ba-Al-Borosilicate glass filler, SiO ₂ nanofillers, Bis-GMA, TEGDMA, Bis-EMA	87/71	20 s for > 500 mW/cm ²
Gradia Direct Posterior (GDP) A3	UDMA, dimethacrylate, fluoroaluminosilicate glass	77/65	20 s for < 1200 mW/cm ² 10 s for > 1200 mW/cm ²
Tetric EvoCeram Bulk Fill (TECBF-IVA) A1	Dimethacrylate, Ba-Al-Si glass, prepolymer filler (monomer, glass filler, and ytterbium fluoride), spherical mixed oxide	80/61 (including 17% prepolymers)	10 s for > 1000 mW/cm ²
Tetric EvoCeram Bulk Fill (TECBF-IVB)			
Fiitek Bulk Fill (FBF)	Bis-GMA, Bis-EMA, UDMA, zirconia/silica, ytterbium trifluoride	65/43	40 s for < 1000 mW/cm ² 20 s for > 1000 mW/cm ²
X-tra fil (XF)	Bis-GMA, UDMA, TEGDMA, Ba-B-Al-Si glass	86/70	10 s for > 800 mW/cm ²

Composite specimens were prepared in black cylindrical Teflon moulds ($d=8$ mm, $h=2$ or 4 mm), covered with a polyethylene terephthalate (PET) film, and light-cured for 30 s. The light transmitted through the specimen during the light-curing was collected by a lens and led to the spectrometer which recorded irradiance as a function of time at the data collection rate of 20 s⁻¹ using custom-made software. Radiant energy (J/cm²) was calculated by integrating the area under the irradiance vs. time curve.

For MH measures, composite specimens of the same geometry as described for the radiant energy measurements ($d=8$ mm, $h=2$ or 4 mm) were prepared by pressing composite pastes in black Teflon molds, covering mould apertures with a PET film and light-curing for 30 s. The specimens were then stored in dark at 37 ± 1 °C for 24 h in order to complete the post-cure reaction.

Microhardness (MH) was evaluated at specimen surface (designated as 0 mm) and at the bottom of 2 mm or 4 mm-thick specimens. Vickers MH was calculated using the following equation: $MH = 1.8544 \times F/d^2$, where d is the indentation diagonal and $F = m \times g$ ($g = 9.81$ N/kg, $m =$ load).

For temperature rise measures, composite specimens ($d=8$ mm, $h=2$ or 4 mm) were prepared in the same black Teflon moulds as had been used for radiant energy and MH measurements. Temperature rise was monitored in real time during the light-curing of 30 s by means of a T-type thermocouple which was positioned centrally at the bottom of composite specimens. The environmental temperature during all the tests was 22 ± 1 °C. For each test, five specimens per experimental group were prepared ($n = 5$).

RESULTS

Radiant energy delivered from the blue and violet-blue curing unit amounted to 19.4 and 28.6 J/cm², which was 19% and 13% lower than specified by the manufacturer. Radiant energies at bottom surfaces (0.2–7.5 J/cm²) were significantly affected by material, thickness, and curing unit.

Curing time, which seems “extended” considering the manufacturer guidelines, was in fact adequate for producing the recommended radiant energies.

All of the composites reached 80% of maximum microhardness at clinically relevant layer thicknesses. The benefit of using the higher-irradiance violet-blue curing unit was identified only in composites containing alternative photo-initiators. Temperature rise during curing ranged from 4.4 °C to 9.3 °C and was significantly reduced by curing with the lower-intensity blue curing unit and by increasing layer thickness.

CONCLUSION

Within the limitations of this study which evaluated radiant energy, curing efficiency, and temperature rise in composites which were light-cured for 30 s using a blue (648 mW/cm²) and a violet-blue (924 mW/cm²) LED curing unit, the following can be concluded:

1. Curing with the lower-intensity curing unit produced less heat, whereas both curing units produced adequate cure at 2 mm for conventional composites and 4 mm for bulk-fill composites.
2. The conventional composites containing combined photo-initiators benefitted from the use of violet-blue curing unit, while no benefit was identified in two bulk-fill composites with combined photo-initiators.
3. Thicker composite layers may protect the pulp from thermal insult by producing lower temperature rise at the layer bottom.
4. Temperature rise was mainly determined by radiant energy, suggesting that thermal hazard can be controlled by limiting curing parameters to optimal values.
5. Most of the temperature rise occurred within 5–10 s after the start of light-curing; extending the curing time to 30 s resulted in a minor additional increase.

Implications for practice:

It appears that many manufacturers underestimate the optimal curing times for their materials. It seems reasonable to allow for a 30 s cure time especially for thick/bulky composites.

Reference

1. Par M, Repusic I, Skenderovic H, et al. The effects of extended curing time and radiant energy on microhardness and temperature rise of conventional and bulk-fill resin composites. *Clin Oral Invest.* (2019) 23: 3777–88.

2. Modified vs. standard hall technique in a paediatric dentistry setting

R Midani, CH Splieth, M Mustafa Ali, J Schmoeckel, SM Mourad, RM Santamaria.
Int J Paediatr Dent. 2019; 29: 550-56.

A large number of studies have compared different therapeutic approaches and materials for restoring primary teeth, showing that the longevity of a restoration is a critical factor in determining treatment success.¹

Therefore, preformed metal crowns (PMCs) are continually recommended in the literature for treating primary teeth with multi-surface carious lesions and after pulp therapy in high-risk children.¹

About a decade ago, a different way of using PMCs – the ‘Hall Technique’ (HT) – was published. This particular technique has been used primarily to treat carious primary molars, but without caries removal, tooth preparation, or the use of local anaesthesia.

Since then, different clinical trials have been performed in order to prove the effectiveness of the technique, including a comparison of the Hall Technique with more conventional treatment options such as fillings. Midani and colleagues (2019)¹ reported on a trial that sought to compare the conventional and modified Hall techniques of preparing and placing PMCs in primary molars.

METHODS AND MATERIALS

This retrospective study relied on the electronic records of patients who had received preformed metal crowns using the Hall Technique over a five year period in Germany. Inclusion criteria were healthy children between two and 11 years old, no reported baseline clinical or radiographic signs or symptoms of pulpal or periradicular pathology, a follow-up period of at least six months, and sufficient documentation.

Only one crown per child was included. In cases where a child had had more than one tooth treated with the HT and was eligible for inclusion, the tooth with the longest follow-up period was selected. If more than one Hall crown was performed at the same appointment, the crown of interest was randomly selected.

Recorded clinical data comprised all baseline and recall intraoral examinations, including age (years), gender, teeth treated, and caries levels (d_3mft/D_3MFT). In addition, initial non-cavitated carious lesions were recorded ($d_{1-2}mft/D_{1-2}MFT$), as well as any available radiographs.

ACRONYMS

HT: Hall Technique
PMCs: Preformed Metal Crowns

A total of 29 treating dentists (specialists $n=9$; postgraduate students $n=20$) performed two different protocols to apply the PMCs: the standard Hall Technique and the modified Hall Technique.

The latter involved proximal tooth slicing, allowing the PMC to fit without separation and providing minimal reduction of occlusal cusps, but, however, without caries removal (Table 1).

The techniques were performed in different settings, for example, chairside, under sedation (nitrous oxide), or general anaesthesia. Outcome measures were assessed according to the following criteria:

- Success: Crown present and appears satisfactory; no intervention was required during the follow-up period. No clinical or radiographic signs or symptoms of pulpal pathology occurred.
- Minor failure: New caries (around margins), crown perforation, crown loss but the tooth is restorable. Signs or symptoms of reversible pulpitis (no spontaneous pain) treated without requiring pulpotomy or extraction.
- Major failure: Irreversible pulpitis (history of spontaneous pain or pain caused by thermal or other stimuli) or dental abscess requiring pulpotomy or extraction. Crown loss and tooth is unrestorable.

RESULTS

In total, 192 children received 295 Hall crowns during the study period. Of these, data from 181 children with sufficient documentation were included for further analysis. The majority of Hall crowns were placed in boys (60.8%; $n=110$).

Patients’ mean age when the crown was performed was 5.9 ± 1.84 , mean d_3mft/D_3MFT was $6.55 \pm 3.48/0.18 \pm 0.66$ and when initial carious lesions were included, the $d_{1-2}mft/D_{1-2}MFT$ was $7.83 \pm 3.71/0.17 \pm 0.65$. The average follow-up period was 22.62 months (range: 6.01-89.07).

Table 1. Hall Technique standard and modified protocol for placing preformed metal crowns.

Step	Standard Hall Technique	Modified Hall Technique
Use of anaesthetic	None	Occasionally/rarely
Caries removal	None	None; food and plaque removed with toothbrush
Tooth preparation	None; But tooth separation with orthodontic separators when needed	Yes; about 1 mm proximal slice so that the PMC fits without separation, and minimal occlusal reduction of the cusps
Cementation	GIC	GIC

The majority of crowns (71.3%; $n=129$ crowns) were placed following the standard Hall Technique protocol and 28.7% ($n=52$) were placed using the modified technique. Local anaesthesia was used in 53.8% of the cases ($n=28$) in the modified technique due to reported pain.

Of these, 57.1% ($n=16$) were performed chairside and 42.9% ($n=12$) on children receiving nitrous oxide sedation. Baseline diagnostic radiographs (mainly panoramic radiographs [OPG]) were available for 69.6% ($n=126$) of the teeth.

Most children (80.7%; $n=146$) were treated chairside, 12.7% ($n=23$) under nitrous oxide sedation, and 6.6% ($n=12$) under general anaesthesia (GA). The standard Hall Technique was mostly performed chairside (85.3%; $n=110$). All Hall crowns placed under GA were performed following the standard technique protocol (9.3%; $n=12$).

Mandibular first molars were the most frequently treated teeth with the Hall Technique (36.5%; $n=48$); the least frequently treated were mandibular second molars (12.7%; $n=23$).

During the follow-up period, the total success rate (standard HT + modified HT) was 92.3% ($n=167$). In a single analysis, the success rate of the standard HT was 91.5% ($n=118$) and the modified HT 94.2% ($n=49$). No statistical significance was found when the two methods were compared ($P=0.44$), even when the use of local anaesthesia ($P=0.64$) was considered.

In total, four crowns (2.2%) presented with minor failures (crown lost) during the follow-up period and recementation were needed. All crowns presenting with minor failures had been performed with the standard HT.

In total, ten major failures were observed; the reasons were abscess/fistula or irreversible pulpitis/radiographic evidence of an apical radiolucency (5 cases or 2.8% each; **Table 5**). Failures with standard vs. modified HT did not show a statistically significant difference ($P=0.25$).

More than two-thirds of the children ($n=129$; 69.6%) had diagnostic radiographs taken prior to treatment. There was however no statistically significant difference in the failure rates of teeth diagnosed at baseline with or without radiographs ($P=0.30$).

In addition, no significant differences between the three groups were observed for dentist's experience level (specialist or postgraduate student: $P=0.24$, CI = 1.52-1.66), tooth type (first or second primary molars: $P=0.484$, CI = 2.31-2.61), or the setting (chair side, nitrous oxide sedation, or general anaesthesia: $P=0.408$, CI = 1.18-1.34).

The overall cumulative survival rate was 92.3% with no statistically significant differences between the standard and the modified Hall Technique ($P=0.56$). The cumulative rates of minor and major failures combined were 5.8% for the modified HT ($n=3$) and 8.5% for the standard HT ($n=11$).

CONCLUSION

The survival rate and clinical efficacy of Hall crowns (both modified and standard) were high in a secondary care-based setting. The Hall Technique is an effective and less invasive management option for asymptomatic carious primary molars.

Implications for practice

This study highlights the efficacy of Hall crowns as a long-term, durable, and successful technique for asymptomatic carious primary molars. This study also showed that the Hall Technique can be successfully used by dentists with different levels of expertise (post-graduate students/specialists) and in different treatment settings (chairside/under nitrous oxide sedation/general anaesthesia).

Reference

1. Midani R, Splieth CH, Mustafa Ali M, Schmoeckel J, Mourad SM, Santamaria RM. Success rates of preformed metal crowns placed with the modified and standard Hall technique in a paediatric dentistry setting. *Int J Paediatr Dent.* 2019; 29: 550-6.

Delve into Research Ethics

SADJ October 2019, Vol. 74 No. 9 p513 - p514

WG Evans



The old adage “Publish or Perish” ...so frequently repeated, so often emphasized. And correct, the list of publications is often the first item considered when a CV is appraised, when a job interview is held. Does the pressure to have his/her name in print at the head of a research article force a researcher to consider cutting corners, to make assumptions that critical ethics standards are being upheld even when no direct effort has been made to confirm that status?

Every responsible researcher is so well aware of this dilemma. Not only is there the pressure to publish but in many cases there is the pressure to publish first... before competing researchers manage to secure pages in the journals. It may be pertinent to consider the sage guidelines of the Human Sciences Research Council (HSRC), supported by a paper published by the American Psychological Association.

The HSRC published advice on Research Ethics in 2019, listing four principles which researchers should “uphold and respect”:

1. Principle of Respect and Protection
2. Principle of Transparency
3. Principle of Scientific and Academic Professionalism
4. Principle of Accountability

The American Psychological Association (APA) took a different approach in 2003 and published their five principles for research ethics:

1. Discuss intellectual property frankly
2. Be conscious of multiple roles
3. Follow Informed Consent rules
4. Respect confidentiality and privacy
5. Tap into ethics resources

Are these guidelines really disparate and if so will that lead to confounding the earnest researcher?

In discussing the Principle of Respect and Protection, the HSRC focuses at the start on the community, making the pertinent statement that “research should preferably be undertaken with, and not merely on, the identified community”. This may reflect a growing awareness that research has been carried out in the community setting, the results have been published... and yet there has been little feedback to the community, nor have there been many benefits. Ethical research would certainly include effective feedback to a participating community.

It is in this first Principle that the HSRC considers Informed Consent, observing that the researcher must respect the autonomy and protect the welfare of all

participants... and that Informed Consent must be secured from all participants. The APA however accord a separate Principle to this important aspect of conducting research. Their Principle “Follow informed consent rules” dictates that individuals who are participating voluntarily in the research should do so only with full knowledge of relevant risks and benefits. The APA goes on to list the factors about which participants should be informed:

- The purpose of the research, expected duration and procedures.
- Participants’ rights to decline to participate and to withdraw from the research once it has started, as well as the anticipated consequences of doing so.
- Reasonably foreseeable factors that may influence their willingness to participate, such as potential risks, discomfort or adverse effects.
- Any prospective research benefits.
- Limits of confidentiality, such as data coding, disposal, sharing and archiving, and when confidentiality must be broken.
- Incentives for participation.
- Who participants can contact with questions.
- If the research involves treatment, individuals must be fully informed about the experimental nature of the treatment and about services which will or will not be available to participants.

The APA warns that a signed Consent Form does not reduce the responsibility to complete the full process of informing the volunteer.



Coming in again on the issue of Informed Consent the HSRC observes in Principle 1 “Respect and protection” that the researcher must be especially concerned about the rights and interests of vulnerable subjects such as children or the elderly. The first precepts mentioned are the avoidance of harm, providing benefit whenever possible and acting justly. But several of the factors

dealt with by the APA under their third Principle, “Follow Informed Consent Rules” are considered by the HSRC under their heading “Principles of Transparency” when they mention that “participants should be clearly briefed on the aims and implications of the research as well as possible outcomes and benefits.”

Thus far in the exploration of the principles proposed by these two erudite bodies we have seen considerable overlap, be that under disparate headings. However, the HSRC now introduces a unique consideration... “The Principle of Scientific and Academic Professionalism”, commenting that researchers should conduct their research in accordance with the professional code of the Association of which they are members, should not misuse their positions or knowledge for personal gain and should aim at all times to achieve the highest possible level of scientific quality in their research. These principles ring true for members of SADA, all will agree.

The HSRC document also includes a fifth Principle... “Accountability”. Researchers are exhorted to ensure they have written mandates in which the general conditions and terms of the research are spelt out... obviously this applies when there are sponsors or clients involved in the research.

The agreement ensures that information is provided at the conclusion of the research but at the same time there should be restrictions on possible interference during the course of the study. Perhaps the reader may expect a modicum of duplication between Principle One of the APA (Discuss intellectual property frankly) and Principle Two of the HSRC (Transparency).

But these Principles are not quite a close as may have been expected. The HSRC commence description of their Principle by listing factors which may be applicable to Informed Consent, for example that the participants should be clearly briefed on the aims and implications of the research. The concepts are extended later to include the admonition that researchers should subscribe to the principles of honesty, transparency and scrutiny by the public and peers.

Some aspects of the APA Principle “Discuss intellectual property frankly” may also be discerned in the APA Principle Two “Be conscious of multiple roles”, for both are in part concerned with recruiting students as participants in research studies. It is not ethical for a professor to use any coercion to induce students to participate... all must be voluntary and under full disclosure. The role of the supervisor should be clearly outlined and understood to avoid later possible conflict.

Ethics in Research is truly a broad canvas. Two organisations involved in research have shown that their emphasis on research ethics may vary, but that the foundations on which their policies have been built are in fact similar. A more comprehensive view and understanding of the ethical demands faced by researchers may be developed by considering all nine Principles. And the ninth Principle is “Tap into ethics resources”... yes, sage guidance indeed!



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CPD questionnaire

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GENERAL

Relationship between cranial base flexure and sagittal jaw relationships

- Identify the CORRECT answer.
Flexure of the cranial base occurs between:
A. the superior and inferior limbs of the base
B. the anterior and posterior limbs of the base
C. the internal and external limbs of the base
D. the proximal and distal limbs of the base
- Identify the CORRECT answer.
It has been hypothesized that opening of cranial base flexure will displace the mandible more:
A. Distally
B. Anteriorly
C. Superiorly
D. Inferiorly
- Baccetti and co-workers reported that orthopaedic treatment of Class III malocclusion with maxillary expansion and face mask therapy can have favourable long-term results.
A. True
B. False
- Identify the CORRECT answer.
A significantly larger cranial base flexure was demonstrated in:
A. the Class II sample
B. the Class I sample
C. the Class III sample
D. the combined Class I and Class III sample

The evolution of sialendoscopy in clinical practice

- Sialolithiasis is more common than salivary duct strictures?
A. True
B. False
- Identify the INCORRECT answer.
The advantages of sialendoscopy are:
A. less invasive than open surgery
B. diagnostic accuracy
C. requires no anaesthesia
D. therapeutic efficiency
- Sialendoscopy is a complication free procedure.
A. True
B. False

- Identify the INCORRECT answer.
Successful sialendoscopy:
A. is safe and effective in managing non-neoplastic salivary gland disorders
B. requires dilation of the papilla and careful case selection
C. enables diagnosis and treatment of salivary duct obstruction quickly and efficiently
D. can be achieved by the most inexperienced operator

Minimally invasive management of a buccal talon cusp: clinical review and case report

- A Talon cusp is characterised by the presence of:
A. an additional cusp on the lingual or palatal surface of an anterior tooth
B. a deep invagination on the palatal surface of an anterior tooth
C. an additional cusp on the lingual or palatal surface of a molar
D. an additional cusp appearing as two crowns and one root
- Talon cusps are most commonly seen on:
A. maxillary central incisors
B. maxillary lateral incisors
C. mandibular central incisors
D. mandibular lateral incisors
- True or False? Talon cusps always contain pulp tissue:
A. True
B. False

Forensic identification of a burn victim

- Identify the INCORRECT statement.
In the identification of a victim using Forensic Dentistry:
A. 12 concordant features are generally adequate for identification
B. the dental records are of high value for identification
C. dental radiographs may provide sufficient evidence, even at less than 12 concordant features
D. ante-mortem study models are essential for positive identification

Laser therapy as an adjunctive therapy for denture stomatitis

13. Identify the INCORRECT statement.
Photodynamic Therapy:
- generates oxygen species which cause cell damage to *Candida albicans*
 - can inactivate *Candida albicans*
 - delivered by lasers of wavelength greater than 980nm may be more effective
 - has been shown unequivocally to be more effective than miconazole.

Glandular odontogenic cyst: case series and summary of the literature

14. Identify the INCORRECT statement.
The Globular odontogenic cyst:
- may appear to be a dentigerous cyst, a radicular cyst or a botryoid odontogenic cyst.
 - presents squamous and mucous epithelial elements resulting in misdiagnosis as a central mucoepidermoid carcinoma
 - requires radiology to confirm the definitive diagnosis
 - exhibits slow, invasive growth, little cortical expansion and high recurrence rates
15. Identify the CORRECT statement.
Characteristic cells seen in the globular odontogenic cyst are called:
- hob nail cells
 - shotgun cells
 - full stop cells
 - marble cells

Maxillofacial Radiology Case 175

16. The radiological features of actinomycosis are not characteristic of the condition.
- True
 - False
17. Cervicofacial actinomycosis is by far the most common type of the condition.
- True
 - False

Clinical Windows - What's new for the clinician

18. In the Par et al. trial, curing time, which seemed "extended", was in fact adequate for producing the recommended radiant energies.
- True
 - False
19. The results of the Par et al. trial suggest that dentists should stick to the manufacturer recommended curing times for composites.
- True
 - False

20. In the Midani et al. study, the success rates of the standard Halls Technique and the modified Halls Technique were similar.
- True
 - False

ETHICS

21. Identify the INCORRECT statement.
Research in a community should:
- involve the community
 - provide feedback to the community
 - be published without further reference to the community
 - ensure the community are aware of the possible benefits of the research
22. Identify the INCORRECT statement.
Information provided to participants as Informed Consent should include:
- a statement explaining the rights of participants to decline to participate and to withdraw from the research once it has started, as well as the anticipated consequences of doing so
 - a statement describing the reasonably foreseeable factors that may influence their willingness to participate, such as potential risks, discomfort or adverse effects
 - a statement defining the limits of confidentiality, such as data coding, disposal, sharing and archiving, and when confidentiality must be broken
 - a clear explanation of the valuable gifts and rewards which will be handed as incentives to participants
23. If the research involves experimental treatment, patients should not be informed as that may discourage their participation.
- True
 - False
24. Identify the INCORRECT statement
The HSRC include the Ethical Principle "Accountability"... by this is meant:
- proper financial and other records must be kept
 - proper agreements are kept recording terms and conditions under which the research is to be carried out
 - commitment to share information arising from the research
 - should the research produce unfavourable results, the fault will lie with the participants
25. Identify the CORRECT statement.
In research which involves students:
- it is obligatory that their participation is rewarded monetarily
 - it is permissible to offer leniency in tests if students participate
 - it is permissible for the researcher to exercise his/her control over students to ensure participation
 - it is obligatory that all student participation is voluntary

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