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Sabre-Toothed Tiger (Smilodon populator)

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Charles R. Knight [Public domain]

Sabre-Toothed Tiger (Smilodon populator: This fearsome beast with 20 cms upper canines roamed America between 37 million and 7 million years ago. The lower canines were reduced in size and the molars were shearing cutting edges, no grinding there! The cervical muscles were well developed so the canines could be used for slashing and stabbing.

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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.**

Sabre-Toothed Tiger (Smilodon populator): This fearsome beast with 20 cms upper canines roamed America between 37 million and 7 million years ago. The lower canines were reduced in size and the molars were shearing cutting edges, no grinding there! The cervical muscles were well developed so the canines could be used for slashing and stabbing.

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New guidelines for dentists in controlling anxiety using responsive sedation

SADJ June 2019, Vol. 74 No. 5 p219 - p220

MA Gillman[1], L Lang[2]

New guidelines[1] were approved by the Board of the South African Dental Association in March this year. This is indeed an historic milestone for SADA and indeed for all South African dentists. To put the matter in perspective, a brief resumé of the history of anaesthesia and conscious sedation may be appropriate.

Few realise the prominent role that dentists have played as the actual pioneers in the fields of both anaesthesia and conscious sedation. In both cases we did the seminal work. It was dentists who were responsible for introducing the wonders of both general anaesthesia and conscious (also now called procedural) sedation to mankind.

Horace Wells, a dentist, was acknowledged posthumously by the American Dental Association in 1864 and the American Medical Association in 1870 as the "discoverer of practical anesthesia" (sic).[2] Interestingly, the honour had been bestowed on him previously, in 1848, by the Parisian Medical Society in France.[1]

Figure 1: Etching of Horace Wells by Henry Bryan Hall

In spite of this clear-cut attribution to Wells, based on carefully researched historical data, the medical profession has a tendancy to wrongly acknowledge William Morton, a physician, as the discoverer of anaesthesia.[3]

In fact Wells demonstrated nitrous oxide anaesthesia in 1845, a year prior to Morton's ether demonstration in 1846.[3,4] Indeed, the first witnessed surgical extraction using nitrous oxide occurred even earlier, for in 1844 Dr Riggs had extracted one of Wells' own wisdom teeth under nitrous oxide anaesthesia.[2] Ironically, Morton was a dentist at the time of his demonstration, although he was also studying medicine.[3]

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Today, the discovery is commonly, but inaccurately, attributed to Morton by leading authorities, with Wells' work consigned to a passing reference.[3] However, research published in a prestigious anaesthetic journal,[5] supported by an editorial stressing the historical accuracy of that research[6] clearly puts paid to the myth that Morton rather than Wells discovered surgical anaesthesia.

Even today, many members of the medical and dental professions are unaware that surgical anaesthesia, and the resultant advances in modern surgery, were due to the inventive mind of a dentist… Horace Wells.

Conscious intravenous sedation was also the brainchild of a dentist, …Neils Bjorn Jorgensen. In 1945, he brought intravenous conscious sedation to dentistry, medicine and mankind, in the form of 'The Jorgensen Technique'.[7-10] He is the first person to have been recorded to have administered a mixture of intravenous agents for conscious sedation.[4,7]

Figure 2: Photograph of Niels Bjorn Jorgenson

According to a recent paper,[11] procedural sedation (alias conscious sedation) only began in the 1980's, ignoring the ground-breaking contribution of the dental profession, which had pioneered and developed the technique at least three decades earlier. It is therefore fair to say that Jorgensen, a dentist, is truly the father of procedural sedation in dentistry and medicine.[4,7]

It was Harry Langa, also a dentist, who in 1936 started using low-dose subanaesthetic nitrous oxide mixed with high concentrations of oxygen to produce conscious sedation. From 1949 onwards, Langa conducted a high quality course in conscious sedation with nitrous oxide which he termed relative analgesia. His work on nitrous oxide culminated in 1976 with the publication of his classic book: "Relative Analgesia in Dental Practice: Inhalation Analgesia and Sedation with Nitrous Oxide".[4,11] This book was the standard reference guide for many decades.

It is ironic that the medical profession has taken almost complete possession of our discoveries and have conveniently ignored our seminal role in these fields.

This seems to confirm the truth of what Winston Churchill is purported to have said, 'History is written by the victors.' For these reasons we need at last, to fully recognise the role that the dental profession has taken in bringing painless dentistry, and as a by-product, painless surgical procedures, to humanity. We as the dental profession can be justly proud of our contributions in the field of conscious sedation and anaesthesia. However, there is also a responsibility for us to take possession of our contributions, at least as far it impacts on our profession.

We must take the reins of controlling all aspects of our profession firmly in hand and this is exactly what SADA has now done by approving these new guidelines as they apply to dentistry. Up to now, we dentists have abdicated our responsibility for designing guidelines for conscious sedation to another profession. For years now, we have requested guidelines from a profession, which, although highly skilled, has little idea of the special needs of our own profession. Until now we have gladly allowed and indeed encouraged them to dictate these guidelines. At last we are now taking responsibility and are formulating our own guidelines which are appropriate to our needs and are true to the historical facts.

Below you will find the crucial points covered in the Summary and Conclusion of these guidelines, which will soon appear in their totality, on the SADA website:

1. The dentist should have undergone proper tuition in both theoretical aspects and in practical hands-on application, properly supervised.
2. If the operator-sedationist is going to use intravenous sedation, the simplest approach must be adopted.
   a. Where possible, only intravenous midazolam should be used according to the procedure outlined.
   b. Should any additional analgesics be required, the drug chosen should not have respiratory depressant properties - hence no opioids should be used. Either IV paracetamol 1000mg should be adminis tered slowly before the midazolam or an intravenous non-steroidal anti-inflammatory can be used intraoperatively. However, it must be very clear that local anaesthesia is the mainstay of pain control in the dental procedure.
   c. Inhalation sedation with nitrous oxide may be used (on its own or with local anaesthesia, or as an adjunct to intravenous sedation, mainly to facilitate the venepuncture. In cases where it is used for venepuncture, nitrous oxide administration should be terminated once the intravenous technique is started.
3. A dentist acting as a dedicated sedationist and wishing to use a multidrug technique, including the use of opioids, should have undergone further training.

The new guidelines conclude:

Sedation, in the hands of a trained, caring practitioner, offers a very safe, affordable solution for those patients who are apprehensive, have had previous traumatic dental experiences or who are due to undergo surgical procedures that might cause discomfort and pain.

The emphasis remains on proper training, continual attendance at workshops to update one's knowledge of procedures and an awareness of the potential problems which may occur and how to handle these.

Bearing all of the above in mind, sedation does afford one the opportunity to provide a service which was summed up thus by Carl Buechner:

"They may forget what you said but they will never forget how you made them feel".

Conflict of interest

Since 2003 Prof Gillman has been the Medical Adviser to Sedatek, a company that sells conscious sedation equipment. He has no shareholding in Sedatek. Dr Lang declares no conflict of interest.

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Understanding dental coding

SADJ June 2019, Vol. 74 No. 5 p221 - p222

KC Makhubele with J Michelson

One of the most important services the South African Dental Association can render to our members and to the Dental and Oral Health professional community is the development, interpretation and maintenance of Dental Codes. This has over the years provided oral health practitioners and stakeholders the basis upon which to speak a "common" language.

At the onset, be reminded that the existence of a Dental Code as determined by SADA does not mean that the procedure will be reimbursed by medical schemes/third party funders - a matter with which the Association is continually dealing.

Medical schemes have the right to limit the scope, the frequency and/or combinations of such dental procedures that are covered or reimbursed. The currently acceptable Dental Codes are published in the SADA 2016 Code book.

There are often misunderstandings of the reasons for using coding in general and, particularly, for the different types of codes used in dentistry.

With the Association planning to release the results of the study on Relative Value Units (RVU) and the revised Code book in the latter part of 2019, it is opportune that we clarify dental coding and its use.

I have taken the liberty of publishing below an article written by Dr Jeff Michelson, for our May Clinical Advisory Bulletin.

Khomi C Makhubele: Chief Executive Officer
Jeff Michelson: Coding and Claims, Head Office

Basic background knowledge for the dentist and practice staff

There are often misunderstandings of the reasons for using coding in general and, particularly, the different types of codes used in dentistry. A coding system is simply a way of assigning numbers or characters to items of information, enabling a user to list, identify, transmit, receive or retrieve data.

Coding allows a user to locate an item of information/data, in a logical list, and to find a descriptor (verbal description) that tells us what that code represents. (In some cases, individual descriptors have further conditions, rules and guidelines attached).

Codes enable us to record in writing actions or charges without having to write out each line item in full.

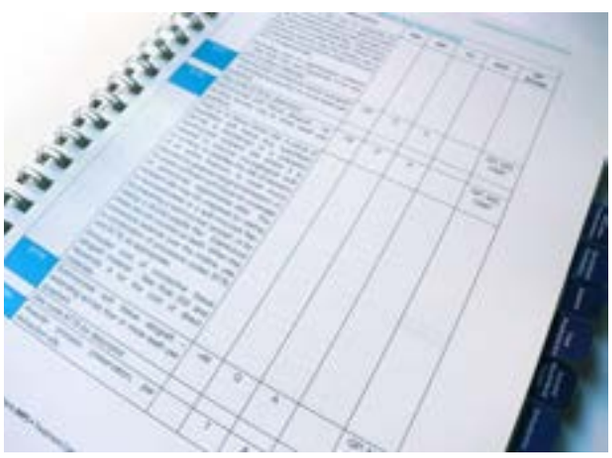
Two major coding systems are commonly used in South African dentistry

Diagnostic codes

Diagnostic codes signify and annotate the reason for an intervention - why/under what circumstances did the patient come?/what is wrong with the patient? The Diagnostic coding system in common use is the ICD-10, created by the World Health Organisation (WHO) for universal usage.

Procedure codes

Procedure codes represent what is actually done to investigate/examine and treat a condition that has been diagnosed. These codes cover consultations, tests/examinations, X-rays/Ultrasound, operations/procedures and technicians' codes.



Basics of diagnostic codes

- **In an ideal world** the individual dentist or dental specialist should be the one assigning an ICD-10 code to every procedure because he or she knows the reason for the patient being there and is the one making the diagnosis or describing the circumstances.
- **In reality**, most of the time, clinicians seem to use the same diagnostic code every time a similar procedure is done, especially if it is a high repetition operation (e.g. a single surface restoration).
- Often, administrative staff who have little or no knowledge about clinical procedures or circumstances are assigned the task of allocating ICD-10 codes.
- In addition, in most practices the electronic accounting software automatically assigns a predetermined ICD-10 code to each procedure code, whether it is really the reason for the procedure or not.
- Medical Aid assessors are therefore often correct in declining claims as a result of mis-matching diagnostic and procedure codes.

Usage of procedure codes

- Procedure codes are the codes used to list consultations, tests/examinations, X-rays/Ultrasound, operations/procedures and technicians' codes.
- The codes for all currently accepted procedures are listed in: **SADA Dental Codes 2016**.

SADA receives frequent requests for the **2019 version** of the **Dental Codes** but these will not be updated until finalisation of the RVU so the **SADA Dental Codes 2016** remains effective.

Members often call in to the Association requesting the "**price**" i.e. what to charge for a **particular procedure**.

In the past, **funders' benefits** were based on the National Reference Price List (NHRPL). This was governed by RAMS (Representative Association of Medical Schemes) under the auspices of the BHF (Board of Healthcare Funders).

In 2010, after pronouncement by the Competition Commission, the **NHRPL was declared invalid**.

Since that time, each **individual medical aid** or administrator has been legally required to publish its **own benefits**, including which codes are reimbursed (with the exception of PMBs, which all funders are obligated to fund) and the tariff for each service.

So, while we are prevented by legislation from making any comment about the price for any procedure, SADA is always happy to assist members with interpretation of procedure codes.

Links to more detailed information about coding and guidelines may be obtained from the SADA website **www.sada.co.za.**

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Understanding the perceptions and experiences of oral conditions and oral health-related-quality-of-life among HIV-infected and undiagnosed adolescents in Johannesburg, South Africa

SADJ June 2019, Vol. 74 No. 5 p223 - p229

Y Malele Kolisa[1], V Yengopal[2], J Igumbor[3], CB Nqcobo[4], PP Sodo[5], SJ Nieuwoudt[6]

SUMMARY

High occurrences of oral diseases among HIV-infected children and adolescents raise concerns about their Oral Health-Related Quality of Life (OHRQoL). The applicability of existing assessment tools for OHRQoL has not been investigated in South Africa.

This study assessed an existing tool by exploring the perceptions and experiences of OHRQoL among adolescents living with HIV (ALHIV) in Johannesburg.

Twenty-five in-depth-interviews of both ALHIV and HIV-undiagnosed adolescents were conducted and thematically analysed to identify arising themes.

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ACRONYMS

ALHIV:	Adolescents Living with HIV
COHIP:	Child Oral Health Impact Profile
OHRQoL:	Oral Health-Related Quality of Life
IDIs:	In-Depth Interviews

Three broad domains and eight themes were identified: (1) **individual level:** oral health awareness, felt oral-symptoms, impaired oral-functioning and coping; (2) **external factors:** access to and negative experiences of using health services; and (3) **social level:** social interaction and self-stigmatisation.

The adolescents' understanding of oral health concurred with global definitions. ALHIV reported HIV-related self-stigmatisation perpetuated by more oral-symptoms and oral impairments (speaking, eating and teeth-cleaning) and more self-care and coping practices.

The perceptions and experiences of OHRQoL among ALHIV in Johannesburg were influenced, as elsewhere, by a combination of self-perception and social interactions, together with the state of their structural environment and biological wellbeing.

High values were placed on coping, symptom endurance, resilience and dental health service experiences. These findings may be relevant in meeting adolescents' oral-health needs and improving services.

Keywords
HIV, oral health, qualitative interviews, quality of life, South Africa, adolescents.

INTRODUCTION

According to global reports, there are nearly 2.1 million adolescents (10-19 years) living with HIV Infections (ALHIV).[1] About 84% live in Sub-Saharan Africa.

Of the 7.1 million South Africans living with HIV in 2016, approximately 370,000 (240,000 - 520,000) were adolescents aged 10 - 19 years.[2]

ALHIV remain vulnerable to oral diseases[3] and have high unmet oral health care needs despite their regular use of anti-retroviral treatment (ART) services.[4,5] Studies conducted on children outside South Africa (SA) have reported a poorer oral health-related quality of life (OHRQoL) due to oral diseases in ALHIV when compared with HIV uninfected children.[6-8] This may or may not be the case for South Africa given that OHRQoL varies with socio-cultural and economic factors.[9,10]

Oral health influences people physically and psychologically; it influences how they grow, look, speak, chew, and socialise, as well as their feelings of social wellbeing. Thus, oral health is essential and fundamental to the quality of life as it ensures social and physical wellbeing.[11]

Glick and co-authors in 2012 defined oral health as including: the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions, with confidence and without pain, discomfort, and disease of the cranio-facial complex".[12]

The conceptualisation of OHRQoL is context reliant as it highlights social relationships in a social environment.[9] Koot and Wallander (2002) added that health-related quality of life has dual subjective-objective elements underpinned by the phase in one's life.[13]

Adolescent patients have distinctive oral health needs, characterised by mixed to permanent dentition, a period of notable caries activity and a higher prevalence of gingivitis. They have heightened vulnerability to environmental factors such as diet, independence to seek care, compliance to care, low priority for oral hygiene, self-image and social acceptance.[15,16] This phase of life has a myriad of life changes besides the added considerations of living with the HIV infection.

The high burden of oral diseases among HIV-infected children and adolescents in South Africa is well documented.[17,18] However, there are gaps with regard to information on the impact of the oral conditions on the OHRQoL of HIV-infected adolescents.

A review of the literature indicates that none of the existing quantitative tools that measure the quality of life in oral health have been developed in the African setting. Thus assessing their local applicability is essential as non-adapted tools may be culturally invalid. Existing OHRQoL tools showed measurement bias when interrogating attributes such as ethnicity due to their inherent theoretical biases.[19]

Sischo and Broder proposed in their 'Theoretical Model of OHRQoL' that the biological-symptom-functional status complex of oral conditions is directly driven by both individual and environmental characteristics and these overall exert an influence on OHRQoL.[20] However, various scholars in the field argue that the frameworks and models consistently underscore the importance of the socio-cultural context and its complex interplay with other critical determinants of OHRQoL.[21,22]

Against this background, this paper seeks to understand the perceptions and experience of OHRQoL among ALHIV in Johannesburg, South Africa and, further, to explore the applicability of the tool that has been developed for the theoretical framework; namely, the Child Oral Health Impact Profile (COHIP) measure.[20]

METHODS

The relationship of ALHIV oral health status with the OHRQoL was explored in a qualitative study design using the theoretical model of oral health-related quality of life framework. The study respondents comprised both HIV positive adolescents aged 14-19 years receiving treatment at a Johannesburg ART Wellness Centre and HIV undiagnosed adolescents recruited from public schools located in the Johannesburg central business district, having similar participant profiles and demographics. Johannesburg is a cosmopolitan, multicultural urban city with a high African migrant population, estimated to have a population of nine million people. The city presents a diverse cultural and ethnic background with a potential to influence the OHRQoL.

In-depth interviews (IDIs) were used to collect information to fulfil the study's objective. IDIs can provide an undiluted focus on the individual as the adolescents may not feel free to talk about their infirmities and matters bordering on their personal issues in a focus group discussion.[22]

Each adolescent and parent/guardian received an information sheet about seeking parent/guardian informed consent for both the interview and audio recording of the process, while the adolescents provided assent. The Human Research Ethics Committee of the University of the Witwatersrand (M161142) approved the full study protocol. Interviews were carried out until thematic saturation was reached.

The participants were asked about their perception of OHRQoL and their experiences of how oral conditions affect their daily activities. The adolescents were probed further for any response given to elicit frequency and severity of problems (if any). Two trained researchers conducted the interviews. Semi-structured interviews were conducted following the interview guide to ensure consistency and trustworthiness. In addition to guiding an open exploration of personal accounts on experiences and views about oral health conditions, the interview guide assisted in exploring the value placed on oral health and assessed the severity of impairment resulting from the oral health conditions.

The IDIs were conducted in a room at the study sites. The interviewers were cognizant of reflexivity, i.e., the ability to evaluate one's own biases and preconceptions. This was done by bracketing; the process of setting aside one's personal experiences, biases and prior notions.[23] Bracketing involved engaging in dialogue with fellow researchers during the conceptualisation stage of the

research proposal, and noting down all personal viewpoints. Then, during the interview stage, daily discussions were held to recognise and to isolate personal bias or preconceived notions. At the conclusion of the interview there was an opportunity for adolescents to ask questions and report any relevant information.

Data management and analysis occurred concurrently. IDIs from both wellness and school sites were transcribed verbatim by the research team and analysed using thematic content analysis. Firstly, the research team read transcripts independently without any coding. The second reading of the transcripts occurred, and initial 'codes' were assigned to a group of text. A mind map visualising the data was run using NVivo software to identify frequently used words which was helpful in understanding the feedback. To enhance the trustworthiness of the process, three independent coders analysed the transcripts. The initial categorisation of themes led to the definitions of the 'arising' codes.

The three coders came up with a list of different codes and in discussion reached consensus on the final initial codes based on the study objectives. The third stage involved discussions with different researchers, investigating the relationships between initial codes to enable reduction of the codes to higher order final themes. Eight themes were identified, and these were later regrouped into three higher order domains, all congruent with the propositions in the reference conceptual framework on OHRQoL.[20,21]

Twenty-five adolescents, 14 females and 11 males ranging from 14 to 19 year olds (Table 1) participated in the IDIs until no new information was retrieved.

Table 1. Distribution of participants

	Male *n*=11	Female *n*=14	Total *n*=25
School site (14-16 yrs.)	5	7	12
Wellness site (15-19 yrs.)	6	7	13

BROAD QUALITATIVE FINDINGS

Following the objective to explore the understanding, perceptions and experiences of the adolescents in Johannesburg regarding their oral health and oral health-related quality of life, eight themes were identified that fell into three broad domains: individual factors, external factors and social impact factors (Figure 1).

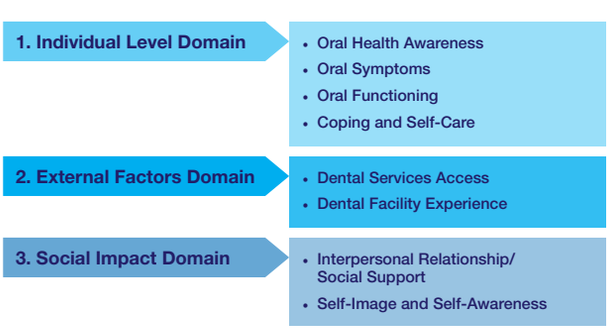

Figure 1. Domains and themes identified from the transcripts.

Individual-level domain

1. Oral health awareness

Adolescents were asked to share their understanding of oral health as a 'concept'. They reported that 'dental health' refers to the presence of dental signs and symptoms of the oral disease; poor habits or good dental health. Knowledge of oral health seemed optimal. When asked "What can you tell me about dental health?" one participant summarised:

"Dental health refers to your teeth, your mouth and taking care of them and all that." - (Male 16 years, Wellness site)

Those participants from the school site described oral health as related to the behavioural practices such as taking care of teeth. ALHIV group related oral health to the effects of bad behavioural practices and to the presence or absence of symptoms. The remark 'taking care of' implied the participants put the responsibility and ability to self.

"Dental health means that if you don't brush your teeth, your mouth always smells when you talk to people."
- (Male 18 Years, Wellness site)
"Dental health means I'm not taking care of my teeth & my teeth are rotten & stuff like that."
- (Male 15 years, School)

ALHIV described 'dental health' based on their perceived health-seeking behaviour; once more, mention of absence or the presence of problems in the mouth or teeth.

"Dental health refers to anything concerning teeth; taking care of them and keeping them fresh. Dental health is treating your teeth like going to the dentist and checking what is going on. Also, is when you do not have teeth problem or paining or has holes."
- (Female 15 years, Wellness)

Both groups of adolescents displayed an understanding of oral health.

2. Oral signs and felt symptoms

The 'oral signs and symptoms' emerged most often in the interviews. ALHIV generally reported more felt symptoms and signs of oral disease than did their counterparts. Among the symptoms most frequently mentioned were pain, bleeding gums, bad breath, dry lips and mouth, sores on the mouth, sores on the tongue, and decayed teeth. When asked about the frequency and intensity of the symptoms, they reported variable levels of intensity, rated from one to ten, with ten being the most intense on a visual analogue scale. There were reports of sores on the tongue that were rated eight out of ten. One participant from the school site reported being affected by bad breath and bleeding gums, rating his feelings at nine. Generally, female adolescents expressed symptoms.

"I have rotten teeth but not bleeding gums. It pains nearly twice a week. Especially when eating when I have tonsils and sores. Swallowing and chewing, sucking is painful. Taste is also affected because I taste something different. That makes me to stop eating." (Female 16 years, Wellness site)

3. Oral functioning

The ways in which symptoms impacted on oral health functions were coded separately. These functions included speaking, eating, cleaning/brushing teeth, and swallowing. Functioning was generally equally reported across the two research sites and across both sexes. When asked about the role of teeth and the mouth in daily activities such as eating, schoolwork, speaking: one respondent replied:

"I am affected, especially eating, when I have tonsils and sores. Homework and sleeping are not affected. Swallowing and chewing, sucking is painful. Taste is also affected because I taste something different. That makes me to stop eating. This affects twice a month…. I love eating, but it makes lose appetite. I get disturbed with brushing because I end up doing it once, but usually, I would do it twice." (Female 16 years, Wellness site)

4. Coping and self-care

A theme emerged of coping and self-care in oral conditions management. The coping mechanism was defined as managing the symptoms and included self-help home remedies treatment of orofacial condition signs and symptoms without seeing a health professional.

Despite adolescents reporting a high frequency and strong intensity of oral symptoms, they mostly had ways of managing or coping with their oral problems. There was an element of being strong and resilient to the oral symptoms experienced. There was a will to take action to solve matters or 'live with the condition' attitude. For instance, when asked 'how do you feel about teeth and mouth problems'; two adolescents shared the following:

"It's very bad sometimes I feel like I can spit out whatever that I'm eating… but I never actually spit it out, I just find a way to withhold the pain, and I act like I'm fine." (Female, 16 Wellness site).

"Sometimes I feel very uncomfortable especially when I talk because of the smell. My mom told me I have a smelly mouth. I wasn't aware of it. She bought the spray for me, and I get ok. Pain makes me not to chew on that side. This makes me feel ……not sure…..but now I am used to chewing on one side." (Female 15 years, School)

External factor domain

1. Dental access

Another emergent theme was related to the use of the dental services and the issues around using dental services. Dental access referred to the adolescent acquiring dental services for the problems experienced. Access would at times be related to the distance to the dental facility, which was a problem for some.

"The clinic is far though. I struggle with transport, but I go, sometimes I walk to the clinic. I get money from my mom; I do get support from people I stay with." (Female 16 years, Wellness site.)

In addition to distance, adolescents spoke about cost as a hindrance to using dental services.

"When I brush my teeth, I always have stains. It is better ever since I started using Sensodyne. But I still have problems. My problem is the filling. When I eat, I have toothache, and I eat on the other side for chewing. I endure pain 'cos I don't have money for the dentist. The private dentist you pay." (Female 16 years, Wellness site)

Another participant reported that remembering past pain would push her to seek dental treatment.

"I needed to take out teeth about six years and was in theatre. At first, I was scared, and my mom told me it has to be done 'cos they are bad. She reminded how it was for me hurting before we came to the clinic. I was scared, but we went to the clinic. When we were at the clinic, it became even be sorer, so there was definitely no turning back." (Female 16 years, Wellness site)

2. Dental experience

A theme on past experiences arose, referring to both the good and bad experiences related to the dental services which had been acquired. This theme was closely related to access, as past experiences had the potential to influence the accessing of dental services. One adolescent shared a very negative and traumatic experience, which she linked to her limited choice of service provision. It was encouraging to note that she acknowledged that the bad experience was an isolated event that might not occur again because 'doctors (dentists) are not the same.'

"It was very painful. I think the injection and the extraction contributed to the pain. I told them it was painful and they told me to sit still. They need to ask people to come check their teeth. Getting to know what they do in their daily live. As for my experience, they should have listened to me and left me alone. I mean I told them it was sore, but they continued taking it out. I might go back again 'cos doctors are not the same. Nothing positive happened during my dental visit, the extraction was very bad." (Female 18 years, Wellness site)

The dental experience was influenced by the perception that free public dental services are of poor quality. The adolescents end up not being empowered about their oral health.

"They do not check the tooth but they give me treatment (tablets). I don't feel good cos I end up not knowing what is wrong with me. The free service clinics they don't attend well, and they will tell you to take it out. They take out teeth badly. I have been there [public clinic] once, and I had a bad experience when I went to take out my tooth, they didn't take it all out. I had to go back to the dentist [private], and they filled it, and my experience was good." (Female 16 years, Wellness site.)

Not only bad service experiences were described in the interviews; some reported positively about the health personnel's right attitude and warmth.

"I had that bad dental experience when I was sick, my teeth were rotten but they took it out so now apparently I have perfect teeth. My second time for checkup the experience was good. They talk well, chat well and are friendly.

Maybe when they transfer to bigger room (it will be even better). Experience at the dentist was my mouth was numb but no pain." (Male 18 years, Wellness site)

Social impact domain

1. Interpersonal relationships and social support

When asked to comment on the role and support received regarding teeth and mouth issues, the importance of family or peer support became evident among the ALHIV at the Wellness Clinic. Social support was identified and defined as the backing by people around self, regarding teeth and mouth problems.

When responding, one adolescent from the Wellness site referred to his own health status generally but at the same time related the response to the teeth and mouth care support. According to adolescents, family, mostly mothers, were very concerned about the children's well being especially those with chronic conditions from the wellness site.

"Family they remind you when one has forgotten medication, and that is good. My place, we're five people living in our house; they are supportive, they remind me to take my medication for my sickness, they give me stuff when I ask for them. When there no money they don't give me and I understand." (Male 16 years, Wellness site.)

One adolescent acknowledged and appreciated the feedback about mouth problems from various people. He also mentioned that some symptoms such as 'bad breath' could interfere with the interpersonal relationships and affect how they socialise.

"People are important cos they will tell you what to do or not to do. Bad breath can affect how you socialise, in a group, they will see it as 'bad', and you'll end up not going out." (Male 15 years, Wellness site)

One reported that teeth and mouth problems compete with playtime because if you are not in pain, you are afforded the time to socialise more and play more. They also commented on having to 'fix the teeth first,' attending to teeth and mouth problems before the time for fun.

"Pain disturbs because sometimes when you are having a fun time with friends or maybe it's a big thing you need to go to the dentist to fix the problem, sometimes your cousins will have more play time than you." (Female 14 years, School)

2. Self-image and self-awareness

Self-image and awareness covered a continuum of individual and socially acquired perceptions. Self-image reporting was related to acceptance in the society. Acceptance of their current and felt symptoms arose from the adolescents attending the Wellness Clinic. Both female and male adolescents expressed the yearning to be accepted by other peers, with being 'cool' an aspiration expressed by many. The males reported self-confidence as a way of being macho and manly. Males expressed the township nuances of being cool and the associated greatness in the responses.

Acting 'cool' may also have been a coping mechanism, primarily because at the wellness site, routine group counselling occurred at every weekly visit by the resident social worker. The IDIs occurred in a context where group counselling services were offered to the ALHIV to increase compliance with the ARV medication. Counselling services also assisted ALHIV with disclosures about their HIV status.

"I don't care what my friends say or think about me, when it comes to 'ukuhloma'- being cool, I'm doing it for me not for them. But it is different when it comes to girls, imagine…no there is different." (Male 18 years, Wellness site)

More adolescents in the wellness group expressed embarrassment about oral conditions than those recruited from the school site. Females generally were more embarrassed than males, expressing feelings of shyness and anxiety when they had to interact with people around them. Closely linked to that was the element of wanting to isolate themselves and not mix with others due to the problems with their teeth and mouth.

"I do get embarrassed when I have gum problems. I am scared to talk this worries me – (rated 5/10). That makes me sad, and I keep quiet, and I stay alone." (Female 16 years, Wellness site)

One female from the Wellness site was distressed and hurt from her oral symptoms of pain, bleeding gums and associated bad breath.

"I hurt (participant really aggrieved when she is relating the story of pain and bleeding gums she was crying) because it shows teeth are not right. I feel bad. I cry because it makes me worry about my condition, [that I am sick] it makes me think about what are they thinking of me." (Female 19 years, Wellness site)

In summary, the responses of the adolescents were based on i) their current oral health status, ii) their experiences and feelings thereof, iii) their perceptions and experiences of oral health care; iv) the actions to resolve their oral health status, and finally, v) the impact of their current health and oral health status on their feelings.

All were affected by their oral conditions. The intensity and frequency of the conditions varied and was expressed more by the HIV-infected adolescents than by their HIV uninfected counterparts.

DISCUSSION

The in-depth interviews used in the study relied solely on the honest recollection of the study participants of their opinions and views on oral health. Discreet observation of the participants might have captured their experiences and behaviours more accurately as opposed to depending on what they said. Taking into consideration the shortcomings, this study provides an account of OHRQoL perceptions and experiences of adolescents at an HIV Wellness Centre and a group of HIV undiagnosed adolescents recruited through schools in Johannesburg.

The understanding of oral health in both groups was consistent with global definitions of oral health as not mere absence of disease and included the ability to fully function and interact.[12]

The perceptions and experiences of oral health were noted as interconnected and perpetuated by each other, with the benefit of influencing the adolescents' oral health practices and health-seeking behaviours. This observation is in agreement with an existing oral health conceptual framework that demonstrates the effect of oral health perceptions on oral health behaviours and the responsibility to care.[21]

The participants, particularly ALHIV, placed a high value on oral health functioning and symptomology. Female participants were more expressive about their felt symptoms and impairments than were the male participants. This was expected as females tend to be more expressive during the adolescent years, with males having less interest in health issues at that stage.[24]

A Brazilian study added that females are more sensitive to physical appearance during adolescence compared with their male contemporaries.[25] The most common functional impairments cited were impaired ability to chew, talk and inability to brush teeth. This observation is worrying given the high prevalence of oral conditions previously reported among ALHIV.[5-8,26]

Experiencing oral health symptoms and functional difficulties resulted in the adoption of self-care and coping practices perceived to be an adequate response to the need. The self-care practices were often adopted to manage pain. This response could, however, delay professional attention and care and could lead to complications.[27]

The current study findings are similar to a qualitative study of adults living with HIV in Cape Town, South Africa, where participants relied on home remedies and over-the-counter medications, which delayed oral care.[27] However, reliance on home remedies for pain also may be linked to poor access and uptake of health services due to previous bad experiences with using health services or the inability to use health services for other socio-economic reasons.

Conceptually, access to oral health care is an important determinant both at the individual and family level.[21,20] Access to health services influences oral healthcare-seeking behaviour and, by extension, oral health well-being. External structural barriers to access to dental service, such as costs and distance, were evident from the study. Bad dental services experiences, also linked to bad staff attitudes, were associated with the perception that free public dental services are of poor quality.

The deterrent effect of healthcare worker attitudes on the pathways to patient satisfaction is well documented in South Africa.[28] Consequently, service access is avoided or delayed, with bad services endured by a resilient few due to their limited choices in service provision for reasons such as affordability of care.

Levels of self-image and awareness, and (self)-stigmatisation were other common themes impacting on the adolescents' perceptions and experiences of OHRQoL. Some participants recounted how halitosis (bad breath) resulted in their social isolation. The self-assigned isolation is a sign of self-stigma noted in the HIV disease and stigma trajectory.[29] This theme was more common among ALHIV due to negative labelling arising from internalised shame associated with the causes of the HIV infection.[30,31] In addition, the attributional process of self-stigmatisation diminishes internalised beliefs about self and consequently the OHRQoL of the ALHIV.

From a theoretical perspective, our findings confirm that both individual and environmental characteristics influence biological functional status, but there is little or no mention of culture and beliefs as determinants of OHRQoL among adolescents in Johannesburg. The theoretical model of oral health-related quality of life proposed by Sischo and Broder (2011) which influenced tool development was supported.[20]

This model highlights the multi-dimensional 'outer' individual and environmental characteristics and the 'inner' overall physiological processes (biological function, symptom status and functional status) which together influence the overall status of the OHRQoL.[20] The interaction between biomedical and psychosocial dimensions and constructs of OHRQoL is also present in a model proposed in 2005.[32]

In conclusion, the perceptions and experiences of OHRQoL among ALHIV in Johannesburg are driven by a combination of how they viewed themselves and socialised, and the sum of the state of their structural environments and biological wellbeing.

This is in agreement with existing OHRQoL frameworks and tools. This study also underscores the high value that ALHIV in Johannesburg place on issues such as coping ability, symptom endurance, resilience and experience of using dental health services.

The study finding can be used to improve the prioritisation and provision of oral health support services for adolescents in Johannesburg, based on the observed service delivery gaps and the value they place on some of the themes identified, while bearing in mind gender differences and preferences. This proposition does not negate the need for further quantitative exploration of the adolescents' ranking of the various themes such as stigma and self-perception, symptom endurance and experience of using health services even in the context of universal HIV treatment in South Africa. Furthermore, the need to secure enhanced oral health promotion is underscored to discourage the delay in seeking care.[27]

Such efforts should include the promotion of preventive measures to improve oral health. Greater integration of oral health services into common adolescents' health services and school health programmes is an imperative.[5] The study also re-emphasizes the need to intensify general health services re-sensitisation for more adolescent and youth friendliness.

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Assessment of job satisfaction among dentists working in different settings in the Tshwane metro

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SUMMARY

Introduction

Job satisfaction of dentists is important, as dentists are critical in the delivery of comprehensive health care.

Whilst job satisfaction among dentists has been widely investigated elsewhere, it is poorly researched in South Africa.

Aims and objectives

To assess job satisfaction among dentists working in Tshwane district.

Design

A cross-sectional study.

Methods

Data were collected using a self-administered, validated, modified questionnaire adapted from the Dentists' Satisfaction Survey. Demographic data and the responses associated with job satisfaction in various settings were collected.

Two of the questions were qualitative and open-ended. Data were analysed using statistical software package (STATA) version 10. Ethical clearance was obtained and all data were anonymous.

Results

The response rate was 77% and 53 %(41) of respondents were female. Perception of income, relationships with patients and personal time were significantly positively associated with job satisfaction.

Patient happiness with treatment, the autonomy and flexibility of private practice and imparting knowledge also contributed to job satisfaction.

Unrealistic expectations of patients, long working hours, restricted funding and lack of equipment contributed to job dissatisfaction.

Conclusion

Overall the dentists were satisfied, however, satisfaction and dissatisfaction were conditional and influenced by factors such as perception of income and unrealistic patient expectations.

Keywords

Job satisfaction, dentists, settings.

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INTRODUCTION

Morale in the workplace, or job satisfaction, has been the subject of much research. This is mainly because, either as an individual or as an important inter-related factor, job satisfaction forms a significant part of the literature in Human Resource Management.[1]

Importantly, job satisfaction influences productivity and performance, as well as the quality of life. One author defined the concept of job satisfaction as the pleasurable emotional state from the appraisal of one's job.[2]

Employee job satisfaction is recognised as a multi-faceted construct that includes the feelings of employees about a variety of both intrinsic and extrinsic job elements.[3]

It has been reported that intrinsic factors are factors such as the nature of the job itself and the opportunity for growth, which are internally mediated rewards.[3]

The externally mediated rewards are, for example, pay and benefits, company policies and support, supervision and relationships with supervisor and co-workers, promotion and working conditions.[4]

Job satisfaction is essential in predicting the stability of systems, worker motivation and retention. Dentistry has been identified as one of the most stressful health professions.[5]

Most studies about job satisfaction among dentists have been conducted in Australia, the United Kingdom and Lithuania.[6-10] However, not much is known about the factors that influence job satisfaction of dentists in South Africa.

The study therefore was aimed at assessing job satisfaction among dentists working in different settings in Tshwane district.

METHODOLOGY

A cross sectional descriptive survey was conducted in 2012, based on an adapted Dentists Satisfaction Survey[11] in order to determine the factors influencing job satisfaction among dentists working in the private and public sectors in the Tshwane Municipality, which is situated in the north of Gauteng Province. Two qualitative open-ended question were added to the questionnaire.

Tshwane is composed of urban, peri-urban and rural settlements. There are two dental schools in the Municipality, namely the School of Oral Health Sciences at Sefako Makgatho Health Sciences University, and the School of Dentistry at the University of Pretoria. The South African Military Health Services also operate several oral health clinics in the area.

The study opted for a convenience sampling, targeting respondents from each occupational sector. The sample was stratified to comprise 25 academics, 25 private practitioners, 25 South African Military Oral Health personnel and 25 dentists working in government clinics, comprising a sample of 100 participants.

A self-administered, modified and validated questionnaire was used to collect the necessary data.[11] The questionnaires posed enquiries on demographic data and factors that measured dimensions such as overall job satisfaction, perception of income, personal time, professional time and relationship with staff, opportunities for advancement, relationship with patients and standards of delivery of care.

In addition there were two questions of a qualitative nature, namely: “In your opinion, what aspects of your job satisfy you the most?” and “What aspects of your job dissatisfy you the most?”

To ascertain the internal reliability of the measuring tool, the Cronbach’s alpha was calculated for each item to measure how closely the statement was identified in the factor and for the overall job facet. Items with poor internal reliability were discarded before the full statistical analysis.

The proposal was submitted to the University of South Africa School of Business Leadership and received ethical clearance. No personal details of the participants were recorded and all information was treated as strictly confidential.

Statistical analyses

The statistical analyses were performed using STATA (StataCorp, 2013. Stata Statistical Software: Release 13. College Station, TX, USA: StataCorp LP). Data were reduced using factor analysis into overall job satisfaction, perception, personal time, professional time, support staff, relationship with patients and delivery of care.

Bivariate analyses such as the T-test and correlations were carried out between overall job satisfaction and binary and continuous variables respectively.

Multivariate linear regression was then carried out using a backward deletion approach by starting with a full model of all independent variables regardless of whether they were significant predictors of overall job satisfaction (forced entry method).

Statistical significance was set at $p < 0.05$ for multivariate linear regression. The responses from the two qualitative questions were categorised in terms of common themes.

Table 1. Characteristics of the study participants

Characteristics	% (*n*)	
Age (Years)		
20 - 29	14.3	(11)
30 - 39	36.4	(28)
40-49	32.5	(25)
50 and above	16.9	(13)
Gender		
Male	46.8	(36)
Female	53.3	(41)
Marital status		
Single	24.7	(19)
Married	74.0	(57)
Divorced	1.3	(1)
Highest level of education		
BChD, BDS	58.4	(45)
Postgraduate diploma	18.2	(14)
Masters	11.7	(9)
Specialization (MChD, MDent)	9.1	(7)
Other	2.6	(2)
Location		
Urban	81.3	(52)
Peri-urban	18.8	(12)
Years of practice		
Other	51.4	(38)
Wellness site (15-19 yrs.)	48.7	(36)

RESULTS

Of the sample of 100, 77(77%) participated and of these 53% (41) were female. The ages ranged from 20 to 69 years, with 69% in the range between 30-49 years, while 74% of the respondents were married (Table 1).

As to the place of work, 44%, 32%, 17% and 7% were in private, public, academia and the military health services respectively. Among those who reported that they were working in more than one sector, 55.6% indicated that the public sector was their main practice area, leaving 44.4% who responded that their primary employment was in private practice. The respondents' years of practice ranged to greater than 21 years.

Using factor analysis, seven groupings were discovered from the data. These included;

- Overall job satisfaction (Cronbach's alpha=0.87%),
- Perception of income (Cronbach's alpha=0.87%),
- Personal time (Cronbach's alpha=0.97%),
- Professional time (Cronbach's alpha=0.74%),
- Support staff (Cronbach's alpha= 0.83%),
- Patient relations (Cronbach's alpha=0.72%),
- and Delivery of care (Cronbach's alpha=0.76%).

Table 2. Correlation between job satisfaction and other characteristics

Characteristics	Pearson correlation coefficient	*p* - value
Perception of income	0.41	<0.001
Personal time	0.24	0.040
Professional time	0.14	0.260
Support staff	0.18	0.130
Patient relations	0.31	0.010
Delivery of care	0.22	0.070

Table 3. Bivariate relationship of socio-demographic factors by job satisfaction

Characteristics	Mean (SE)		*p* - value
Age			0.44
< 50 years	24.9	(0.72)	
≥ 50 years	26.0	(1.26)	
Gender			0.67
Male	25.3	(0.93)	
Female	24.8	(0.86)	
Location			0.01
Urban	24.2	(0.80)	
Peri-urban	28.1	(1.08)	
Years of practice			0.21
≤ 10 years	25.7	(0.92)	
> 10 years	24.1	(0.88)	
Main practice			0.64
Private	25.2	(1.34)	
Public	26.1	(1.23)	

Table 4. Multiple linear regression predicting factors associated with job satisfaction

Characteristics	Odds ratio	95% Confidence interval
Age		
< 50 years	1.0	
≥ 50 years	1.21	1.05-1.40
Years of practice		
≤ 10 years	1.0	
>10 years	0.85	0.77-0.95
Perception of income	1.02	1.01-1.03
Years of practice	1.03	1.01-1.05

There was a correlation between overall job satisfaction and perception of income. The higher the respondents perceived their income, the higher the job satisfaction (Table 2).

Participants with practices in the peri-urban areas reported better job satisfaction than did those in the urban area. However, gender and number of years of practice did not have any association with job satisfaction (Table 3).

Multiple linear regression predicting factors associated with linear job satisfaction revealed that dentists who were 50 years and above were more likely to be more satisfied with their jobs when compared with those who were below 50 (OR=1.21; 95% confidence interval=1.05-1.40). Also, those dentists who reported more positively on the perception of income (OR=1.02; 95% confidence interval=1.01-1.103), had a higher job satisfaction (Table 4).

It was also found that those dentists who reported to be happy with their relationship with patients (OR=1.03; 95% Confidence interval=1.01-1.05), were more satisfied with their job (Table 4).

Qualitative analysis

Questions 8 and 9 of the questionnaire were open-ended. For thorough analysis, underlying themes were identified from the various responses. The results are reported below:

Question 8: In your opinion, what aspects of your job satisfy you the most?

Major themes identified were as follows:

Patients' satisfaction

A number of respondents reported that seeing patients satisfied with the treatment they had received made the practitioner more satisfied about his/her job. The tone of the responses was:

A happy and satisfied patient when leaving my surgery - Male, Private Practice

Reaching out to a person who came with a dental problem and who is able to leave with a smile and satisfaction - Female, Public Service

Seeing a happy and satisfied patient is most fulfilling - Male, Academic

Interaction

Interaction with patients, colleagues and students are the sub-themes that stood out amongst the responses from the dentists surveyed. The respondents reported that interacting with the groups mentioned above enhanced their job satisfaction.

Interaction with students - Female, Academic

Interacting with fellow colleagues - Female, Academic

Interacting with patients - Male, Military Health Services

Helping patients
The respondents reported that they were satisfied when they could see that they have helped a patient.

It feels good to know that you have removed someone's pain and improved someone's aesthetics
- Male, Private Practice

Solving patients' problem - Female, Academic

To provide help to my patients, mostly to alleviate their pain - Male, Public Sector

Teaching and research
Respondents from the academic sector reported that their job satisfaction was enhanced by imparting knowledge to their students and by research.

I also enjoy post-graduate teaching and training
- Male, Academic

Working with students and doing research
- Female, Academic

Career development in research - Female, Academic

Helping postgraduate students with big complex cases
- Female, Academic

Educating patients and oral health promotion
The opportunity of being able to educate patients was reported to be a factor that also enhanced job satisfaction.

Being able to promote oral health to the community especially the elderly and the schoolchildren
- Female, Public Sector

The amount of dental education and knowledge I provide to my patients to improve their dental IQ
- Female, Private Practice

Improving oral healthcare outcomes for patients through educating patients and seeing results
- Female, Academic

Autonomy
Respondents from private practice reported that the autonomy associated with the running of their practices enhanced their job satisfaction.

Clinical freedom - the ability to decide on treatment planning issues - Female, Private Practice

In my work I am my own boss - Male, Private Practice

Working for myself, determining the working hours
- Male, Private Practice

Flexibility of time - I am the boss - Male, private practice

Relationships with colleagues
A number of respondents reported that having a good relationship with colleagues was pivotal in enhancing their job satisfaction.

Having a good working relationship with my colleagues and being part of a team - Female, Academic

Good support from staff makes my work easier to perform despite the long working hours - Male, Private Practice

Friendly, helpful co-workers - Female, Academic

Treatment outcomes
Dentistry is a very clinically oriented profession. A number of respondents reported that having favourable treatment outcomes gave them satisfaction in their job. One respondent's response was:

With orthodontics, the end results are life changing for a patient e.g. I have treated a 9yr old class II Div 1 patient who was being teased at school and after the treatment, the mother came back to tell me that her son is now confident and his school work has improved and he was even chosen as a class prefect - Male, Academic

Question 9: What aspects of your job dissatisfy you the most?
Major themes identified were as follows:

Patients' expectations
A number of respondents reported that unrealistic expectations of patients contributed to their dissatisfaction about their job.

Occasional unrealistic expectations from patients
- Female, Military Health Services
Ungrateful patients
- Female, Private Practice

Long working hours
A number of respondents reported that long working hours contributed to their dissatisfaction about their job.

Having to work hard to fulfil your dreams. Not having enough time to take a holiday - Female, Private Practice

Long working hours, non-flexible time - Female, Academic

Lack of equipment and materials
A number of respondents from both the public sector and academia reported that lack of equipment and dental materials necessary for them to carry out their duties contributed to their dissatisfaction with their job.

The technical aspects - not enough equipment, lack of maintenance and repairs of equipment, outdated equipment - Male, Public Sector

Lack of resources e.g. gloves. Outdated equipment
- Female, Public Sector

Lack of resources for teaching, training, and research and service delivery makes working in this field a very frustrating exercise - Male, Academic

Lack of career development
A number of the respondents reported that their careers were stagnant and that contributed to their dissatisfaction about their jobs.

Not receiving further training in other fields such as endodontics, surgical removal of teeth, which are not provided in public sector/most primary health care centres - Female, Public Sector

Lack of opportunities to advance or enrich our skills - Female, Public Sector

Heavy workload

A number of respondents reported that the heavy workload contributed to their job dissatisfaction.

Having to deal with a large number of patients to have their teeth extracted on a daily basis - Female, Public Sector

Stress caused by too heavy workload (too many patients) - Male, Public Sector

Lack of support from management

Targets set by superiors that are impossible to meet consistently - Female, Military Health Services

Lack of support from top management to get the best quality instruments and equipment in order to make a proper diagnosis and treatment - Female, Public Sector

The public sector is negligent in promoting people on time, and operates under the premise that its employees can be shoved aside for trivial matters - Male, Public Sector

Dealing with third party funders/medical aid schemes

A number of respondents from private practice reported that dealing with medical aid schemes contributes to dissatisfaction about the job.

Restriction in funding allocated for dentistry by Medical Aids often means that I have to provide compromised treatment and not necessarily the best treatment for that patient - Male, Private Practice

Most medical aid benefits covering the cost of both basic and special dentistry treatments are too little. Authorisation processes required by most medical aids vary - Male, Private Practice

Medical aid regulations or exclusions that don't cover for things that are clinically warranted. Obviously the fees that I charge are at times too low, but I am guided by my market - Male, Private Practice

Inability of patients to pay for dental treatment

A number of respondents reported that the inability of patients to pay for dental treatment contributed to their job satisfaction about their job.

Always finances stand in the way of providing good quality work for patients visiting our training centre - Male, Academic

Patient not able to afford the cost of treatment - Female, Private Practice

DISCUSSION

The age distribution of the respondents in the study pointed towards the national trend. The Quarterly Labour Force Survey of the second quarter of 2012 indicated that amongst employed South Africans, the majority are between the ages of 30 and 50 years.[12]

The results showed that there were no demographic characteristics which were associated with job satisfaction. Similar studies in the USA[13] and the UK[8] in which the same survey instrument was used, found that there were few or no demographic and practice characteristics which related to job satisfaction. However, a USA study identified lower job satisfaction among rural dentists than those who practiced in urban areas.[13] In contrast; this study identified higher job satisfaction among dentists who practiced in peri-urban areas.

Perception of income, relationship with patients and personal time were found to be significantly associated with job satisfaction. These findings are similar to the study done on factors related to job satisfaction among South Korean dentists.[10]

The relationship between job satisfaction and professional time was also found to be insignificant. These findings were in contrast to the study among Canadian orthodontists.[14] Responses from the survey demonstrate that dentists working in different settings are as a group generally satisfied with intrinsic factors such as helping patients and seeing patients satisfied with their treatments.

Dentists working in the academic setting reported that their job satisfaction was enhanced by imparting knowledge to their students and doing research whilst those in private practice reported that their satisfaction was enhanced by the autonomy and the flexibility associated with being self-employed.

A number of respondents reported that having favourable treatment outcomes resulted in job satisfaction. These findings are consistent with findings from a study in Holland which reported that immediate results, aesthetics and long-term results of working with patients enhanced job satisfaction of dentists.[15]

A number of respondents from different settings reported that the unrealistic expectations of patients contributed to dissatisfaction. These results are similar to a study that reported that higher patient expectations and higher targets for the provision of dental care puts increased demands on dentists.[16]

A number of respondents reported that they have to put in long hours, which contributed to job dissatisfaction. Respondents from private practice complained that they have to work hard to fulfil their dreams whilst those from the academic field reported that their working hours are long and lack flexibility. One study reported that doctors and dentists who take on a teaching role in addition to their clinical role may increase their levels of stress, but there is also evidence that this dual role may reduce job-related stress.[17]

The frustration with the lack of dental equipment and materials is consistent with a study that found that lack of equipment, malfunctioning and delay in repairs of equipment remains a considerable source of frustration.[18]

Dentistry in South Africa has limited opportunites in the specialities and the majority of dentists are finding it difficult to advance their careers. A number of respondents reported being frustrated about their lack of career development.

Private practitioners, in particular, were dissatisfied about third party funders restricting dental benefits to the patient, thereby denying their autonomy in making treatment decisions for their patients. Dentists reported that they have to deal with patients who cannot afford their services and that hinders them in the provision of quality care to their patients.

CONCLUSIONS

On overall, the dentists in Tshwane are more satisfied than dissatisfied with their jobs. The satisfaction is however; conditional.

Perception of income, relationship with patients and personal time were significantly associated with job satisfaction. Intrinsic factors such as helping patients and seeing patients satisfied with their treatments contributed to satisfaction.

For dentists working in the academic setting their satisfaction was positively correlated with imparting knowledge to their students and in pursuing research, whilst those in private practice valued the autonomy and the flexibility associated with being self-employed.

Job dissatisfaction was positively correlated with unrealistic patients' expectations, long working hours, lack of career progression, restricted funding from funders and lack of equipment.

Limitations of the study

This study finding should be interpreted with caution, as there are some design limitations. For example, this was a cross-sectional study, therefore causality cannot be inferred.

The research was conducted on a small sample size and therefore, the results cannot be generalised either with regard to the Tshwane Metropolitan as a whole or to other areas. The study should have involved more participants both at different levels and in Tshwane Metropolitan as well as other locations.

Despite limitations, the current study provided useful information that may inform the design of further studies.

Recommendations

It is recommended that the study be extended to a national project on a large sample regarding job satisfaction for dentists, providing a more in-depth understanding of how dentists in South Africa feel about their jobs. Management in the public sector needs to review the working conditions of dentists and the procurement of dental equipment so that dental practitioners can practice their profession without limitations.

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Conflicts of interest

There are no conflicts of interest.

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An unusual occurrence of Pleomorphic adenoma involving the buccal minor salivary gland
- A case report and literature review

SADJ June 2019, Vol. 74 No. 5 p236 - p238

K Rajkumar[1], AS Singh[2], CJ Perumal[3], M Hainsworth[4]

INTRODUCTION

Pleomorphic Adenoma (PA) is a benign tumour of salivary gland origin. PAs are found frequently in adult females between the 3rd and 5th decades of life. They frequently involve the parotid gland (53 - 77%).[1]

The submandibular gland is affected in 44 - 68% of cases while only 6.4% of PAs are discovered in minor salivary gland sites.[1] The most common sites for the occurrence of PAs in minor salivary glands are found in the palate (42.8 - 68.8%), the upper lip (10.1%), cheek (5.5%), throat (2.5%) and retromolar region (0.7%).[2]

The anatomical contents of the buccal space includes adipose tissue, parotid duct, accessory parotid lobules, facial and buccal arteries, facial vein, lymphatic channels, branches of facial and mandibular nerves as well as minor salivary glands.[3] This case is being reported due to the uncommon occurrence of pleomorphic adenoma within minor salivary glands.

CASE REPORT

A 23 year old male was referred to the Maxillofacial and Oral Surgery department at Grey's Hospital with the main complaint of an asymptomatic slow growing lesion on the left side of his face. The patient reported no medical history of any significance.

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4. **M Hainsworth:** 33.3%

On examination the patient presented with a small oval (4x2x2mm) mobile lesion, firm, non-pulsatile and non-fluctuant, which could be palpated beneath the buccal mucosa of the left buccal space (**Figures 1A and 1B**). The lesion was located on the left side of the face above the commissure of the mouth and below the ala of the nose, just posterosuperiorly to the upper lip. No enlarged lymph nodes were apparent.

The oral mucosa appeared to have an increased vascularity overlying the lesion (**Figure 1C**). The skin overlying the lesion appeared normal with the mass easily slipping on bi-manual palpation. The differential diagnosis included foreign body granuloma, lymphadenitis, lymphoma, pleomorphic adenoma, nasolabial cyst, dermoid cyst, mucous retention cyst and lipoma.

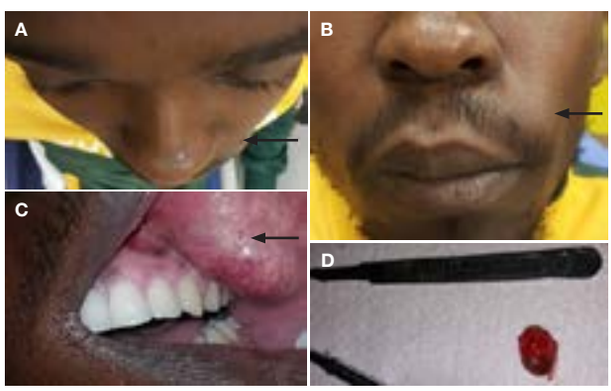

Figure 1.
Figure 1A and B demonstrate the extra-oral view of lesion in the buccal space by arrows.
Figure 1C demonstrates the intra-oral view of the lesion.
Figure 1D demonstrates the size of the excised lesion in comparison to a Bard-Parker No. 3 scalpel handle.

Treatment plan

An intraoral surgical approach was conducted as this would allow access to the lesion without affecting the appearance of the patient.

An intraoral excisional biopsy was performed under local anaesthetic with the histology confirming a diagnosis of a pleomorphic adenoma. The patient was pleased with his now normal appearance and is scheduled for close follow-up visits in the future.

Histology report

Histology revealed epithelial and a chondroid stromal components microscopically (Figure 2A). The lesion had a well circumscribed margin which showed a fine but incomplete fibrous capsule which appeared to abut on the excisional margins in small areas. These findings were consistent with a pleomorphic adenoma of minor salivary gland origin.

DISCUSSION

The anatomy of the buccal space lies deep to the zygomaticus major muscle. It is limited medially by the buccinator muscle, the superficial layer of the deep cervical fascia as well as the muscles of facial expression anteriorly and laterally, posteriorly by the masseter muscle, mandible, lateral and medial pterygoid muscles and the parotid gland.

There is no true superior and inferior border of the buccal space. The contents of the buccal space include: adipose tissue known as the buccal fat pad, parotid duct, minor salivary glands, accessory parotid lobules, facial and buccal arteries, facial vein, lymphatic channels as well as branches of the facial (cranial nerve VII) and mandibular nerves (cranial nerve V_3).[3]

Pleomorphic adenomas (PAs) are the most common benign tumour of salivary gland origin. They are most frequently found in adult females between the 3rd and 5th decades of life and frequently involve the parotid gland (53 – 77%).[1]

The submandibular gland is affected in 44 - 68% while only 6.4% of PAs are discovered in minor salivary gland sites.[1] The most common sites for the occurrence of PA in minor salivary glands are found in the palate (42.8 - 68.8%), the upper lip (10.1%), cheek (5.5%), throat (2.5%), and retromolar region (0.7%).[2]

This benign tumour is comprised of three components histologically; viz the epithelial, myoepithelial and a stromal or mesenchymal component. The identification of these three components is diagnostic of PA albeit in quantitative variations of the above.

Immunohistochemistry has aided in the differentiation of the different cell types within PAs.[4] Recurrence of PAs has been documented due to spillage, inadequate removal or enucleation during surgical intervention.[5]

Khandekar et al. report a recurrence of 2-44% of treated PAs. They recommend wide local excision with good safety margins, however intraoral lesions can be treated by extracapsular excision with 3-4 years of close patient follow-up.[5] Ascani, Messi and Balercia reported a study of 347 PA of salivary glands in which no recurrences were found during the follow up period of 2-4 years.

This finding encourages pericapsular enucleation as a favourable treatment modality, achieving reduced morbidity without oncological compromise.[6] In contrast Moore, Burkey and Netterville et al. recommend a wide excision including a cuff of normal healthy tissue as the treatment for benign salivary gland tumours as enucleation may not be adequate.[7]

Recurrence maybe facilitated by pathological and surgical factors. The pathologic factors include: capsule thickness or lack of capsule, pseudopodia, satellite nodules and multi-centricity while surgical factors include: rupture of tumour, spillage of tumour contents, insufficient resection margins attributed to nerve branches and lastly inadequate excision related to the type of surgery. [8]

Special mention needs to be made of a significant but rare variant of PA called carcinoma ex pleomorphic adenoma which displays features of vascular invasion, focal dysplasia, and non-invasive (intracapsular) extent.[9]

Multiple recurrences and the size of the tumour may play a role in the malignant transformation of the PA. Malignant transformations may be suspected by clinical signs of sudden increase in size with pain, ulceration, spontaneous bleeding and tissue invasion.[9]

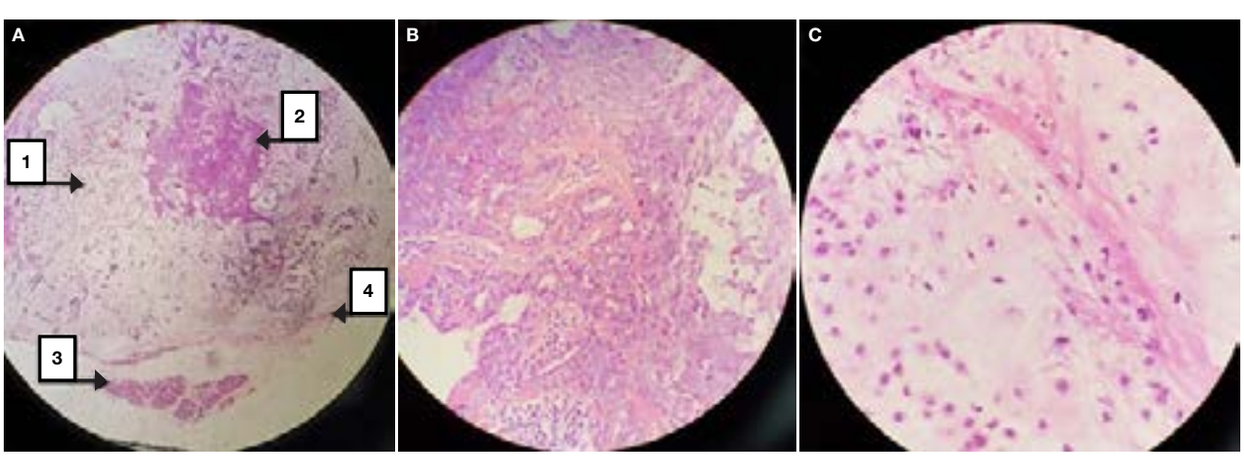

Figure 2.
Figure 2A: Low power photomicrograph of the specimen.
Arrow 1 demonstrating chondroid stromal tumour component.
Arrow 2 demonstrating epithelial tumour component.
Arrow 3 demonstrating residual minor salivary gland.
Arrow 4 demonstrating the fine tumour capsule.

Figure 2B: High power photomicrograph of the specimen demonstrating epithelial component inclusive of well-formed glands.

Figure 2C: High power photomicrograph of chondroid stroma.

CONCLUSION

Pleomorphic Adenomas rarely occur in the buccal space. This lesion demonstrated a fine but incomplete fibrous capsule adjacent to the excisional margins in small areas. Early removal of the lesion as in this case, with no further identifiable factors that could contribute to possible recurrence of the lesion, is advantageous. Despite this, long term follow-up is necessary where recurrence is a concern.

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Treatment of thumb-sucking habit using a fixed tongue crib appliance - a case report and literature review

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D Reddy[1], SM Dawjee[2]

SUMMARY

A prolonged thumb sucking habit is associated with certain dental malocclusions. Numerous techniques and appliances have been reported for the treatment of thumb sucking, all having varying degrees of success.

This report presents a clinical case of a seven year old female patient with thumb sucking habit and an anterior open bite.

Through careful motivation, good patient compliance and a fixed tongue crib, the habit ceased and there was spontaneous correction of the anterior open bite within a treatment period of six months.

Keywords

Thumb-sucking, anterior open bite, fixed tongue crib.

INTRODUCTION

Oral health care providers are often consulted by concerned parents of children who have a thumb/finger-sucking habit, wanting to know its cause and how it can be corrected.

This article presents a literature review of the causes of thumb sucking, as well as modalities that have been employed in the treatment of the habit, followed by a case presentation.

Sucking is a fundamental behaviour in the new-born infant.[1] It appears in two forms: nutritive, which provides nourishment, and non-nutritive, such as pacifier use and digit sucking, which provides comfort and a sense of security.[2] Thumb-sucking is a common habit in children, and is regarded to be harmless up to the age of four to five years.[3,4]

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2. **Salahuddien M Dawjee:** 40%

AETIOLOGY

There are three theories that attempt to explain the aetiology of prolonged non-nutritive sucking habits[5]:

1. Insufficient satisfaction of sucking needs during childhood (as a result of insufficient breastfeeding).

Maternal nipple deprivation may be followed by apparent emotional confusion and frustration, leading to an inappropriate replacement of the nipple by a digit or pacifier.[6]

Breathing, swallowing, mastication and speech articulation are developed during breastfeeding and any imbalance in these systems might lead to unsatisfied sucking needs[7].

2. Learned behaviour

The learned behaviour theory describes digit sucking as innate behaviour that becomes a habit, and, because thumb-sucking is soothing to the infant, the habit persists in some children when they are bored, tired or anxious.[8]

The innate nature of sucking is supported by ultrasound pictures of foetuses indulging in the habit in-utero.[9] Further support of the learned behaviour theory may be seen in a study which found that the subjects with finger-sucking siblings were more likely to also demonstrate persistent finger-sucking.[10]

3. Emotional theory

The emotional theory is Freudian-based and relates finger-sucking to the oral phase of child development. Should the habit continue beyond the oral phase of child development, it becomes a fixation. Digit/finger sucking at a later stage is usually considered a sign of regression, and fixation and regression are the signs of emotional disturbance.[7]

Support for the emotional theory may be found in studies that found a greater incidence of thumb-sucking in children who, as infants, had been left to fall asleep alone, compared with infants who enjoyed the presence of a parent at the onset of sleep.[11,12]

In support of these findings, the results of a recent study suggest that solitary sleeping in infants is a predictor of insecure attachment.[13]

If the habit continues beyond the age of four to five years it is associated with dental changes in the primary, mixed and secondary dentition, such as an anterior open bite,[8] which frequently leads to a secondary tongue thrust habit.[14] Other changes include: Class II molar and canine relationship,[15] excessive overjet,[16,17] maxillary protrusion,[18] posterior cross bite,[19] digital deformity[20] and paronychia.[21] The adverse effects associated with thumb sucking are dependent on its frequency, intensity, duration and position of the digit in the mouth.[22,23]

MANAGEMENT

Breastfeeding for six months or more has been reported to protect against the development of pacifier sucking habits.[24] Breastfeeding and bottlefeeding also involve different orofacial muscles which possibly have different effects on the harmonic growth of the maxilla and dental arches.[25,26]

Various modalities have been reported for treating a thumb sucking habit. These include:

- Time-out, in which a reinforcer is removed whenever thumb-sucking occurs. For example, a mother could stop reading a story whenever thumb-sucking occurred.
- When the child removed his/her thumb from their mouth, the mother immediately resumed reading the story.[27]
- Positive reinforcement, such as verbally praising the absence of sucking or placing reward stickers on a calendar.
- Negative or aversion therapies, such as applying a foul-tasting oil on thumbs. A sock, adhesive strip, splint, or glove can be used to remind the child not to put the thumb or fingers in the mouth.
- Competing response therapy, such as squeezing an object whenever the child feels the impulse to thumb or finger-suck.
- Dental appliances.[9,28]
- Hypnosis.[29]
- An awareness enhancement device (AED), which produces a tone each time an individual raises a hand to the head.

Thumb-sucking occurs most frequently when the child is alone.[30] Therefore, a modality that does not require close monitoring of the child may be more successful in treating the habit.

A dental appliance is one such modality. Numerous dental appliances have historically been used to treat the thumb-sucking habit. Examples include: the sharp rake, the blunt rake, lingual spurs, the vertical crib, the palatal bar, the horizontal crib, the Graber appliance and the blue grass appliance. While some of these appliances have been described as cruel and inhumane,[30] the palatal crib (vertical crib/tongue crib) has been reported to be successful in treating a thumb sucking habit.[32-35]

The habit may intensify if the child is criticised, nagged or threatened. The parent should therefore be patient and empathetic. Discretion should be used by both the clinician and the parent as to when/whether treatment for thumb-sucking should be pursued. Caution should be exercised in cases when, for example, a child older than four experiences the loss of a family member or pet, or is subject to fear or pain, thumb sucking may then become a temporary coping strategy[36].

CLINICAL REPORT

A seven year old female patient in the mixed dentition presented with an open bite (**Fig. 1**). She displayed a convex profile and an acute naso-labial angle. She had an Angle Class I Type 2 malocclusion, 6 mm overjet and a 3 mm anterior open bite.

Evaluation of oral function showed a tongue thrust when swallowing and an intermittent thumb sucking habit. Skeletal classification was Class I (Wits) and Class II (Steiner). Canines were developing normally, the sequence of eruption was normal and both upper and lower incisors were proclined and protruded.

Figure 1. Pre-operative extra-oral and intra-oral photographs.

Good compliance and motivation is essential for interceptive orthodontic treatment. To achieve this, the patient was shown photographs of children her age with normal occlusion and then shown pictures of her occlusion.

She was informed that these complications could extend into the secondary dentition and was shown pictures of adults with an anterior open bite and/or excessive overjet. She was informed that if she stopped the thumb-sucking, those malocclusions could possibly be avoided. She was informed that the appliance was placed as a reminder and not as a punishment.

Figure 2. Appliance design

A tongue crib was constructed of 0.7 mm stainless steel wire and welded to bands on the second primary molars. The thumb-sucking habit ceased after four weeks. The patient's anterior open bite had spontaneously corrected after four months. The appliance was removed after six months.

Figure 3. Pre-operative intra-oral photograph .

Figure 4. Post-operative intra-oral photograph.

DISCUSSION

Prolonged thumb sucking is often associated with an anterior open bite, which frequently leads to a secondary tongue thrust habit. An appropriate appliance will therefore address both of these habits.[25]

Since the palatal crib ameliorates an anterior open bite by preventing the tongue from resting on the teeth, it should also extend far enough inferiorly to keep the tongue from positioning itself below the crib. To achieve this, the crib should extend to the lingual gingival margin of the lower incisors and should extend transversely from the upper left canine to the upper right canine[37].

CONCLUSION

Through careful motivation, good patient compliance and a fixed tongue crib, a thumb-sucking habit can be successfully treated with spontaneous correction of the anterior open bite.

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How the brain controls all pleasures including sex, food, drugs, rock ‘n roll and others

SADJ June 2019, Vol. 74 No. 5 p243

Author: Professor Mark Alfred Gillman
Publisher: Cerebrum
605 pages in the Kindle version. 10 chapters; 6 Illustrations; 436 references.

This is not a book to be read in one sitting… although it is compulsive reading! That paradox is reflected through the pages as Professor Mark Gillman takes the reader on a fascinating journey founded on the paradox that without pain, there can be no pleasure! But the focus is firmly on the pleasure side of the equation, delving into the many ways in which humans may enjoy pleasure.

Mark brings to this book all of his many years of remarkable exploration into the byways and pathways of the human brain. Steeped as he is with an intricate knowledge of the complexities of the brain, it must have been a major challenge for Professor Gillman to reduce and compress that acumen into a most readable ten chapters dealing with aspects of the sources and control of that most human of endeavours... the pursuit of pleasure.

That challenge has been met most effectively by the author who, as an accomplished wordsmith, has produced an intriguing and logical exposition of the continuum of pain and pleasure, a concept which was the result of long term cooperation and liaison with a psychiatrist, Dr Fred Lichtigfeld… but the read itself is essentially Gillman.

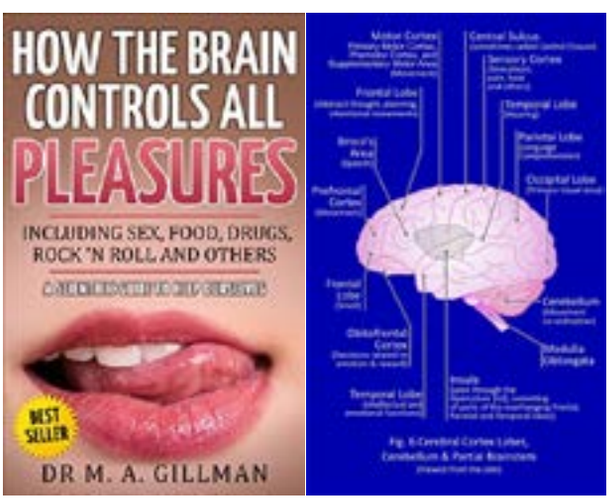
The reader is introduced to the basics of brain anatomy and function, the text being well supported by informational diagrams of considerable clarity.

The pathways of pleasure are described together with the controlling chemical interactions… always on a level to ensure understanding by the lay reader whilst stimulating the interest of the more involved professional.

Then commences the opportunity for illuminating debate on the variety of pleasures sought after by Man. Dealt with are Drugs, Gambling, Eating, Sex, Computer, Shopping, Dancing and other addictions. An innovative touch is introduced by the inclusion of Health Tips at the conclusion of each chapter.

The text evaluates relevant research and balances opposing views dispassionately and fairly, acknowledging the gaps in knowledge. The author is excited about the future unravelling of some of the dilemmas. Indeed he may be instrumental in some of that elucidation!

This is a book to be savoured, chewed over, contemplated, debated. It is an intriguing read for all having even a remote interest in what motivates and drives us to seek the pleasurable. Sit back and enjoy the pleasure!



The Author

Professor Gillman lists more than 300 publications in scientific journals, has lectured internationally, held positions at the University of the Witwatersrand, at Medunsa and at the Albert Einstein Medical Science University. He is Emeritus Director of The South African Brain Research Institute, where he and Dr Lichtigfeld made seminal contributions. He is also the author of several books.

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Errors in root canal preparation: a review of the literature and clinical case reports

SADJ June 2019, Vol. 74 No. 5 p246 - p254

PJ van der Vyver[1], M Vorster[2], F Paleker[3], FA de Wet[4]

SUMMARY

Chemo-mechanical preparation and the removal of infected dentine in order to eliminate microorganisms and avoid apical periodontitis remain the main objectives in endodontic treatment.

Mechanical preparation of the root canal system not only provides the space for obturation but also facilitates disinfection of the root canal system through the use of irrigation solutions.

Iatrogenic preparation errors affect the root canal anatomy and can result in apical canal transportation, uncentered preparations, ledge formation, or perforations. These errors are all associated with inferior outcomes of endodontic treatment.

In this paper, the authors will discuss a review of the literature which considers some of these procedural errors and, using clinical case studies, will illustrate the appropriate clinical management when errors do occur.

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2. **Martin Vorster:** Responsible for some of the scientific writing, contributed to the writing of the abstract, literature review as well as concluding remarks and was also involved in the editing and proofreading of the article as well as editing and verifying of references.
3. **Farzana Paleker:** Responsible for some of the scientific writing, final layout of the article and collecting cases that were not provided by Prof P vd Vyver.
4. **Francois A de Wet:** Responsible for some of the scientific writing and for proofreading of the article.

INTRODUCTION

The goal of root canal shaping procedures is to treat apical periodontitis through the removal of infected dentine from root canal walls. Endodontic treatment focuses on eliminating microorganisms by chemo-mechanical preparation of the root canal.[1,2]

Ideal "chemo-mechanical preparation" refers to an adequately shaped canal that is sufficiently accessible by disinfecting solutions. Root canal shaping by means of mechanical preparation not only provides the space for obturation but also facilitates disinfection by disrupting the biofilms that adhere to canal surfaces.[3]

Correct mechanical instrumentation of the root canal should result in a continuously tapered, funnel-shaped canal that corresponds to the original canal anatomy. This objective is often difficult to achieve when a dentist is faced with the complex internal morphology of curved root canals.[4,5] Iatrogenic preparation errors affecting the root canal anatomy remain a problem in this type of canal and can result in apical canal transportation, uncentered preparations, ledge formation, or perforation. Procedural errors that occur during root canal shaping are associated with inferior outcomes.[4,5]

1. Ledge formation

A ledge is an iatrogenically created irregularity or platform on the inside of the greater curvature of the canal. It may form in the original canal path, create a new false canal, and/or block the apical part of the root canal.[6] A ledge that cannot be bypassed impedes instruments and, in some cases, prevents irrigants from entering the apical portion of the canal.

This occurrence results in inadequate instrumentation and incomplete obturation.[4,5] Ledges have been associated with persistent peri-apical infection after endodontic treatment.[7]

Typically, ledge formation occurs when stiff files with sharp inflexible cutting tips are used in a rotational motion in curved root canals. This common procedural error usually occurs on the outer side of the curvature when instruments are used aggressively, with exaggerated cutting during root canal instrumentation.[6] Ledges are formed either within the original canal path or through creating a new false canal (Figure 1).

Various factors have been associated with ledge formation; these include tooth and canal location, canal curvature, instrument design, alloy properties, instrumentation techniques, and operator experience. Ledge formation was found to be the most frequently encountered error in a study among patients who had received root canal treatment performed by undergraduate students who used hand-operated stainless steel files in a step-back technique.[8]

Figure 1. Schematic representation of a ledge formed within the original canal path as a result of skipping instrument sizes or erroneous working length estimation.

Another study on ledge formation in maxillary and mandibular first and second molars treated endodontically by undergraduate students showed that canal curvature influenced ledge formation more than did the other variables examined.[9] As canal curvature increased, so did the number of ledges. Canal curvature in this study was measured by using Schneider's technique.[10] Canals with a curvature of less than 10° were rarely ledged, whereas canals with a curvature of more than 20° were ledged over 56% of the time.[11] The study also showed that canal location influences the incidence of ledging. The mesio-buccal and the mesiolingual canals were more frequently ledged than were the distal, lingual, or distobuccal canals.[9] Similar results were also reported in a study which demonstrated that the frequency of occurrence of ledged root canals was significantly greater in molars compared with that seen in anterior teeth.[12]

According to Lambrianidis (2009) the most common causes of ledge formation are:[6]

- Incorrect or insufficient access cavity preparation that does not allow adequate and unobstructed access to the apical constriction;
- An incorrect assessment of the root canal direction;
- Incorrect length determination of the root canal;
- Use in a curved canal of stainless steel instruments that are not pre-curved;
- Use of over-curved stiff instruments;
- An attempt to retrieve or by-pass a fractured instrument or a foreign object;
- Removing obturation materials during endodontic retreatment;
- An attempt to negotiate a calcified or a very narrow root canal; and
- During preparation of space for a post after completion of root canal treatment.

Several authors have highlighted additional causes:

- Forcing and driving the instrument into the canal;[7]
- Using a non-curved stainless steel instrument that is too large for a curved canal;[11]
- Failing to use the instruments in sequential order;[11]
- Rotating files excessively at working length;[13]
- Inadequate irrigation and/or lubrication during instrumentation;[14]
- Relying too heavily on chelating agents;[13] and
- Creating an apical blockage by inadvertently packing debris in the apical portion of the canal during instrumentation.[14]

Lateral perforations might occur when the ledge is created during initial instrumentation or as a strip perforation on the concave side of the curvature of the root as the canal is straightened out (a perforation that occurs along the inner wall of a curved root canal).[7]

Case report 1

The patient, a 49 year old female presented with percussion sensitivity on her mandibular, right second molar. A peri-apical radiograph revealed that all the root canals were prepared short of working length, and showed evidence of peri-apical pathology around the mesial roots (Figure 2).

The tooth was anaesthetised and isolated before the previous obturation material was removed from the root canals using Endosolv E (Septodont) and a size 15 Hedstrom files. A size 10 K-File was introduced into the distal and mesio-buccal root canals, and it was possible to negotiate them to full working length. The same protocol was followed in the mesio-buccal root canal but it was impossible to negotiate the canal further. The tip of the instrument was hitting against a solid wall of dentin (Figure 3). A ledge formation in the canal was confirmed at the beginning of the root curvature.

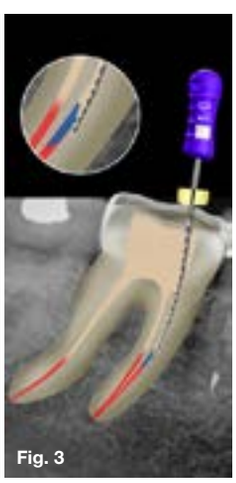


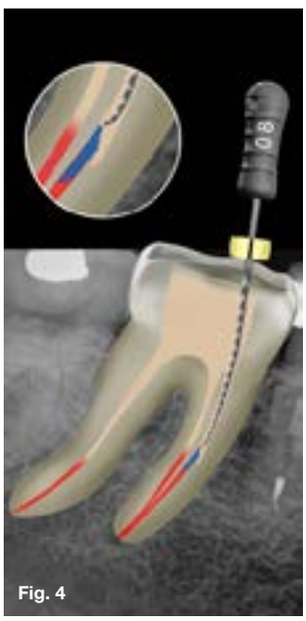
Figure 2. Preoperative periapical radiograph of a mandibular right second molar with a substandard root canal treatment outcome. Note the periapical pathology around the apical part of the mesial root.

Figure 3. A size 10 K-File was introduced into the mesio-buccal canal but it was impossible to negotiate the canal further as the tip of the instrument was hitting against a solid wall of dentin. A ledge formation in the canal was confirmed at the start of the root curvature.

A size 08 C+-File, 21mm long, with a distinct curve in the apical 2-3mm of the file was selected in the attempt to bypass the ledge. The directional marker on the rubber stop was positioned to indicate the direction of the curve placed on the tip of the file (Figure 4).

The canal was filled with 6% sodium hypochlorite (Chlor-Xtra, Vista Dental). The file was introduced into the canal, ensuring that the curved tip was directed towards the wall opposite the ledge. A slight rotation

motion combined with a light “picking motion” was used to try to discover the original canal entrance. After several attempts, re-orientating the file in different positions, the pre-curved file tip advanced for about 0.5 mm (Figure 5).



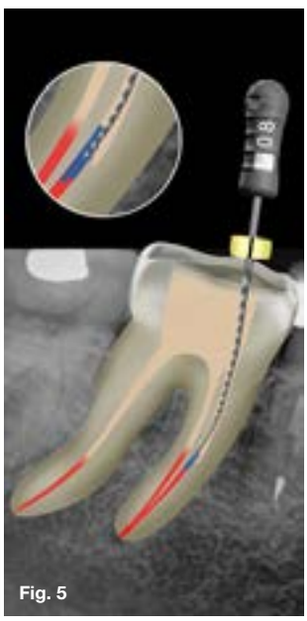


Figure 4. A size 08 C+-File (21 mm) with a distinct curve in the apical 2-3 mm of the file was selected in the attempt to bypass the ledge.

Figure 5. A size 08 C+- File was used in a slight rotation motion combined with a light “picking motion” to discover the original canal entrance.

Figure 6. Postoperative periapical radiograph immediately after obturation.

The file was slightly retracted, and advanced again. This procedure was repeated and the file progressively advanced further down the canal for another 2.5 mm. The 08 C+-File, with the tip placed apically to the ledge, was used with a filing motion combined with push-pull motions, pushing the file against the canal wall in the endeavour to reduce the internal canal irregularity.

The C+-File was removed and the canal was irrigated before a pre-curved size 08 K-File was negotiated to full working length and patency. The working length was confirmed radiographically after using an electronic apex locator (ProPex Pixi, Dentsply Sirona).

Figure 6 shows the final result after glide path preparation with a ProGlider (Dentsply Sirona), canal preparation with a Primary WaveOne Gold (Dentsply Sirona) instrument and canal obturation with gutta-percha and Pulp Canal Sealer (SybronEndo, Orange, California) using warm vertical condensation technique.

2. Canal transportation

Canal transportation is a sustained deviation from the original axis of the canal during root canal instrumentation (Figures 7a and 7b).

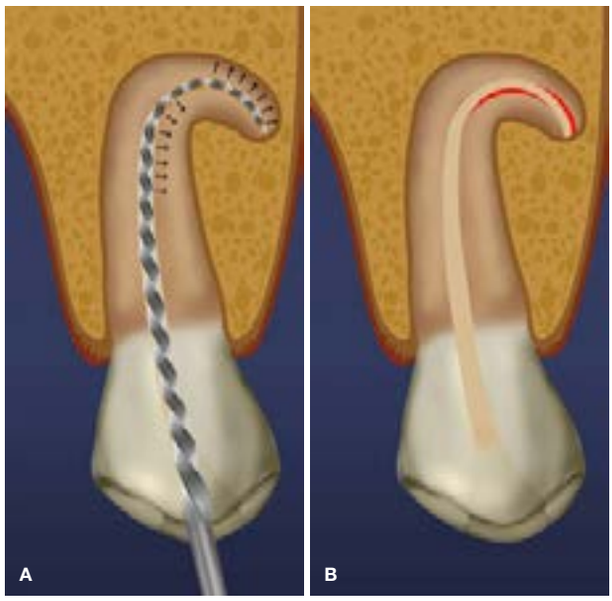


Figure 7. Schematic representation of (A) potential directions for transportation in particular zones (as indicated by arrows) when the elastic memory of larger files tend to straighten out the root canal system; (B) the end result of greater removal of dentine (red colour in the illustration) from the external zone of the curve in the apical one third and from the internal zone of the curve in the middle one third of the root canal system (Adapted from Berutti and Castellucci[19]).

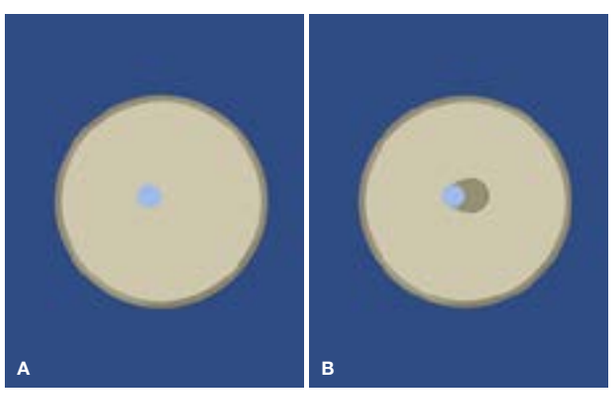


Figure 8. Schematic representation of (A) cross section of a root canal system at the level of the apical foramen (apical foramen in light blue); (B) appearance of a teardrop foramen after canal preparation with a straight, non-pre-curved instrument. The original foramen is light blue and the additional dentine removed by the non-pre-curved instrument is brown in colour (Adapted from Berutti and Castellucci[19]).

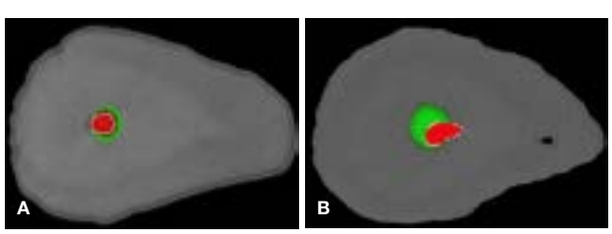


Figure 9. A representative Micro Computed Tomography example of a curved mesio-buccal root canal system, 1mm from the apical foramen. The canal was prepared with a Primary WaveOne Gold instrument (25/08) (Dentsply Sirona). No canal transportation at the of the root canal occurred (**Red:** pre-instrumentation area, **Green:** effect of canal preparation with shaping instrument).

Figure 10. A representative Micro Computed Tomography example of a curved mesio-buccal root canal system, 1mm from the apical foramen. The canal was prepared with the OneShape instrument (25/06) (Micro-Mega). Canal transportation of the root canal is shown (**Red:** pre-instrumentation area, **Green:** effect of canal preparation with shaping instrument).

Apical canal transportation is described as the removal of canal wall structure on the outside curve in the apical half of the canal due to the tendency of files to recover to their original linear shape during canal preparation.[15]

As a result, the main axis of the root canal is transported away from its original axis. Other terms for canal transportation include "canal straightening" and "zipping".[4]

Stiff endodontic instruments, particularly large-sized stainless steel files, tend to exert elevated lateral forces in curved canals and can result in straightening, especially in the middle and apical thirds.[16]

This straightening or transportation can create problems with canal cleaning, obturation and, ultimately, healing.[4,5] Apical canal transportation can cause enlargement of the apical foramen (Figures 8a and 8b), which compromises the apical seal.[17] Lack of an apical stop might result in extrusion of irrigants and/or obturation materials and cause irritation to the peri-radicular tissues.[4,18]

Figures 9 and 10 illustrate micro-computed tomographic images of two curved mesio-buccal root canal systems of extracted, maxillary first molar teeth at a level 1mm from the apical foramen. The example in Figure 9 shows minimal canal transportation after root canal preparation compared with that in Figure 10 which clearly shows an excessive amount of canal transportation.

Case report 2

The patient, a 54 year old female, presented with irreversible pulpitis on her maxillary left first premolar, caused by extensive decay under a previously placed porcelain veneered crown (Figure 11). After removal of the defective crown and decay a core build-up was done prior to root canal treatment. A size 10 K-File was negotiated to full working length and confirmed radiographically (Figure 12). Note the sharp apical curvature in the last 3mm of the root canal system.

The root canal system was prepared with the ProTaper Universal (Dentsply Sirona) system. Incorrect use of the X3 file (30/09) resulted in apical transportation. This was visible on the peri-apical radiograph taken to confirm the cone-fit of the gutta-percha point (Figure 13). After root canal obturation it became more evident that an excessive amount of the root canal wall structure on the outside curve in the apical part of the canal was removed by the rotary file. This resulted in the loss of the original apical curvature, lack of an apical stop and subsequent extrusion of the obturation material (Figure 14).

3. Perforation

A direct perforation is a channel or communication between the root canal space and surrounding cementum (Figures 15a and 15b). Such a perforation can result in the destruction of cementum and the irritation and/or infection of the periodontal ligament in the surrounding area. As with ledging, perforation of curved canals is associated with stiff instruments with sharp cutting tips used in a rotational motion.

Depending on the location, a perforation cannot easily be sealed and/or bypassed, which results in an inadequately prepared and sealed root canal.[4,5]

A perforation that occurs along the inner wall of a curved root canal is referred to as a "strip perforation" (Figure 15c).

Figure 11. A peri-apical radiograph of a maxillary left first premolar, with extensive decay under a previously placed porcelain veneered crown.

Figure 12. A peri-apical length determination radiograph Note the sharp apical curvature in the last 3mm of the root canal system, indicated by the bending of the size 10 K-File.

Figure 13. Cone-fit peri-apical radiograph. Note the loss of the apical curvature of the root canal system.

Figure 14. A post-operative peri-apical radiograph showing apical root canal transportation resulting in loss of the original apical curvature and lack of an apical stop, resulting in extrusion of the obturation material.

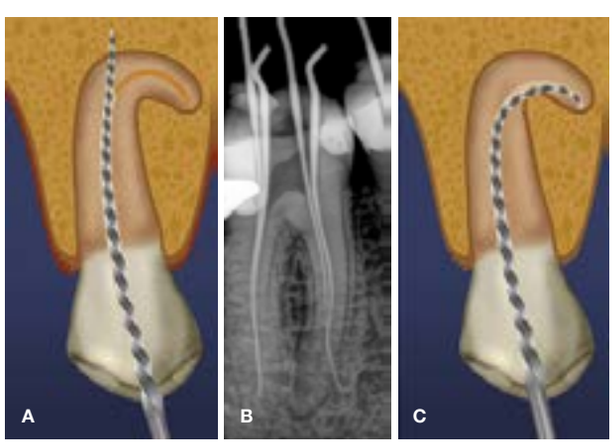


Figure 15. (A) Schematic representation of a direct perforation; (B) clinical example of a direct perforation (arrow) of the two mesial root canals of a mandibular right first molar; (C) schematic representation of a strip perforation (arrow).

This results from over-preparation and straightening along the concavity and is of particular concern in the mesiobuccal roots of maxillary molars and mesial roots of mandibular first molars.[20,21] The root walls facing the furcal aspect of roots are often extremely thin and are therefore termed "the danger zone".[22]

Case report 3

The patient, a 37 year old female presented with irreversible pulpitis on her maxillary left first second premolar. The tooth had been previously restored with a large composite resin restoration and two retention pins. A preoperative peri-apical radiograph (**Figure 16**) and a length determination radiograph (**Figure 17**) revealed and confirmed a challenging "S" shaped or bayonet-shaped root canal configuration.

Due to the lack of proper glide path preparation and management in this case, the operator was faced with a rotary file fracture in the apical part of the root canal and a strip perforation at the point of maximum curvature on the distal aspect of the root. It was impossible to even attempt the retrieval of the fractured instrument and it was left *in situ*.

Figure 16. A preoperative peri-apical radiograph a maxillary left second premolar, restored with a large composite resin restoration and two retention pins. Note the "S" shaped or bayonet-shaped root canal configuration.

Figure 18. Rotary file fracture in the apical part of the root canal and a strip perforation at the point of maximum curvature on the distal aspect of the root that was repaired with ProRoot MTA (Dentsply Sirona) before conventional canal obturation, placement of a fibre post and composite to close the access cavity.

After canal irrigation, the perforation was repaired with ProRoot MTA (Dentsply Sirona) before conventional canal obturation (**Figure 18**).

The access cavity was restored with composite resin and placement of a fibre post. **Figure 19** shows a four-year follow up radiograph with some evidence of resorption of the extruded ProRoot MTA material.

4. Uncentered preparations

The ability of an instrument to stay centered in the canal can be measured by the mean centering ratio.[23] The importance of maintaining preparations that are centered (**Figure 20a**) and correspond to the original canal anatomy has been pointed out by Berutti et al.[24] A study by Pasqualini et al. examined rotary glide path files and concluded that files with a high root canal centering ability resulted in fewer modifications of the canal curvature and therefore fewer canal aberrations.[25] Several studies have shown that more flexible instruments produce more centered preparations.[26,27] Flexibility can be defined as the elastic bending of an endodontic instrument when subject to a load applied at its extremity in the direction that is perpendicular to its long axis.[28]

Figure 17. A peri-apical length determination radiograph confirmed the "S" shaped or bayonet-shaped root canal configuration.

Figure 19. A four year follow up radiograph with some evidence of resorption of the extruded Proroot MTA material.

Flexibility may influence an instrument's ability to properly shape curved root canals. Inflexible files, on the other hand, may cause a deviation from the original canal axis, which can result in canal straightening, transportation, thinning of the canal wall and perforation (Figure 20A and 20B).

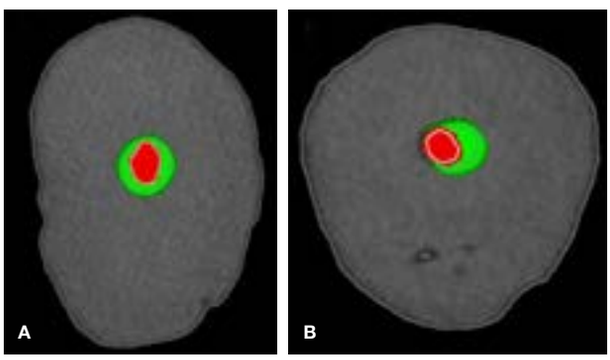


Figure 20. Representative micro-computed tomography examples of mesio-buccal root canal systems of extracted mandibular first molars at the level of 7 mm from from the apical foramen:
(A) a centred canal preparation;
(B) a non-centred canal preparation that can lead to canal straightening, transportation, thinning of the canal wall and perforation (Red: original canal, Green: canal after preparation with rotary nickel-titanium instrument).

5. Instrument separation

A common problem with the use of rotary files is the potential risk of separation or breakage within the canals.[29] In most clinical situations, the breakage of the instrument occurs in the apical third of the canal and the remaining portion is often difficult or impossible to remove.[30,31] Attempts at removal may even result in other procedural errors like perforation. The fragment that is left behind blocks the root canal system and results in inadequate cleaning, shaping and sealing (Figure 21A and 21B).[32]

Fracture of rotary instruments can occur because of torsional overload[33], or fatigue through flexure.[34] The torsional fracture occurs when the tip or any other part of the instrument binds to the canal walls while the hand piece keeps turning. When this binding occurs and the elastic limit of the metal is exceeded, fracture of the instrument is inevitable.

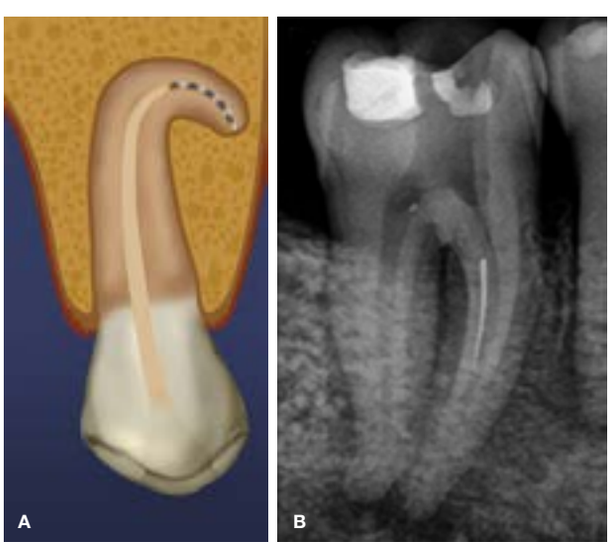


Figure 21. (A) Schematic representation of a fractured instrument in a root canal system; (B) clinical example of a fractured root canal instrument in the mesio-buccal root canal of a mandibular right second molar.

This type of fracture has been associated with the application of excessive apical force during instrumentation. Fracture resulting from flexural fatigue occurs when an instrument that has already been weakened by metal fatigue is placed under stress.

The instrument does not bind to the canal wall but rotates freely until the fracture occurs at the point of maximum flexure.[33] This type of failure is believed to be an important factor in the fracture of nickel-titanium (NiTi) rotary instruments in clinical usage, and might result from their use in curved canals.[30] Various factors have been associated with the fracture of rotary instruments: rotational speed and angle and radius of curvature,[30] instrument design and instrumentation technique[35], torque[36], and operator experience.[37]

Case report 4

The patient, a 21 year old male presented with a fractured rotary file in his maxillary left upper central incisor. The fragment (14 mm long) was located approximately 4 mm apically from the cemento-enamel junction at the coronal aspect extending apically to about 5 mm from the apical foramen (Figure 22). Under 15x microscope magnification, the fractured instrument was clearly visible in the canal (Figure 23).

It was decided to use the Terauchi File Retrieval Kit (TFRFK) (Dental Cadre) to assist in removal of the fractured instrument. The 12 o'clock Micro-spoon ultrasonic tip (Figure 24) was used to penetrate through between

Figure 22.
Peri-apical radiograph of a maxillary left upper central incisor with a fractured fragment (14 mm long).

Figure 24.
The 12 o'clock Micro-spoon ultrasonic tip.

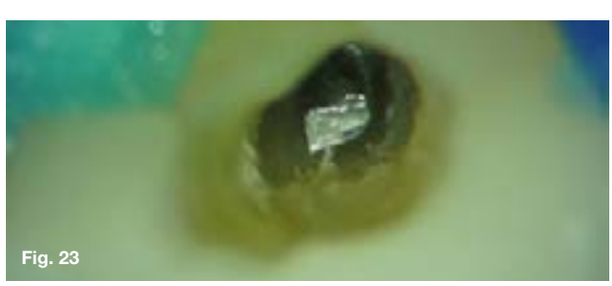


Figure 23. Under 15x microscope magnification the fractured instrument was clearly visible in the canal.

the file and the canal wall in circular motion until it was noticed that the fractured file was loose in the canal. Considering the length of the fragment it was decided to attempt retrieval using the Yoshi Loop (Dental Cadre) (Figure 25a and 25b), a stainless steel micro-lasso that extends from the end of a stainless steel cannula attached to a handle with a retraction button for tightening the loop around the file segment.

Under magnification, the preformed loop was carefully placed around the exposed coronal aspect of the file. The loop was tightened around the fractured file by moving the retraction button on the loop system. The loop device was then used to slowly pull the loosened fragment from the root canal system (Figure 26). Figure 27 shows a magnified view of the retrieved instrument attached to the micro-lasso from the Yoshi Loop. Note that the tip of instrument is missing, indicating that the file tip must have been fractured in a previous clinical application prior to the case presented in this case report.

Having removed the fractured instrument, a size 30 K-File was fitted loose in the root canal up to working length as confirmed radiographically and with an electronic apex locator (ProPex, Dentsply, Sirona). According to the file selection criteria outlined by Van der Vyver et al. (2019)[38] for WaveOne Gold files, a size large WaveOne Gold File (45/05) was selected for canal preparation.

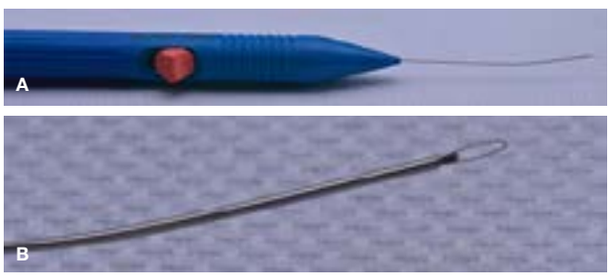


Figure 25. (A) The Yoshi Loop (Dental Cadre), a stainless steel micro-lasso that extends from the end of a stainless steel cannula attached to a handle with a retraction button for tightening the loop around a file segment; (B) Magnified view of the cannula and stainless steel micro-lasso.

After canal preparation and irrigation with heated 3.5% sodium hypochlorite and 17% EDTA solutions, a size Large WaveOne Gold Gutta Percha Point (Dentsply Sirona) was fitted and the position verified radiographically.

The canal was obturated with the selected gutta percha point and Pulp Canal Sealer (SybronEndo), using the continuous wave condensation technique with the Calamus Dual Obturation Unit (Dentsply Sirona).

6. Apical bacterial extrusion

All root canal preparation techniques cause apical debris extrusion to some degree, in spite of stringent control of working length of instruments during debridement. Some amount of debris in the form of dentinal chips, pulp fragments, necrotic debris, microorganisms, and intra-canal irrigants is unavoidably pushed out from the root canal into the peri-apical tissues.

The volume of materials that are extruded depends on canal/apical foramen size, instrumentation technique, instrument type, instrument size, preparation end-point and irrigation solution (Figure 26).[39]

Figure 26. Retrieved fractured instrument using the Yoshi Loop.

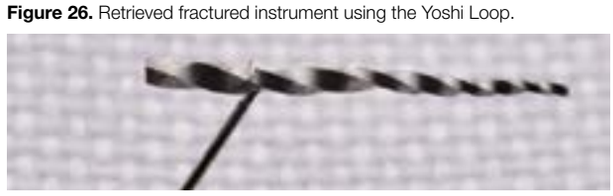


Figure 27. Magnified view of the retrieved instrument attached to the micro-lasso from the Yoshi Loop. Note that the tip of instrument is missing, indicating that the file tip must have been fractured in a previous clinical application.

Figure 28. Size 30 K-File fitted loose in the root canal up to working length as confirmed radiographically and with an electronic apex locator (ProPex Pixi, Dentsply, Sirona).

Figure 29. Cone-fit peri-apical radiograph confirming the correct apical placement of the size Large WaveOne Gold Gutta Percha Point (Dentsply Sirona).

Figure 30. Immediate post-operative result after canal obturation.

The extruded material is referred to as the "worm of necrotic debris" and has been linked to peri-apical inflammation and postoperative flare-ups that will likely interfere with healing.[40] The incidence of flare-ups during root canal treatment is reported to range between 1.4% and 16%.[41]

In asymptomatic chronic peri-radicular lesions a balance exists between host defences and microbial aggression from the root canal microbiota associated with infected canals in peri-radicular tissues.[42] If bacteria are extruded apically during root canal treatment procedures, there will be a transient disruption in this balance and the host will mobilise an acute inflammatory response to re-establish the equilibrium. The intensity of this acute inflammatory response depends on the number and/or virulence of the bacteria.[41]

According to Reddy and Hicks (1994) the variation in levels of apical extrusion is primarily due to different root canal preparation techniques and instrument designs.[43] Many studies have shown that techniques involving a push-pull filing motion result in a greater mass of apical debris compared with techniques that involve some sort of rotational action.[39,44]

Luisi et al. have demonstrated that the direction of instrumentation, either in cervico-apical or apico-cervical, is also an important factor influencing apical extrusion.[44] Crown-down techniques, irrespective of whether hand-driven- or engine-driven instruments are used, usually extrude less debris.[45,46]

CONCLUSION

Procedural errors during endodontic treatment are associated with a reduction in treatment success and possible non-resolution of apical periodontitis. Correct clinical management of these iatrogenic procedural errors could aid in proper preparation, allowing for disinfection of root canal systems and an increase in successful outcomes of endodontic treatment.

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

SADJ June 2019, Vol. 74 No. 5 p255 - p258

Compiled and edited by V Yengopal

1. Tooth crown discoloration induced by endodontic sealers: a 3-year evaluation

MA Ekici, A Ekici, T Kaskat, et al. Clin Oral Invest. 2019; 23:2097. https://doi.org/10.1007/s00784-018-2629-1.

Discoloration of a single tooth is a demanding clinical issue especially if present in the aesthetic zone. It can be due to calcification of the pulp chamber, pulp necrosis and/or iatrogenic mishaps during various stages of endodontic treatment. Teeth often become discoloured consequent to the influence of endodontic materials, which can lead to an unpleasant appearance.

Tooth discoloration caused by restorative and endodontic materials has been evaluated with subjective approaches and objective methods.[1] Spectrophotometers, colorimeters, digital photography, and digital image analysis techniques enable the objective evaluation of colour and colour change over time.[1]

Instrumental measurements commonly employ the Commission International de L'Eclairage's (CIE's) L*, a*, b* system. The CIE L*a*b* colour coordinates enable the determination of colour in three-dimensional space.

L* values describe lightness, which ranges from black (0) to white (100); a* values represents red (+80a*) to green (–80a*) colour changes; and b* values represent yellow (+80b*) to blue (–80b*) colour changes.[1]

Ekici and colleagues (2019)[1] reported on a study that sought to evaluate the tooth crown discoloration induced by commonly used and new-generation endodontic sealers at one month and one and three years after application.

METHODS

Sixty human mandibular incisors that were free of caries, restorations, developmental defects, and crown discoloration were used.

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The teeth were cleaned using an ultrasonic method and a rubber cup to remove debris and extrinsic stains from the crown surfaces. The crowns were removed 2mm below the cemento-enamel junction with high-speed diamond discs under water coolant.

The pulp was extirpated with a dental spoon, and the pulp chambers were chemo-mechanically debrided through the apical access. The prepared cavities were rinsed with 2% sodium hypochlorite, followed by sterile saline solution, and then dried with paper points and air-water spray.

The specimens were divided randomly into four groups ($n=15$). The pulp chambers were filled with Pulpispad in group 1, AH26 in group 2, MTA Fillapex in group 3, and EndoREZ in group 4. The sealer compositions and manufacturer's information are presented in Table 1.

Sealers were prepared according to the manufacturers' instructions and left intentionally in the pulp chambers. After the specimens were sealed from the apical side using a composite resin (Charisma), they were placed into tap water-filled tubes, and then stored in an incubator (temperature, 37°C; humidity, 100%) until their respective evaluation times were reached.

The colour of the specimens was measured with a spectrophotometer (Vita Easyshade Compact) before sealer placement (baseline) and at one month and one and three years thereafter. For standardization, the same operator performed all colour evaluations. A mounting system was used for the customization and the reproducibility of the position of each crown. The cylindrical inner frame (diameter = 2 cm, height = 0.2 cm) of the blackbakelite sample assembly with which the spectrophotometer was equipped, was filled with black, non-polychromatic, thermo-plasticized silicone.

All spectrophotometric measurements were performed under constant laboratory illumination in "tooth single"

Table 1. Details of study materials

Group	Material	Manufacturer	Composition according to manufacturers
1	Pulpispad	Dentsply, France	Silver powder, diiodothymol, zinc oxide, menthol, parachlorophenol, synthetic camphor, eugenol.
2	AH26	Dentsply DeTrey GmbH, Konstanz, Germany	Bismuth oxide, methenamine, titanium dioxide, silver phenol A, epichlorohydrin resin, pigments.
3	MTA Fillapex	Angelus, Londrina, Brazil	Resins (salicylate, diluting, natural), bismuth trioxide, nanoparticulated silica, mineral trioxide aggregate, pigments.
4	EndoREZ	Ultradent, South Jordan, UT, USA	Urethane dimetacrylate resin matrix, zinc oxide, barium sulfate, pigments.

mode after spectrophotometer calibration. Colour measurement was repeated twice for each sample, and recorded using the CIE L*a*b* system. The L*a*b* values were used to calculate changes in colour (ΔE) as follows:

$$\Delta E_{L^*a^*b^*} = [(\Delta L)_2 + (\Delta a)_2 + (\Delta b)_2]_{12} \Delta EL^*a^*b^* = [(\Delta L)2 + (\Delta a)2 + (\Delta b)2]12$$

$$\Delta L^* = L^*_1 - L^*_0 \Delta L^* = L^*_1 - L^*_0$$
$$\Delta a^* = a^*_1 - a^*_0 \Delta a^* = a^*_1 - a^*_0$$
$$\Delta b^* = b^*_1 - b^*_0 . \Delta b^* = b^*_1 - b^*_0$$

ΔE, ΔL, Δa, and Δb values thus represented differences from baseline at each timepoint.

The means of ΔE, ΔL, Δa, and Δb values were calculated for each group and timepoint. The significance of changes over time was assessed using repeated-measures analysis of variance and Tukey's honestly significant difference test.

RESULTS

All sealers caused discoloration over time. Tooth colour change values were as follows: after one month (T1), group 1 = group 2 > group 3 = group 4; after one year (T2), group 1 = group 2 = group 4 > group 3; and after three years (T3), group 1 > group 2 = group 3 = group 4 ($p < 0.05$).

So, groups 1 and 2 showed more colour change which differed from groups 3 and 4 at T1 ($p < 0.05$). At T2 (1 year), group 3 showed less colour change which differed from the other groups ($p < 0.05$). At T3 (3 years), group 1 showed more colour change which differed from the other groups ($p < 0.05$). Group 1 displayed an increase in mean ΔE values at time periods.

Within-group comparison for group 1 revealed a statistically difference between ΔE at T1 compared with ΔE at T2, T3 ($p < 0.05$). The ΔE value of group 2 at T3 was statistically less than ΔE value at other time periods ($p < 0.05$). Group 3 had the highest ΔE value at T3 and there was a statistically significant difference between ΔE at T1 and ΔE at T3 ($p < 0.05$). There was no statistically significant difference between the ΔE values of group 4 at all time periods ($p > 0.05$).

The mean ΔL^* values of groups 1 and 2 were statistically lower than mean ΔL^* values of groups 3 and 4 at T1 ($p < 0.05$). There was a statistically significant difference between all groups at T2 ($p < 0.05$). At T3, the ΔL^* value of group 1 was statistically lower than ΔL^* value of other groups ($p < 0.05$). For group 1, the mean ΔL^* value at T1 was statistically higher than mean ΔL^* values at T2 and T3 ($p < 0.05$). For group 2, the mean ΔL^* value at T3 was statistically lower than mean ΔL^* values at T2 ($p < 0.05$). For group 3, the mean ΔL^* value at T3 was statistically lower than mean ΔL^* values at T1 ($p < 0.05$). For group 4, the mean ΔL^* value at T2 was statistically lower than mean ΔL^* values at T1 and T3 (< 0.05).

At T1, the mean Δa^* values of group 2 were statistically lower than other groups ($p < 0.05$). At T2, the mean Δa^* value of group 3 was statistically lower than other groups ($p < 0.05$). At T3, the mean Δa^* values of group 1 were statistically higher than other groups ($p < 0.05$). For groups 1 and 2, there was a statistically significant difference between mean Δa^* values at all time periods ($p < 0.05$). For group 3, the mean Δa^* value at T2 was statistically higher than mean Δa^* values at T1 and T3 ($p < 0.05$). For group 4, the mean Δa^* value at T1 was statistically lower than mean Δa^* values at T2 and T3 ($p < 0.05$).

At T1, the mean Δb^* value of group 2 was statistically lower than other groups ($p < 0.05$). At T2, the mean Δb^* values of groups 2 and 4 were statistically higher than the mean Δb^* values of groups 1 and 3 ($p < 0.05$).

At T3, the mean Δb^* value of group 1 was statistically lower than the mean Δb^* value of group 3 (< 0.05). For groups 1 and 3, the mean Δb^* value at T3 was statistically higher than mean Δb^* values at other time periods ($p < 0.05$). For groups 2 and 4, there were statistically significant differences between Δb^* values at all time periods ($p < 0.05$).

CONCLUSIONS

The researchers concluded that all tested sealers induced varying chromatic alterations at different time intervals.

Implications for practice:

ΔE value changes were correlated with changes in ΔL, Δa, and Δb values. Because the ΔE values of all tested sealers were sufficiently high so as to represent clinically visible colour changes, it is recommended that dentists remove residual sealer from treated pulp chambers thoroughly following obturation of root canals, before placing permanent restorations.

Reference

1. Ekici MA, Ekici A, Kaskat T, et al. Tooth crown discoloration induced by endodontic sealers: a 3-year *ex vivo* evaluation. Clin Oral Invest. 2019; 23:2097. https://doi.org/10.1007/s00784-018-2629-1.

2. Effect of air-blowing time and long-term storage on bond strength of universal adhesives to dentin

P Saikaew, J Fu, Chowdhury AFMA. Clin Oral Invest. 2019; 23:2629.
https://doi.org/10.1007/s00784-018-2656-y.

Direct tooth-coloured restoration has become routine for dental practice and attention has been given to improve effectiveness and longevity of resin-dentin bonds.

The newly introduced universal adhesive systems rapidly gained attention from dental clinicians due to their flexible application mode.[1] Considering their compositions, universal adhesives are similar to the one-step self-etching system since all ingredients are incorporated into one bottle.

Air-drying after application of the adhesive is considered a crucial step in the bonding procedure.[1] Within that step alone, many factors can affect the bond strength, including air-blowing time, air pressure, and air temperature.[1] According to the conventional 3-step etch and rinse adhesive systems, the air-blowing step is necessary to evaporate the solvent from the primer and to achieve a uniform, thin bonding layer.

In general, the recommended air-blowing duration for the newest universal adhesives range from 5s to 15s, or until the liquid film on the surface is no longer visibly mobile, but the specific air-blowing time is not standard. Inadequate air-blowing can lead to insufficient solvent evaporation, and therefore, the residual solvent can affect the mechanical properties of the adhesives and the bond strength.[1]

Indeed, extended air-blowing time was reported to increase the bond strength by improving solvent evaporation. However, the effect appears to be solvent-dependent. Hence, the effect of air-blowing time on the resin-dentin bond is still unclear.

Saikaew and colleagues (2019)[1] undertook a study that sought to evaluate the effect of air-blowing time on the microtensile bond strength (μTBS) of three universal adhesives to dentin after 24h and one year. The null hypothesis tested was that the air-blowing time had no immediate or long-term effect on the resin-dentin bond strength of universal adhesives.

METHODS

Ninety extracted human third molars were used in this study. The teeth were free from decay and cracks. They were stored in an aqueous solution of 0.5% chloramine-T at 4°C and used within six months of storage.

The mid-coronal dentin surface was exposed by grinding the occlusal enamel with a gypsum model trimmer. The flat surfaces were confirmed by using a light microscope that no enamel remained. After that, the teeth were ground manually with 600-grit SiC paper under running water for one min.

Five teeth per group were randomly assigned into 18 experimental groups according to three adhesives, three air-blowing durations, and two storage times. The adhesives used in this study were Clearfil Universal Bond, G-Premio Bond, and Scotchbond Universal Adhesive. Details of adhesive applications and compositions are listed in Table 1.

The adhesive application was performed according to the manufacturer's instruction. After adhesive application, each group was assigned for 5s, 15s, or 30s of air-blowing time and then light-cured at >1200mW/cm^2 for 10s. All bonded surfaces were restored with two layers of 2mm-thick resin composite (Clearfil AP-X). Each layer was light-cured for 20s.

After storage in distilled water at 37°C for 24h, each bonded tooth was sectioned into slabs using Isomet diamond saw. Three resin-dentin slabs from the central area were selected and further cut into beams (cross-sectional area approximately 1mm^2) and resin-dentin slabs from the crown periphery were separated for observation of the resin-dentin interface.

For μTBS test, resin-dentin beams were then subjected to μTBS test for immediate bond strength or tested after one year of water storage for the long-term test. Fifteen randomly selected beams originated from five

Table 1. Details of study materials

Adhesive	pH	Composition	Manufacturers' instruction
Clearfil Universal Bond	2.3	10-MDP, Bis-GMA, HEMA, ethanol, hydrophilic aliphatic dimethacrylate, colloidal silica, dl-camphorquinone, silane coupling agent, and water.	1. Apply the adhesive to the dentin surface with applicator brush and rub it for 10s. 2. Dry the dentin surface sufficiently by blowing mild air for more than 5s until the adhesive does not move. 3. Light cure for 10s.
G-Premio Bond	1.5	10-MDP, 4 methacryloxyethyl-trimellitate anhydrate, dimethacrylate monomer, distilled water, acetone, photo initiators, and silica fine powder.	1. Apply using a micro-brush. 2. Leave undisturbed for 10s after application. 3. Dry thoroughly for 5s with oil free air under maximum air pressure. 4. Light cure for 10s.
Scotchbond Universal	2.7	10-MDP, HEMA, silane, dimethacrylate resins, Vitrebond™ copolymer, filler, ethanol, water, and initiators.	1. Apply the adhesive on the surface and rub it for 20s. 2. Gently air-dry the adhesive for approximately 5s for the solvent to evaporate. 3. Light cure for 10s

teeth were tested per group. A cyanoacrylate glue was used to attach the beam to a Ciucchi's jig. A tensile force was applied at a crosshead speed of 1 mm/min in a desktop testing apparatus until failure occurred. The beams that failed involving the glue or failed at the glue before beam fracture were excluded from the analysis. μTBS was expressed in MPa by the division of applied force (N) at the time of fracture by the bonded area (mm^2). The data were then analysed by three-way ANOVA and Duncan test ($\alpha = 0.05$).

The fractured specimens were carefully removed from the jig and mounted on an aluminum stub. The overall failure mode was determined using SEM at an accelerating voltage of 10 kV with low magnification (×80). Failure mode categories were classified into cohesive in composite, cohesive in dentin, cohesive in the bonding agent, adhesive at interface, and mixed involving interfacial de-bonding. The specific features of fracture surfaces were further observed at high magnification by SEM (×10,000).

Two resin-dentin slabs from the peripheral part of the tooth prepared for μTBS were used for resin-dentin interface observation. The internal surface of the slab was polished with a series of SiC papers under running water and diamond pastes. After that, the surface was treated with 5% HCl for 30 s followed by NaOCl for 5 min. The slabs were left dried overnight in an incubator. Finally, they were sputter-coated and examined using SEM at ×3000 magnification.

RESULTS

Microtensile bond strength (μTBS): There were no pre-test failures observed in this study. Three-way ANOVA revealed a significant effect of adhesive ($p < 0.0001$), air-blowing time ($p = 0.002$), and storage time ($p < 0.0001$). The interaction between the three variables was also significant ($p = 0.026$).

As for the immediate bond strength, highest bond strength was observed with Scotchbond. There was no effect of air-blowing time on the immediate bond strength of Scotchbond and G-Premio Bond whereas increasing air-blowing time to 30s for Clearfil Universal Bond resulted in statistically significant higher bond strength than that of 5 s air-blowing time.

Long-term bond strengths of all groups were significantly lower than those of immediate bond strength, except for Clearfil Universal Bond at 5s and 30s of air-blowing time. When compared with 5s of air-blowing time, the extension of air-blowing time to 15s and 30s led to significantly higher long-term bond strength with Scotchbond and Clearfil Universal Bond, respectively, while air-blowing time showed no effect on G-Premio Bond.

Failure analysis

For Scotchbond, the failure mode was mainly categorized into cohesive in dentin. On the other hand, adhesive failure at interface and cohesive in bonding were the mainly observed failure modes in Clearfil Universal bond and G-Premio Bond except for Clearfil Universal Bond at 15s blowing time which showed the highest percentage of cohesive failures in dentin at both test periods.

Resin-dentin interface observation: The thicknesses of the adhesive layers were between two and 10 μm. Thinner adhesive layers were noticed after extended air-blowing time groups compared with those of 5s. Micron-sized voids were detected in the adhesive layers of G-Premio Bond, which were approximately 2–5μm in diameter. A lesser number of voids was observed with increased air-blowing time.

CONCLUSIONS

The researchers concluded that air-blowing time had no influence on the bond strength of the acetone-based adhesive (G-Premio Bond). On the other hand, extension of air-blowing time tended to have a beneficial effect on the ethanol-based adhesives (Clearfil & Scotchbond).

Long-term bond strength of Clearfil & Scotchbond were significantly increased, whereas improvement of immediate bond strength was only found in Clearfil.

Implications for practice

These results suggest that extended airblowing times can only increase bond strengths in general for Clearfil & Scotchbond.

Reference

1. Saikaew P, Fu J, Chowdhury AFMA. Effect of air-blowing time and long-term storage on bond strength of universal adhesives to dentin. Clin Oral Invest. 2019; 23:2629. https://doi.org/10.1007/s00784-018-2656-y.

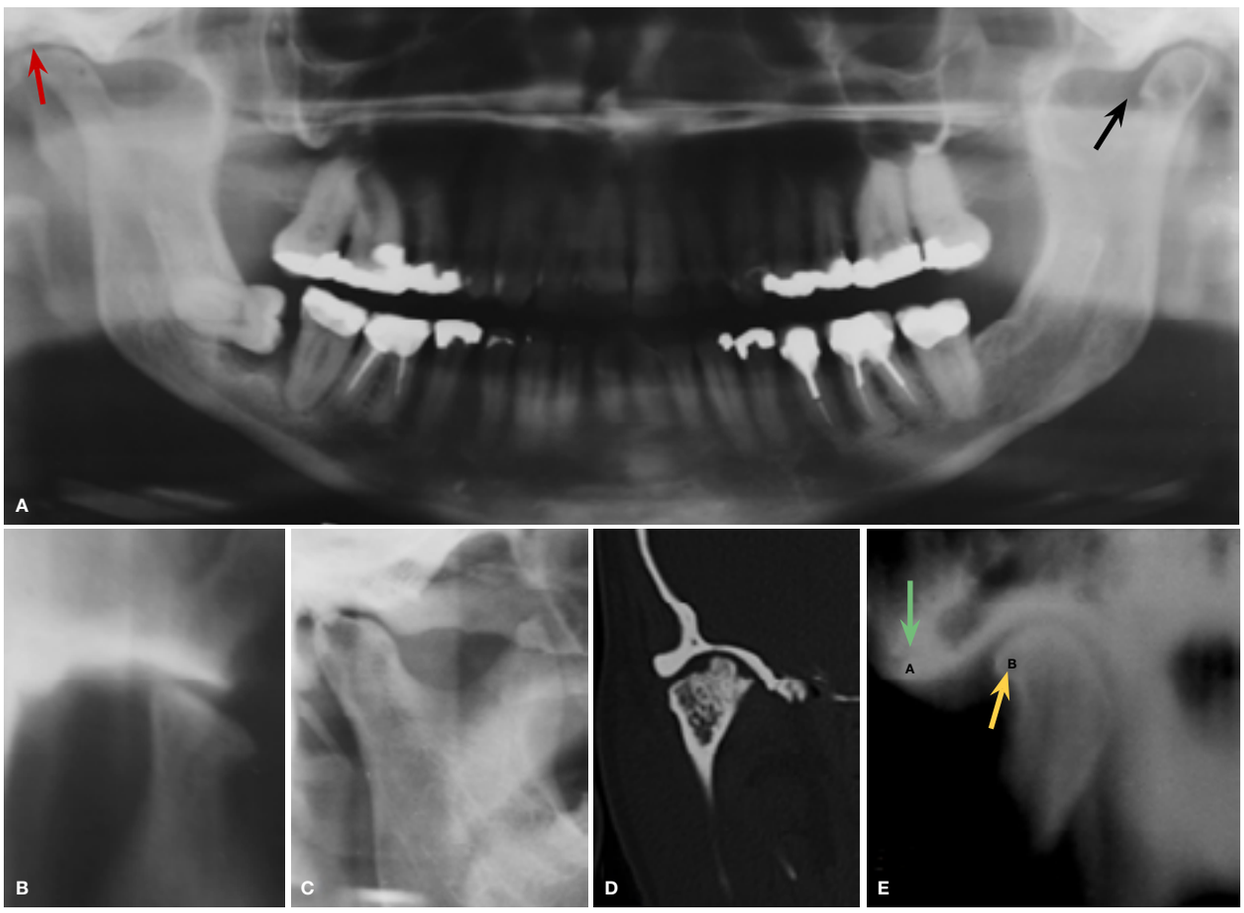
http://dx.doi.org/10.17159/2519-0105/2019/v74no5a8

Maxillofacial Radiology 171

SADJ June 2019, Vol. 74 No. 5 p259

CJ Nortjé

A 40 year old female complains of pain and limitation of movement of her right temporomandibular joint (TMJ). Clinical examination of the joint reveals palpable crepitus and limited movement. What are the important radiological findings and what is your diagnosis?



INTERPRETATION

Symptoms may derive from the impacted and infected 48, osteoarthritis of the TMJ's, joint space narrowed, (red arrow) or an osteophyte (black arrow). Osteoarthritis (OA), the most common type of arthritis (National Institute of Arthritis and Musculoskeletal and Skin Diseases), is caused by normal wear and tear of any joint. The cartilage deteriorates and may even disappear completely, the bone-to-bone contact causing pain, stiffness, and sometimes swelling. OA of the TMJ may include loss of articular cartilage and narrowing of the joint "space" (red arrow), condylar and anterior articular eminence flattening (Fig. B), formation of subcortical cysts and erosion (Fig. C). Axial CT scan (Fig. D) shows OA with a large lateral osteophyte on the superior condylar surface. Conventional tomogram (Fig. E) shows an anterior osteophyte (yellow arrow, dense cortical bone). The green arrow demonstrates eburnation of the eminence (ivory-like reaction of exposed bone). Previously thought non-inflammatory, osteoarthrosis was, an inadequate misnomer. Now accepted as a low grade inflammatory condition involving all components of the joint, a major cause of pain and disability in adults. About 10% of men and 18% of women over 60 years have symptomatic osteoarthritis, commonly of the knee, hip and hand joints, but also the TMJ. Diagnostic imaging (MRI) may be necessary to confirm diagnosis. Disc displacement and osteoarthritis may be shown, since both soft tissue and bone abnormalities can be assessed. However, for bone details CT is generally accepted as superior to MRI. CBCT is increasingly used to assess the TMJ, offering diagnostic accuracy and lower radiation dose, is advisable to ascertain that no other underlying pathology is present.

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Reference

1. Rozylo-Kalinowska, I, Orhan, K: Imaging of the Temporomandibular Joint, Springer Nature Switzerland 2019 p264.
2. Farman AG, Nortje CJ, Wood RE: Oral and Maxillofacial Imaging, 1st Ed, Mosby. St. Louis, Missouri 1993 pp 366-9.

http://dx.doi.org/10.17159/2519-0105/2019/v74no5a9

Ethical principles

SADJ June 2019, Vol. 74 No. 5 p260 - p261

WG Evans

Ethical principles are the absolute central core to ensuring sound professional practice by the health care teams. Over the multiple years of the evolution of these professions, those principles have been honed and polished, the objective being to ensure absolute clarity for the understanding of those obligated to observe the directives. The American Dental Association have identified five fundamental principles which form the foundation of the ADA Code of Ethics. The Health Professions Council of South Africa have devolved the principles into thirteen "core values."

Whilst it may have been the health professions which first recognised the need to formalise the ethics of practice, considerable philosophical thought has been focussed on ethics in society as a whole. We can evoke Aristotle and Plato, Augustine and Aquinas, Kant and Daniels… as were eloquently scrutinised in the Ethics article published in the SADJ in April this year. Indeed the year has seen a series of events across several countries in which ethics should have played a most dominant role… the election of representatives to govern the people... whether in Africa, the United States or Turkey, the Principles of Ethics should have been paramount.

An intriguing article appeared on the Web in 2016... "The Five Principles of Integrity in Elections." How does society evaluate ethics on these events, so vital to the progress of the country? It has of course been observed that a democracy is really free only on Election Day! If that is true how much more essential that election ethics are impeccable. The five Elements were defined as:

1. **Independence**
2. **Transparency**
3. **Integrity**
4. **Competence**
5. **Fairness**

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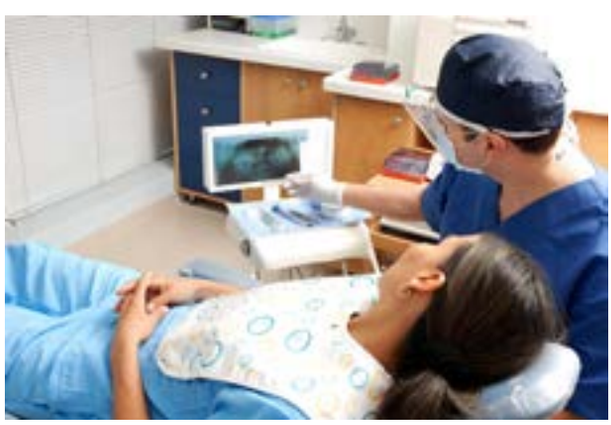
But hark.. these elements are designed to apply to the Election Officials, who must show independence, be open to inspection, be eminently trustworthy, demonstrate efficiency and be fair.

These are surely characteristics that also mark the ethical professional. How does the ADA describe this individual? The five fundamental ADA principles are patient **autonomy**, **non-maleficence**, **beneficence**, **justice** and **veracity**. Can we link the ADA principles with the elements describing ideal election officialdom?

Justice and veracity are integrity and transparency, patient autonomy could be linked to independence, non-maleficence and beneficence relate to competence and fairness.



The five elements of Election Integrity combined with the five fundamental ADA principles should accommodate the thirteen core values enunciated by the HPCSA. Those thirteen core values with corresponding Elements and Principles are listed on p209.

It may be seen that there is considerable overlap.
The HPCSA Core Values spell out our commitments more completely (to ensure absolute clarity!).

There are social and civil privileges which are basic to the tenet of free and fair elections... such as the freedom of speech, the freedom of association and the freedom of assembly. An ethical society provides those privileges without demur. Dental professionals hope to live in such an ethical society... but the aspirations are for a society in which they may be also held in considerable esteem. Earning that privileged position imposes an obligation for those in the profession to uphold high levels of ethical conduct... to be upheld at all times… without regard for whether it is election time or not.

References

https://www.governing.com/gov-institute/voices/col-5-principles-integrity-election-administration.html

The Five Elements of Election Integrity	The Five Fundamental Principles identified by the ADA	The thirteen core values identified by the Health Professions Council of South Africa
The element of Independence	The principle of Autonomy	**Respect for persons:** applying the **Principle of Independence** Health care practitioners should respect patients as persons, and acknowledge their intrinsic worth, dignity, and sense of value.
		Best interest or well-being: Actually described as the **Principle of Beneficence** Health care practitioners should act in the best interests of patients even when the interests of the latter conflict with their own personal self-interest.
		Autonomy: Respecting the **Principle of Independence** of patients to make their own decisions Health care practitioners should honour the right of patients to self-determination or to make their own informed choices, and to live their lives by their own beliefs, values and preferences.
The element of Transparency	The principle of Non-maleficence	**Best interests or well-being:** Actually described as the **Principle of Non-maleficence** Health care practitioners should not harm or act against the best interests of patients, even when the interests of the latter conflict with their own self-interest.
		Integrity: Integrity yes, well, the **Element of Integrity!** But also the **Principles of Justice and Veracity** Health care practitioners should incorporate these core ethical values and standards as the foundation for their character and practice as responsible health care professionals.
The element of Integrity	The principle of Beneficence	**Human rights:** Applying the **Element of Fairness** in dealing with patients Health care practitioners should recognise the human rights of all individuals.
		Truthfulness: Again, the **Element of Integrity** ...and the **Principle of Veracity** Health care practitioners should regard the truth and truthfulness as the basis of trust in their professional relationships with patients.
		Confidentiality: Can one be transparent and confidential? A Professional **has to be.** The **Principle of Veracity**... and the **Element of Integrity** Health care practitioners should treat personal or private information as confidential in professional relationships with patients - unless overriding reasons confer a moral or legal right to disclosure.
The element of Competence	The principle of Justice	**Compassion:** Linked to the **Element of Competence** Health care practitioners should be sensitive to, and empathise with, the individual and social needs of their patients and seek to create mechanisms for providing comfort and support where appropriate and possible.
		Tolerance: Linked to the **Element of Fairness** Health care practitioners should respect the rights of people to have different ethical beliefs as these may arise from deeply held personal, religious or cultural convictions.
		Justice: Linked to the **Element of integrity** ...and to the **Principle of Justice!** Health care practitioners should treat all individuals and groups in an impartial, fair and just manner.
The element of Fairness	The principle of Veracity	**Professional competence and self-improvement:** Repeat the link to the **Element of Competence** Health care practitioners should continually endeavour to attain the highest level of knowledge and skills required within their area of practice.
		Community: Linked to **all five Elements**, especially at Election time! Health care practitioners should strive to contribute to the betterment of society in accordance with their professional abilities and standing in the community.

CPD questionnaire

This edition is accredited for a total of 3 CEUs: 1 ethical plus 2 general CEUs

GENERAL

Understanding the perceptions and experiences of oral conditions and oral health-related-quality-of-life among HIV-infected and undiagnosed adolescents in Johannesburg, South Africa

1. The self-care practices were often adopted to manage pain and reliance on home remedies for pain also may be linked to poor access to health care services.
   A. True
   B. False

2. Identify the INCORRECT answer.
   The individual domain consisted of the following factors:
   A. Oral Health Awareness
   B. Oral Signs and Felt Symptoms
   C. Oral Functioning
   D. Dental Experience

3. According to the global report, how many adolescents (10-19 years) are living with HIV Infections (ALHIV)?
   A. 2.5 million
   B. 2.1 million
   C. 2.5 million
   D. 5 million
   E. 7 million

4. How many in-depth-interviews for both ALHIV and HIV-undiagnosed adolescents were conducted in the study?
   A. 15
   B. 20
   C. 25
   D. 10

5. The responses of the adolescents were based on:
   A. Their current oral health status and their experiences and feelings
   B. Their perceptions and experiences of oral health care
   C. The actions to resolve their oral health status and the impact of their current health and oral health status on their feelings
   D. All of the above

An unusual occurrence of Pleomorphic adenoma involving the buccal minor salivary gland - A case report and literature review.

6. Pleomorphic adenomas:
   A. are benign salivary gland neoplasms
   B. may be completely excised
   C. have epithelial, myoepithelial and a stromal or mesenchymal component histologically
   D. have been known to transform into malignancies
   E. all of the above

7. Close follow-up is necessary for a patient diagnosed with pleomorphic adenoma.
   A. True
   B. False

8. Pleomorphic adenomas may recur due to improper surgical technique resulting in capsule rupture and spillage of contents.
   A. True
   B. False

Treatment of thumb-sucking habit using a fixed tongue crib appliance: case report and literature review.

9. Thumbsucking habits may be copied from siblings.
   A. True
   B. False

10. Solitary sleeping in infants may be a predictor of insecure attachment, leading to habits.
    A. True
    B. False

11. The tongue crib should extend to the lingual gingival margin of the lower incisors and extend transversely from the upper left lateral incisor to the upper right lateral incisor.
    A. True
    B. False

Errors in root canal preparation: A review of the literature and clinical case reports

12. Identify the INCORRECT answer.
    Ledge formation during endodontic treatment may occur:
    A. when stiff files with sharp inflexible cutting tips are used in a rotational motion in curved root canals
    B. on the inside curvature of the root canal
    C. when files are used aggressively
    D. when a false canal is created

13. Identify the INCORRECT answer.
    Canal transportation:
    A. is a sustained deviation from the original axis of the canal during root canal instrumentation
    B. canal cleaning and obturation are facilitated with a straighter canal.
    C. stiff endodontic instruments, particularly large-sized stainless steel files, tend to exert elevated lateral forces in curved canals and can result in straightening
    D. apical canal transportation can cause enlargement of the apical foramen

14. Identify the INCORRECT answer.
    Fracture of rotary endodontic instruments can occur:
    A. when the tip of the rotating instrument binds to the canal walls
    B. when a small instrument is rotated in a large canal
    C. when an instrument suffers flexural fatigue
    D. when excessive rotational speed is used

What's new for the clinician? summaries of recently published papers.

15. In the Ekici et al study, for group 2, the mean ΔL^* value at T3 was statistically lower than mean ΔL^* values at T2.
    A. True
    B. False

16. In the Ekici et al study, all sealers caused discoloration over time.
    A. True
    B. False

17. In the Saikaew et al trial, extension of air-blowing time to 15s and 30s led to significantly higher long-term bond strength G-Premio Bond.
    A. True
    B. False

18. The Saikaew et al. study is an example of a:
    A. case-control
    B. cross-sectional study
    C. randomised controlled trial
    D. in-vivo study
    E. in-vitro study

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19. Osteoarthritis is the most common type of arthritis?
    A. True
    B. False

20. The word osteoarthrosis is a misnomer?
    A. True
    B. False

ETHICS

Ethical principals

21. The Elements described as central to Election Ethics are:
    A. Transparency, Common sense, Competence, Fairness
    B. Commitment, Transparency, Integrity, Competence, Fairness
    C. Independence, Transparency, Integrity, Competence, Fairness
    D. Independence, Consistency, Integrity, Competence, Fairness

22. Practitioners should act in the best interests of their patients:
    A. apart from when the self interest of the patient is in conflict with that best interest
    B. always, even when the self interest of the patient is in conflict with that best interest
    C. providing that the practitioner agrees with the self-interest of the patient whether harmful or not
    D. excepting when the interests of the practitioner are in conflict with the interests of the patient.

23. Health care practitioners should treat personal or private information as confidential in professional relationships with patients:
    A. unless the financial contract with the patient is threatened
    B. unless the case is to be published
    C. unless the patient is a celebrity and releasing the data will be of interest to the public.
    D. unless overriding reasons confer a moral or legal right to disclosure.

24. Dentists live in societies which hold them in some esteem and therefore:
    A. Dentists can rest assured of continued respect
    B. Dentists need to earn that continued respect
    C. Dentists can play a role in society without that continued respect
    D. Dentists can simply demand that continued respect

25. By acknowledging the intrinsic worth and dignity of patients, practitioners are allowing appropriate levels of independence amongst their clients.
    A. True
    B. False

Online CPD in 6 Easy Steps

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.

1 Go to the SADA website www.sada.co.za.
2 Log into the 'member only' section with your unique SADA username and password.
3 Select the CPD navigation tab.
4 Select the questionnaire that you wish to complete.
5 Enter your multiple choice answers. Please note that you have two attempts to obtain at least 70%.
6 View and print your CPD certificate.

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Language

All articles must be submitted in English. Spelling should be in accord with the Shorter Oxford English Dictionary.

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To be kept as brief, clear and unambiguous as possible.

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The summary shall consist of not more than 200 words.
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- Articles should be clear and concise.
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In general, papers should be between 4000 and 5000 words, although this is flexible. The Editor reserves the right to edit the length of an article in conjunction with the author(s) and SADJ reserves the right to charge for excess/additional pages. The first four pages of original research papers published in the SADJ will be free of charge after which a charge of R500 per page or part thereof will be levied.

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- **Please note:** Figures should be included in the text **and** sent separately in jpg. format.
- The Figure numbers must be in Arabic numerals and clearly identified for each illustration, graphic or photograph.
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Continuing Professional Development

Please supply **5-8 questions** related to your article, **at least five** of which should be in the multiple choice format. Answers must be either True or False or, if multiple choice, have only **one** correct answer. Please provide answers to the questions.

References

- References should be set out in the **Vancouver style** and only approved abbreviations of journal titles should be used (consult the *List of Journals Indexed* in *Index Medicus* for these details at:
  http://www.nlm.nih.gov/tsd/serials/lji.html).
- References should be inserted seriatim in the text using superscript numbers and should be listed at the end of the article in numerical order.
  Do not list them alphabetically.
  It is the author's responsibility to verify each reference fromits original source. Please note that an article may be rejected if the referencing is inaccurate.
- Names and initials of all authors should be given unless there are more than six, in which case the first three names should be given, followed by 'et al'. First and last page numbers should be given. Where it is applicable the page numbers should be abbreviated by omitting redundant numbers eg. pages 456 to 478 is recorded as 456-78, and 456 to 459 as 456-9, but 398 to 401 is recorded as 398-401.
- Notice that volume numbers are not given in bold, authors are not linked by 'and' or '&', and the date of publication appears after the name of the journal. No item should appear in italics except for foreign terms, eg *in vivo*.

Journal references should appear thus:

Smith NC, Haines A. The role of the dentist in public health promotion. Br Dent J. 1983; 298: 249-51.

Book references should be set out as follows:

Terblanche N. Principles of Periodontology, 4th ed. London: Butterworth, 1985: 96-101.

Weinstein L, Swartz MN. Pathogenic properties of invading microorganisms. In: Sodeman WA, Smith RT, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974: 457-72.

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DENTAL & ORAL HEALTH
CONGRESS AND EXHIBITION
30 AUGUST - 1 SEPTEMBER 2019
Inkosi Albert Luthuli International
Convention Centre, Durban

SADA

Congress Programme

"From Start to Finish"

Friday 30 August 2019

Master Classes/Hands-On Tracks

(Please note the Master Classes/Hands-on tracks run concurrently)

Friday 30 August 2019	Track 1 Lasers & Snoring	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	**Lasers & Snoring:** Effective non-surgical treatment modality alleviating snoring	*Dr Sofia Aravopoulou*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	**(Repeat) Lasers & Snoring:** Effective non-surgical treatment modality alleviating snoring	*Dr Sofia Aravopoulou*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	**Practice management:** Creating a quality practice	*Dr Raj Rattan*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**Practice management:** Managing failures and human error	*Dr Raj Rattan*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 2 Digital Dentistry	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	**Digital Dentistry:** Aesthetic excellence chairside with CADCAM	*Dr Murray Orr*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	**Digital Dentistry:** Aesthetic excellence chairside with CADCAM **(Continued)**	*Dr Murray Orr*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	**Digital Dentistry:** Digital solutions for complex cases	*Dr Frank Spitznagel*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**Digital Dentistry:** CAD/CAM in Implant Dentistry - Key to success	*Dr Johannes Boldt*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 3 Paedodontic Society of South Africa	
07:15 - 08:00	**Congress registration**	
08:00 - 09:00	The 6th sense of behaviour management	*Dr Nicoline Potgieter*
09:00 - 10:00	Management of the medically compromised patients	*Dr Nadia Mohamed*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	Paediatric Zirconia Crowns	*Dr Makul Jain*
11:30 - 12:30	Silver Diamine Fluoride and Paedo-Rotary Files	*Dr Makul Jain*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	Current trends in Paediatric Dentistry	*Prof Peet van der Vyver & Dr Martin Vorster*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	Glass ionomers from A to Z	*Dr Riaan Mulder*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 4 Young Dentist's Council	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	Endodontics - back to the future	*Dr Hussein Seedat*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	Implant failure – a microscopic perspective Update on oral and oropharyngeal carcinoma	*Prof Erich Raubenheimer*
11:30 - 12:30	Sugar, caries and all things nice	*Dr Hanif Laher*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:15	An introduction to dental implantology	*Dr Bradley Bredenkamp*
15:15 - 15:30	**Tea break and tradeshow**	
15:30 - 16:15	Problems & Solutions	*Dr Alasdair McKelvie*
16:15 - 17:00	From Start to Finish	*Mr Bruce Fordyce*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 5	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	**Ethics:** Problems & solutions	*Dr Alasdair McKelvie*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	**Ethics:** Problems & solutions	*Dr Kobus Barnard*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	**Aesthetics:** Cementation	*Dr Michael Dieter*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**Endodontics:** Set your Endo on fire	*Dr Martin Vorster*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 6	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	**Restorative:** How to create flawless impressions for indirect restorations	*Prof Peet van der Vyver*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	**Endodontics:** Mastering Endodontic treatment on maxillary molars respecting the true anatomy	*Prof Peet van der Vyver*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	**Aesthetics:** Catherization of Ceramic Restorations	*Mr Tom Behaeghel*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**Orthodontics:** Why restorative dentistry needs Orthodontics	*Dr Mark Bowes*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 7 Endodontics	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	The basic golden rules in endodontics	*Dr Boela van der Merwe*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	Fundamentals approaching challenging endodontic anatomy Technologies taking endodontics from darkness into the light	*Dr Grethé Koen*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	Predictability in Endodontics Clinical tips to better endodontics	*Dr Gavin Williams*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	Iotrogenic damage caused with Endodontics	*Dr Christo van Rensburg*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Please Note: Programme subject to change.

Friday 30 August 2019	Track 8 Implantology	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	Introduction to implant dentistry Implant engineering-geometry and implant-abutment connections	*Prof Andre van Zyl, & Team*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	Applied anatomy for implants: a brief overview	*Prof Andre van Zyl, & Team*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:00	**Hands-on/Practical training:** Placement of a single posterior implant - from stent to provisional crown	*Prof Andre van Zyl & Team*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**Hands-on/Practical training:** Placement of a single posterior implant - from stent to provisional crown **(Continued)** Demonstration of impression taking on a single posterior implant	*Prof Andre van Zyl & Team*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 9 Style Italiano	
07:15 - 08:00	**Congress registration**	
08:00 - 10:00	State of the art anterior composite restorations	*Dr Walter Devoto & Dr Monaldo Saracinelli*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	State of the art anterior composite restorations **(Continues)**	*Dr Walter Devoto & Dr Monaldo Saracinelli*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:30	**(Repeat)** State of the art anterior composite restorations	*Dr Walter Devoto & Dr Monaldo Saracinelli*
15:00 - 15:30	**Tea break and tradeshow**	
15:30 - 17:00	**(Repeat)** State of the art anterior composite restorations **(Continues)**	*Dr Walter Devoto & Dr Monaldo Saracinelli*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

Friday 30 August 2019	Track 10 Dental Technician Plenary	
07:15 - 08:00	**Congress registration**	
08:00 - 09:00	In Lab and the Connect Case Centre workflow	*Mr Leo Dingemans*
09:00 - 10:00	Back to basis - a reminder	*Mr Miha Skaza*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	One guide to all today's Zirconia solutions	*Mr Uwe Greitens*
11:30 - 12:30	Owning your financial future	*Ms Jacqueline Newton*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:30	Implant denture frameworks and attachments	*Mr Shrikanth Mallem Kumar*
14:30 - 15:30	Red and white ceramic polymers in harmony	*Mr Richard Newman*
15:30 - 16:00	**Tea break and tradeshow**	
16:00 - 17:00	The quality of Vita teeth comparison with computer teeth	*Mr Tom Behaeghel*
18:00	**Cocktail evening with *Barry Hilton* and German Oompah Band**	

End of Day 1 - Continue to Day 2 on p4

Saturday 31 August 2019
Main Plenary
(Please note the Plenary and Parallel tracks run concurrently)

07:15 - 08:00	**Congress registration**	
08:00 - 08:15	Opening **(All Delegates)**	
08:15 - 08:45	From start to finish	*Mr. Bruce Fordyce*
08:45 - 09:45	SADA Awards Ceremony	
09:45 - 10:15	The Dentist as Healthcare Provider	*Prof James Curtis*
10:15 - 11:00	**Tea break and tradeshow**	
11:00 - 12:30	Camouflage - The composite revolution in anterior teeth	*Dr Walter Devoto & Dr Monaldo Saracinelli from Style Italiano*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:15	Implants, abutments and the restorative platform	*Dr Michael Michael*
14:15 - 15:00	Aesthetics in the Digital Age	*Dr Michael Dieter*
15:00 - 15:45	CBCT - How it can benefit your practice	*Prof Peet van der Vyver*
15:45 - 16:15	**Tea break and tradeshow**	
16:15 - 17:00	Talking points in Dentistry	*Dr Kwinda, Dr Raj Rattan, Dr Alasdair McKelvie, & Mr KC Makhubele*
17:00 - 17:45	Unconventional pathways in contemporary prosthodontics	*Dr Johannes Boldt*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019
Parallel Tracks
(Please note the Plenary and Parallel tracks run concurrently)

Saturday 31 August 2019	**Oral Hygienist**	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:15 - 11:00	**Tea break and tradeshow**	
11:00 - 12:30	Periodontal Treatment, Periodontal Maintenance, and Periodontal Negligence - where are you?	*Mr Deepak Simkhada*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:15	Out with the old and in with the new...	*Ms Dirna Grobbelaar*
14:15 - 15:00	Burnout	*Dr Alasdair McKelvie*
15:00 - 15:45	How to bring balance in your life as a health professional	*Dr Ntombi Khumalo*
15:45 - 16:15	**Tea break and tradeshow**	
16:15 - 17:00	CADCAM for the modern dental auxiliary. The critical role these auxilliaries play in a productive and profitable dental practice and how valued they are	*Dr Murray Orr*
17:00 - 17:45	Decoding dental ethics: from theory to practice	*Prof Shenuka Singh*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019	**Dental Assistant**	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:30 - 11:15	**Tea break and tradeshow**	
11:15 - 12:00	CADCAM for the modern dental auxiliary. The critical role these auxilliaries play in a productive and profitable dental practice and how valued they are	*Dr Murray Orr*
12:00 - 12:45	What dental assistants need to know about laser procedures	*Mr Peter Doubell*
12:45 - 13:45	**Lunch break and tradeshow**	
13:45 - 15:15	Infection prevention and waste management	*Ms Tebatso Mutibi*
15:15 - 16:00	Recognise the signs and symptoms of chemical dependency	*Dr Jeanne Oosthuysen*
16:00 - 16:30	**Tea break and tradeshow**	
16:30 - 17:00	The importance of supporting your Dentist when placing and restoring Dental Implants	*Ms Lee-Ann Bird*
17:00 - 17:30	How to bring balance in your life as a health professional	*Dr Ntombi Khumalo*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Please Note: Programme subject to change.

Saturday 31 August 2019	Practice Manager/Receptionist	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:30 - 11:15	**Tea break and tradeshow**	
11:15 - 11:45	Medical Office Management	*Ms Adele Pretorius*
11:45 - 12:15	Image is Everything	*Ms Adele Pretorius*
12:15 - 12:45	Troubleshooting Techniques	*Ms Adele Pretorius*
12:45 - 13:45	**Lunch break and tradeshow**	
13:45 - 14:30	Telephone Etiquette	*Ms Adele Pretorius*
14:30 - 15:15	Communication and Listening Skills	*Ms Adele Pretorius*
15:15 - 16:00	Understanding Medical Ethics	*Ms Adele Pretorius*
16:00 - 16:30	**Tea break and tradeshow**	
16:30 - 17:00	Confidentiality in the Practice	*Ms Adele Pretorius*
17:00 - 17:30	A compassionate mindset	*Ms Adele Pretorius*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019	Dental Technician Plenary	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	Digital implant workflow from planning to placement	*Mr Darron Chidrawi*
11:30 - 12:30	Partial dentures/CAD Designs and 3D Printing	*Mr Miha Skaza*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:30	Aesthetic considerations of anterior and posterior CAD/CAM restorations	*Dr Murray Orr*
14:30 - 15:30	Scan - design - print	*Mr Adriaan van der Spuy*
15:30 - 16:00	**Tea break and tradeshow**	
16:00 - 17:00	A functional, a predictable approach to aesthetic restoration	*Mr Michael Lazarevic*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019	Dental Technician Master Classes/Hands-on - Track 1	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	Renfert occlusal compass and anatomy - Part 1 & 2	*Mr André Buys*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 15:30	Renfert occlusal compass and anatomy - Part 3 & 4	*Mr André Buys*
15:30 - 16:00	**Tea break and tradeshow**	
16:00 - 17:00	Renfert occlusal compass and anatomy - Part 5	*Mr André Buys*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019	Dental Technician Master Classes/Hands-on - Track 2	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	Precision, power and control with digital Orthodontics - Part 1 & 2	*Ms Andrea Schepers*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:30	Topic to be announced	*Speaker to be confirmed*
14:30 - 15:30	Topic to be announced	*Speaker to be confirmed*
15:30 - 16:00	**Tea break and tradeshow**	
16:00 - 17:00	Topic to be announced	*Speaker to be confirmed*
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Please Note: Programme subject to change.

Saturday 31 August 2019	The South African Society for Periodontology, Implantology and Oral Medicine	
07:15 - 08:00	**Congress registration**	
08:00 - 10:15	Join opening	
10:15 - 11:00	**Tea break and tradeshow**	
11:00 - 12:30	Principles of anticoagulation Drug-drug interactions: core knowledge for the dental specialist	*Dr Erick Decloedt*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:15	Clinical case discussions	*Dr Erick Decloedt*
14:15 - 15:00	New classification of periodontal disease	*Dr Shogan Govender*
15:00 - 15:45	CBCT - The role in digital dentistry	*Dr Khaleb Beshtawi*
15:45 - 16:15	**Tea break and tradeshow**	
16:15 - 17:45	SASPIO - AGM	
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

Saturday 31 August 2019	The South African Society of Maxillofacial and Oral Surgeons	
08:00 - 08:30	**Congress registration**	
08:00 - 10:00	Join Opening	
10:15 - 11:00	**Tea break and tradeshow**	
11:00 - 12:30	Digital planning in maxillofacial surgery	*Dr Ebrahim Fakir*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:30	A practical approach to understanding and managing functional TMJ disorders	*Dr Jameel Desai*
14:30 - 15:30	The interface between Maxillo Facial Radiology and Surgery	*Dr Suvir Singh*
15:45 - 16:15	**Tea break and tradeshow**	
19:30	**Gala dinner at uShaka Marine World with *the Beat Route* band**	

End of Day 2 - Continue to Day 3

Sunday 1 September 2019
Main Plenary
(Please note the Plenary and Parallel tracks run concurrently)

08:00 - 08:30	**Congress registration**	
08:30 - 09:15	Conflict in business ethics	*Dr Raj Rattan*
09:15 - 10:00	Aesthetic direct restorations in endodontically treated anterior teeth. Post or not Post: Amletic question?	*Dr Monaldo Saracinelli*
10:00 - 10:15	**Tea break and tradeshow**	
10:15 - 11:00	Motivational Speaker	*Mr. Alex Granger*
11:00 - 11:45	New frontiers in removable prosthodontics	*Prof Frank Spitznagel*
11:45 - 12:15	Comprehensive Dental Care Continuum	*Prof James Curtis*
12:15 - 13:15	**Lunch break and tradeshow**	
13:15 - 14:30	Back to the roots	*Dr Christof Zirkel*
14:30 - 15:15	Implant restorations in a digital world	*Dr Murray Orr*
15:15 - 15:30	**Closure and Prize Draw**	

Sunday 1 September 2019
Parallel Tracks
(Please note the Plenary and Parallel tracks run concurrently)

Sunday 1 September 2019	**Dental Technician** Plenary	
08:00 - 08:30	**Congress registration**	
08:00 - 09:00	Anterior shade matching journey	*Mr André Buys*
09:00 - 10:00	Topic to be announced	*Prof Peet van der Vyver*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	Partial dentures - 3D printing, design and casting	*Mr Miha Skaza*
11:30 - 12:30	Digital workflow	*Mr Barry Lockston*
12:30 - 13:30	**Lunch break and tradeshow**	
13:30 - 14:30	Digital treatment planning - a team approach	*Dr Mark Bowes*
14:30 - 15:30	Topic to be announced	*Mr Tom Behaeghel*
15:15 - 15:30	**Closure and prize draw**	

Sunday 1 September 2019	**Dental Technician** Master Classes/Hands-on - Track 1	
08:00 - 08:30	**Congress registration**	
08:00 - 09:00	Topic to be announced	*Dr Murray Orr*
09:00 - 10:00	Topic to be announced	*Dr Murray Orr*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 12:30	Precision, power and control with digital Orthodontics - Part 1 & Part 2	*Ms Andrea Schepers*
12:30 - 13:30	**Lunch break and tradeshow**	
15:15 - 15:30	**Closure and prize draw**	

Sunday 1 September 2019	**Dental Technician** Master Classes/Hands-on - Track 2	
08:00 - 08:30	**Congress registration**	
08:00 - 09:00	Galvanforming	*Ms Karin Schaffner*
09:00 - 10:00	Red and white ceramic polymers in harmony	*Mr Richard Newman*
10:00 - 10:30	**Tea break and tradeshow**	
10:30 - 11:30	Staining and glazing full monolithic milled restorations	*Mr Michael Lazarevic*
11:30 - 12:30	The full digital solution	*Ms Cherodene Bester & Mr Bryan Perkin*
12:30 - 13:30	**Lunch break and tradeshow**	
15:15 - 15:30	**Closure and prize draw**	

End of Day 3 and Programme

Delegate Registration Form

30 August 2019 - 1 September 2019

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DENTAL & ORAL HEALTH
CONGRESS AND EXHIBITION
30 AUGUST - 1 SEPTEMBER 2019
Inkosi Albert Luthuli International Convention Centre, Durban

SADA

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Postal Address: Code:

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Email Address: Company Vat No.

Accompanying Person

Surname: Initials: Title:

Section B: Registration Fees (Vat Included)

Registration Section
Note: Please mark the appropriate registration fee **(with an X)** according to your specific delegate category.

Delegate Category	Full Registration Fee: (3 Days) 30 August 2019 - 1 September 2019				Day Delegate Registration Fees Per Day							
	Early Bird before 30 June 2019	Mark X	Booked from 1 July 2019	Mark X	Early Bird before 30 June 2019	Fri 30 Aug	Sat 31 Aug	Sun 1 Sept	Booked from 1 July 2019	Fri 30 Aug	Sat 31 Aug	Sun 1 Sept
*SADA Core Member	R 4 840.00		R 5 540.00		R 1 940.00				R 2 220.00			
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2nd Year Qualified Dentist in Practice	R 3 000.00		R 3 440.00		R 1 200.00				R 1 375.00			
Dental Students (1st - 5th Year)	FREE		FREE		FREE				FREE			
Registrar/Post Graduate Student	R 1 920.00		R 2 300.00		R 770.00				R 920.00			
Emeritus (70+ Years)	R 2 000.00		R 2 500.00		R 800.00				R 1 000.00			
Dental Technician	R 2 750.00		R 3 500.00		R 1 200.00				R 1 320.00			
Dental Therapist	R 2 750.00		R 3 500.00		R 1 200.00				R 1 320.00			
Oral Hygienist	R 2 165.00		R 2 500.00		R 850.00				R 1 000.00			
Dental Assistant	R 1 700.00		R 2 000.00		R 700.00				R 800.00			
Receptionist/Practice Manager	R 1 700.00		R 2 000.00		R 700.00				R 800.00			
Exhibition Only Visitors	R 5 000.00		R 6 000.00		R 2 000.00				R 2 500.00			
Spouse Visitor	R 1 200.00		R 1 500.00		R 610.00				R 750.00			
		Total	R		Total	R			Total No. of Days			
									Total Section B	R		

Group Bookings - Qualify for great discounts
1 Dentist + 3 Auxilliary Staff
2 Dentists + 3 - 5 Auxilliary Staff
2 & More Dentists + 6 & More Auxilliary Staff

For your discounted quote contact: Marilize van der Linde

Cell: +27 (0)83 339 8911
Tel: +27 (0)11 484 5288
Email: mvdlinde@sada.co.za
Fax: +27 (0)86 680 7390
Office hours: Monday to Friday, 08:00 - 16:00

***SADA Core Member:** This member gets a preferential rate of R1460 less on the Annual SADA Congress full registration fee unavailable to SADA Non-Members.
****SADA Educational Member:** This member who has purchased the Educational membership top-up package is entitled to a further discount of R1000 (total discount of R2460) on the Annual SADA Congress full registration fee to SADA Non-Members.

Please fill in registration form and **Email:** mvdlinde@sada.co.za, **Fax:** +27 (0)86 680 7390 or **register online:** www.sadacongress.co.za

Section C

Programme Session Bookings

Due to lecture room limited seating all bookings are processed on a first come first served basis. If you do not indicate which lecture you wish to attend you will not be registered to attend the lecture on that day and your registration will not be accepted. Please indicate your option in the **white spaces** provided with an ' ✓ '.

Friday 30 August 2019

Time	Track	✓
Master Classes / Hands-On		
	Track 1 - Lasers & Snoring	
08:00 - 10:00	**Lasers & Snoring:** Effective non-surgical treatment modality alleviating snoring - *Dr Sofia Aravopoulou*	
10:30 - 12:30	**(Repeat) Lasers & Snoring:** Effective non-surgical treatment modality alleviating snoring - *Dr Sofia Aravopoulou*	
13:30 - 15:00	**Practice Management:** Creating a quality practice - *Dr Raj Rattan*	
15:30 - 17:00	**Practice Management:** Managing failures and human error - *Dr Raj Rattan*	
	Track 2 - Digital Dentistry	
08:00 - 12:30	**Digital Dentistry:** Aesthetic Excellence Chairside with CADCAM - *Dr Murray Orr*	
13:30 - 15:00	**Digital Dentistry:** Digital solutions for complex cases - *Dr Frank Spitznagel*	
15:30 - 17:00	**Digital Dentistry:** CAD/CAM in Implant Dentistry: Key to success - *Dr Johannes Boldt*	
	Track 3 - Paedodontic Society of South Africa	
08:00 - 09:00	The 6th sense of behaviour management - *Dr Nicoline Potgieter*	
09:00 - 10:00	Management of the medically compromised patients - *Dr Nadia Mohamed*	
10:30 - 11:30	Paediatric Zirconia Crowns - *Dr Makul Jain*	
11:30 - 12:30	Silver Diamine Fluoride and Paedo-Rotary Files - *Dr Makul Jain*	
13:30 - 15:00	Current trends in Paediatric Dentistry - *Prof Peet van der Vyver & Dr Martin Vorster*	
15:30 - 17:00	Glass ionomers from A to Z - *Dr Riaan Mulder*	
	Track 4 - Young Dentist's Council	
08:00 - 10:00	Endodontics - back to the future - *Dr Hussein Seedat*	
10:30 - 11:30	Implant failure – a microscopic perspective Update on oral and oropharyngeal carcinoma - *Prof Erich Raubenheimer*	
11:30 - 12:30	Sugar, caries and all things nice - *Dr Hanif Laher*	
13:30 - 15:15	An introduction to dental implantology - *Dr Bradley Bredenkamp*	
15:30 - 16:15	Problems & Solutions - *Dr Alasdair McKelvie*	
16:15 - 17:00	From start to finish - *Mr Bruce Fordyce*	
	Track 5	
08:00 - 10:00	**Ethics:** Problems & solutions - *Dr Alasdair McKelvie*	
10:30 - 12:30	**Ethics:** Problems & solutions - *Dr Kobus Barnard*	
13:30 - 15:00	**Aesthetics:** Cementation - *Dr Michael Dieter*	
15:30 - 17:00	**Endodontics:** Set your Endo on fire - *Dr Martin Vorster*	
	Track 6	
08:00 - 10:00	**Restorative:** How to create flawless impressions for indirect restorations - *Prof Peet van der Vyver*	
10:30 - 12:30	**Endodontics:** Mastering Endodontic treatment on maxillary molars respecting the true anatomy - *Prof Peet van der Vyver*	
13:30 - 15:00	**Aesthetics:** Catherization of Ceramic Restorations - *Mr Tom Behaeghel*	
15:30 - 17:00	**Orthodontics:** Why restorative dentistry needs Orthodontics - *Dr Mark Bowes*	
	Track 7 - Endodontics	
08:00 - 10:00	The basic golden rules in endodontics - *Dr Boela van der Merwe*	
10:30 - 12:30	Fundamentals approaching challenging endodontic anatomy Technologies taking endodontics from darkness into the light - *Dr Grethé Koen*	
13:30 - 15:00	Predictability in Endodontics Clinical tips to better endodontics - *Dr Gavin Williams*	
15:30 - 17:00	Iotrogenic damage caused with Endodontics - *Dr Christo van Rensburg*	

Friday 30 August 2019

Time	Track	✓
Master Classes / Hands-On		
	Track 8 - Implantology	
08:00 - 10:00	Introduction to implant dentistry Implant engineering-geometry and implant-abutment connections	
10:30 - 12:30	Applied anatomy for implants: a brief overview	
13:30 - 15:00	**Hands-on/Practical training:** Placement of a single posterior implant - from stent to provisional crown	
15:30 - 17:00	**Hands-on/Practical training:** Placement of a single posterior implant - from stent to provisional crown **(Continued)** Demonstration of impression taking on a single posterior implant - *Prof Andre van Zyl and Team*	
	Track 9 - Style Italiano	
08:00 - 12:30	State of the art anterior composite restorations - *Dr Walter Devoto & Dr Monaldo Saracinelli*	
13:30 - 17:00	**(Repeat)** State of the art anterior composite restorations - *Dr Walter Devoto & Dr Monaldo Saracinelli*	
	Track 10 - Dental Technician	
08:00 - 09:00	In Lab and the Connect Case Centre workflow - *Mr Leo Dingemans*	
09:00 - 10:00	Back to basis - a reminder - *Mr Miha Skaza*	
10:30 - 11:30	One guide to all today's Zirconia solutions - *Mr Uwe Greitens*	
11:30 - 12:30	Owning your financial future - *Ms Jacqueline Newton*	
13:30 - 14:30	Implant denture frameworks and attachments - *Mr Shrikanth Mallem Kumar*	
14:30 - 15:30	Red and white ceramic polymers in harmony - *Mr Richard Newman*	
16:00 - 17:00	The quality of Vita teeth comparison with computer teeth - *Mr Tom Behaeghel*	

Saturday 31 August 2019

Time	Session	✓
08:00 - 17:45	**Main Plenary**	
08:00 - 17:45	**Oral Hygienist**	
08:00 - 17:30	**Dental Assistant**	
08:00 - 17:30	**Practice Manager/Receptionist**	
	Dental Technician - Plenary	
10:30 - 11:30	Digital implant workflow from planning to placement - *Mr Darron Chidrawi*	
11:30 - 12:30	Partial dentures/CAD Designs and 3D Printing - *Mr Miha Skaza*	
13:30 - 14:30	Aesthetic considerations of anterior and posterior CAD/CAM restorations - *Dr Murray Orr*	
14:30 - 15:30	Scan - design - print - *Mr Adriaan van der Spuy*	
16:00 - 17:00	A functional, a predictable approach to aesthetic restoration - *Mr Michael Lazarevic*	
	Dental Technician - Master Classes/Hands-on - Track 1	
10:30 - 12:30	Renfert occlusal compass and anatomy - Part 1 & 2 - *Mr André Buys*	
13:30 - 15:30	Renfert occlusal compass and anatomy - Part 3 & 4 - *Mr André Buys*	
16:00 - 17:00	Renfert occlusal compass and anatomy - Part 5 - *Mr André Buys*	
	Dental Technician - Master Classes/Hands-on - Track 2	
10:30 - 12:30	Precision, power and control with digital Orthodontics - Part 1 & 2 - *Ms Andrea Schepers*	
13:30 - 14:30	Topic to be announced - *Speaker to be confirmed*	
14:30 - 15:30	Topic to be announced - *Speaker to be confirmed*	
16:00 - 17:00	Topic to be announced - *Speaker to be confirmed*	
08:00 - 17:45	**The South African Society for Periodontology, Implantology and Oral Medicine**	
08:00 - 15:30	**The South African Society of Maxillofacial and Oral Surgeons**	

Sunday 1 September 2019

Time	Session	✓
08:00 - 15:30	**Main Plenary**	
	Dental Technician - Plenary	
08:00 - 09:00	Anterior shade matching journey - *Mr André Buys*	
09:00 - 10:00	Topic to be announced - *Prof Peet van der Vyver*	
10:30 - 11:30	Partial dentures - 3D printing, design and casting - *Mr Miha Skaza*	
11:30 - 12:30	Digital workflow - *Mr Barry Lockston*	
13:30 - 14:30	Digital treatment planning - a team approach - *Dr Mark Bowes*	
14:30 - 15:30	Topic to be announced - *Mr Tom Behaeghel*	
	Dental Technician - Master Classes/Hands-on Track 1	
08:00 - 09:00	Topic to be announced - *Dr Murray Orr*	
09:00 - 10:00	Topic to be announced - *Dr Murray Orr*	
10:30 - 12:30	Precision, power and control with digital Orthodontics - Part 1 & 2 - *Ms Andrea Schepers*	
	Dental Technician - Master Classes/Hands-on Track 2	
08:00 - 09:00	Galvanforming - *Ms Karin Schaffner*	
09:00 - 10:00	Red and white ceramic polymers in harmony - *Mr Richard Newman*	
10:30 - 11:30	Staining and glazing full monolithic milled restorations - *Mr Michael Lazarevic*	
11:30 - 12:30	The full digital solution - *Ms Cherodene Bester & Mr Bryan Perkin*	

Section D

Congress Social Functions

Indicate which functions you will attend by marking the appropriate block.
Note: There is **no cost** related to these functions. A cash bar will be available.

Thursday 29 August 2019: Pre-Registration & Welcome Function **Venue: Durban ICC Foyer**	Yes ✓	No X
Delegate		
Accompanying Person		

Friday 30 August 2019: Cocktail Evening with *Barry Hilton* and German Oompah Band **Venue: Durban ICC**	Yes ✓	No X
Delegate		
Accompanying Person		

Indicate whether you will attend the Gala Dinner by marking the appropriate block.
Note: The Gala Dinner costs **R550 pp**. A cash bar will be available.

Saturday 31 August 2019: Gala Dinner with *the Beat Route Band* (R550 pp) **Venue: uShaka Marine World**	Yes ✓	No X
Delegate		
Accompanying Person		

Section E

Dietary Requirements

- The food served at the venue is certified by HFSA (Halaal Foundation of South Africa) at no extra cost. Please indicate your choice below.
- If you require a Halaal menu option certified by SANHA (South African National Halaal Authority), a surcharge is applicable. Please indicate your choice below.
- If you require a Kosher menu option this is served at no extra cost. Please indicate your choice below.
- If you have any allergies, please indicate this below.

Special dietary requirements: Register by cut off date: 20/07/2019.
Please contact Marilize van der Linde at mvdlinde@sada.co.za in this regard.

Indicate your special dietary requirements if applicable: ✓

	Standard Menu Requirement	HFSA Halaal Requirement	SANHA Halaal* Requirement	Kosher Requirement
Delegate				
Accompanying Person				

*A surcharge is applicable for SANHA certified Halaal food.

Indicate your allergies if applicable: ✓

	Nuts	Wheat	Gluten	Lactose
Delegate				
Accompanying person				
Indicate any other allergies you have				

Section F

Payment Details

R SECTION B + R SECTION D = R

Debit / Credit Card Payments Only: Please Fill In Details Below.
SADA does not store or record any card details.
You will be called on the telephone number you have indicated on page 1 of this registration form for card details to be processed.

Charge my Visa: ☐ Master: ☐ Amex: ☐ Diners: ☐

Card Number: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Card Verification Value (CVV) on reverse of card: ☐☐☐☐

Expiry date: Day ☐☐ Month ☐☐ Year ☐☐☐☐

Surname: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Amount to be deducted: R ☐☐☐☐☐☐☐☐☐☐☐☐

Terms and Conditions
- Full payment of registration fees are required to confirm registration.
- Delegates are responsible for their own accommodation and travel arrangements.

Cancellations
- 25% Cancellation fee will be levied on cancellations on or before 30 June 2019.
- 50% Cancellation fee will be levied on cancellations between 1-31 July 2019.
- No refund for cancellation or non-attendance from 1 August 2019.
- Cancellation must be received in writing.
- If notification is not received in writing and confirmed by this office, you will be liable for the full registration fee.

Signature
I have read and understand the **Terms & Conditions** and **Cancellation** clause, as indicated above.

Title: ☐☐☐☐☐☐☐☐ First name: ☐☐☐☐☐

Surname: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date: D D / M M / 2 0 1 9

SADA Banking Details
Account name: The South African Dental Association
Bank: Investec Bank Limited **Branch:** Sandton **Branch Code:** 58 01 05
Account Number: 10011847744 **Swift Code:** IVESZAJJ
Reference: Account no as it appears on invoice & name of individual/company

International Transfers
International Swift No.: IVESZAJJ
Address Details: 11 Diagonal Street, Newtown, Johannesburg, 2001

Section G

Accomodation Arrangements

Delegates are responsible for their own accommodation and travel arrangements, we have secured preferential rates for congress delegates at The Hilton Hotel, Durban.

The Hilton Hotel, Durban
www.hiltondurban.com
238 rooms
R 1 800.00 - Single Occupancy
R 2 250.00 - Double Occupancy
Contact: Chanel Pillay
A: 12 - 14 Walnut Road, Durban, South Africa
D: +27 (0)31 336 8123
T: +27 (0)31 336 8285
E: chanel.pillay@hilton.com
Distance: Walking distance from the venue
Our quests must quote the group code to recieve the special congress rate: **GSADA**

For a comprehensive list of more accommodation visit www.sadacongress.co.za

The South Africa Dental Association (SADA) and its representatives respect your rights to privacy and protection of your personal information. SADA is seeking your written permission to release your name and contact details to traders participating in the Congress. Please indicate your preference by ticking the appropriate box.	YES	NO

For more information contact: Marilize van der Linde

Cell: +27 (0)83 339 8911 **Fax:** +27 (0)86 680 7390
Tel: +27 (0)11 484 5288 **Office hours:** Monday to Friday, 08:00 - 16:00
Email: mvdlinde@sada.co.za
For online registration and payment go to: www.sadacongress.co.za

Please fill in registration form and **Email:** mvdlinde@sada.co.za, **Fax:** +27 (0)86 680 7390 or **register online:** www.sadacongress.co.za

Register Now! An exceptional event not to be missed.

DENTAL & ORAL HEALTH
CONGRESS AND EXHIBITION

30 AUGUST - 1 SEPTEMBER 2019

Inkosi Albert Luthuli International
Convention Centre, Durban

SADA