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BDS(MUK), JUBILEE DENTAL CLINICS

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DR. NAMAYANJA JOAN, BDS (MAK)



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DR. JOAN NAMAYANJA
Editor UDA Journal

EDITORIAL MESSAGE

Greetings to you all,

I'd like to thank all of us for making UDA a success through the annual subscriptions and ideas shared on the dentists' forum. We'd be nowhere without you all

In a special way, my gratitude to the doctors that submitted articles used in the journal, thank you for sharing your knowledge with us. For it's in giving that we receive.

In this edition you'll find multidisciplinary topics that aim at widening our scope of knowledge thus betterment of our clinical approach.

Enjoy the read

Thank you and God bless you all.

Dr. Namayanja Joan.

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UGANDA
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UDA

Our Mandate

To coordinate, harmonize
/standardize the dental
profession in Uganda.

Our Mission

To strengthen the dental
profession through utilizing the
synergies of its membership

Our Vision

An effective and professional
dental system that is accountable,
sustainable and accessible.

...Healthy teeth for a beautiful smile



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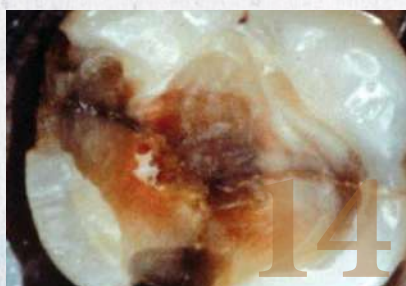
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“
Dentistry is a constantly evolving profession and dentists need to constantly renew their knowledge and information to take into account the latest developments.”

PRESIDENT'S MESSAGE

Dear Colleagues,

It is indeed a great honour to have served as the President of our Association. I am deeply moved and thank you for the confidence you have shown me. I accepted the position of President of UDA with humility because it is not an easy task and I am certain that despite my best efforts, I did disappoint some of you some times. We had a good year in office with a brilliant team which made our task at time seem easier.

Over the past year we faced great challenges and have managed to preserve our unity and our basic standards. We have made enormous strides in improving the running of the association, thanks to the School of dentistry (Makerere University) for hosting us.

We present to you the amended constitution of the Uganda dental Association 2018 for adoption. As you are aware, the old constitution was lacking in many aspects and we managed to put together what we thought should be mentioned in the constitution, once again thank you to all those who contributed to the Amendment. Key highlight of the amended constitution is the extension of term of office of the Executive committee from one year to three years. We urge members to be more supportive to the leadership of the Association if greater achievements are expected. The strength of the Association is the strength of the members and vice versa.

We all know that, Dentistry is a constantly evolving profession and dentists need to constantly renew their knowledge and information to take into account the latest developments. Being 'ahead of the game' is what our customers expect from us and we cannot lose focus on that. For decades, the dental profession - dental medicine as it should be designated has limited its scope to the "operative or restorative" approach to dentistry.

Today, it is generally agreed that we must move closer to the medical sphere, especially as co-related classic areas of dental medicine, education, prevention, treatment and rehabilitation demand this approach: Over the last few decades, the scope of dental medicine has been limited essentially to operative and restorative dentistry, to the detriment of the important fields of education and prevention.

Finally, even dentists themselves have become impatient with their excessive identification as technicians specialized in dental aesthetics. It is our view that that the profession, and dental medicine in general, should have a much wider ambition. The various fields of education, prevention, diagnosis, treatment and rehabilitation are becoming increasingly interrelated; in the same way that relations between dental medicine and medicine in general, as well as other fields such as nutrition, psychology and sociology, are growing. It is now time to admit that viewing oral health as somehow separate from general health is truly obsolete, and nowhere is the indisputable relationship between the two better illustrated than in the area of noncommunicable diseases (NCDs), or chronic diseases as they are sometimes known.

Oral diseases do not account for high death rates; nevertheless neglected NCDs such as tooth decay and periodontal disease affect more than 90% of the world's population and have an enormous impact on health. Tooth decay, the most prevalent oral disease, affects the life of billions of people worldwide and is a major challenge for public health in its complexity, scale and impact both on the life of the individual and the community.

Thank you all for giving me this opportunity to serve you all as President

Wishing you all a happy and fruitful time

Dr Ayub Twaha
President, Uganda Dental Association



UDA COMMITTEE MEMBERS



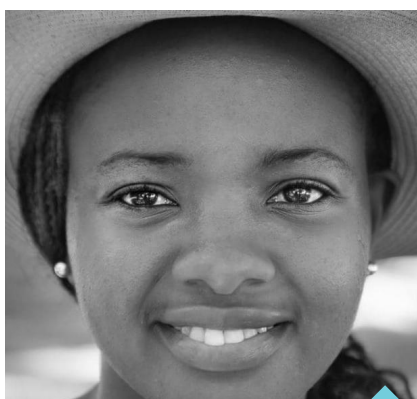
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RECURRENT APHTHOUS STOMATITIS; THE UNLEASHED CLINICAL APPROACH.

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CASE PRESENTATION:

A frustrated 36-year-old female and banker, presented with a complaint of “painful mouth sores”. Her description was on and off sores, very painful especially on taking salty things, they last a few days, remit and appear at her next menstrual cycle. Patient had an insignificant medical history however reported had seen several physicians and dentists who prescribed amoxicillin, metronidazole and a painkiller with no improvement.

On examination of soft tissues, 3 small sized ulcers less than 1cm were seen on the left lateral border of the tongue, had an erythematous margin with a yellowish base, very tender on palpation.

Cutaneous and dental examination was unremarkable.

This is one of the common clinical scenarios that have encountered and the questions I can first raise are;

- What did the previous medical practitioners miss out?
- What more information do I need to get from this patient?
- What could be the cause of the recurrence in episodes?
- Which protocol of management should I apply to help this patient i.e. topical versus systemic?



Steps taken to reach diagnosis

1. How are you, how is work?

“Work is really hectic; I’ve just been moved to a new office so I have to juggle a lot of things to fit in, otherwise apart from what has brought me, am ok.”

2. Do you have any family member with a similar issue?

Patient reported to have a younger sister who frequently complains of a sore tongue although was uncertain of the timing.

3. Have you experienced any food or drug allergies before?

There was no history of any allergy.

4. Is there any difference in the character of the sores each time they recur?

Patient noted no difference in character apart from location and sometimes 4 to 5 sores instead of 3 at the time of examination.

5. Apart from the medication prescribed before, have you tried out alternatives to find a solution?

Patient answered in the affirmative and further disclosed use of herbal products but to no avail.

6. Could you run me through on the monthly diet?

There was no specific diet for sore free periods but could hardly eat anything salty when she had sores and noted weight loss during recurrence episodes because of poor feeding.

7. Have you noticed any factors that initiate, exacerbate or relieve symptoms?

Sores would only appear during her menstrual periods and severity has been increasing since she was 20, the herbal products only brought temporary relief and salty foods had become a nightmare.



On extraoral examination, also checked out for pallor on the sclera and nail beds. These were unremarkable.

The following factors rang bells at just the initial conversation with the patient:

- Stress due to the change in work
- Genetic predisposition due to a sister with a similar complaint
- Endocrinology due to association with menstrual cycle

Examination was to rule out iron deficiency and other possibility of systemic diseases which were unremarkable in history taken.

The monthly recurrence, the 3 lesions on the lateral border of the tongue, their clinical appearance and size with no cutaneous lesions made me arrive at an impression of Minor Recurrent Aphthous ulcers.

I didn't do any laboratory tests initially looking forward to response after my intervention.

My approach to management:

- I started by reassurance that the condition is common and that the patient was not unique from her fellows.
- I then went ahead to explain how the condition manifests and predisposing factors that could link to the recurrence.
- Factors that could be reversed like stress were addressed on a serious note. Advised the patient to get enough rest and find time off busy schedules.
- I further brought out the fact that there is no permanent solution however dealing with reversible risk factors and symptoms was the goal of management.
- I prescribed Vitamin B12, triamcinolone topical paste, advised patient to take plenty of fluids, avoid spicy and hard foods that may traumatize the ulcers.
- I further told the patient we may need to do some laboratory tests once no improvement was noted.

Review

After a week, the patient was much better with no lesions and looked healthier than the previous appointment. On continuous follow up, patient reported a decline in recurrences from monthly to once in every 6 months and with less severity.

A once frustrated patient is now a very happy patient not because of the medication but because she got to understand her condition, how to live with it and avoid things that could worsen the already vulnerable state. The other magic was not raising her expectations from reality but using reality to transform her perception as regards her condition.

The most important thing is she understood the statement, *"this could happen again!"*

Recurrent Aphthous Stomatitis (RAS) is the most common inflammatory condition of the oral cavity, affecting 5-25% of the population.

In a study by Jaisri, RAS was found to affect 5-66% of the population, approximately 1% of children from higher socioeconomic groups in developed countries. 40% of the selected groups of children had a history of RAS starting at 5 years and frequency of affected patients increased with age.

This depicts that it starts in childhood or adolescence i.e. between 10-40 age groups as stated by Belenguer et al. Prevalence is more in women compared to men. They are characterized by small, recurrent, painful, round or ovoid ulcers with well-defined erythematous margins like a halo and a central yellow or gray floor. A positive family history of RAS is common and natural history involves resolution in the 3rd decade of life. RAS should be based on the identification and control of the possible predisposing factors, with the exclusion of possible underlying systemic causes, and the use of a detailed clinical history along with complementary procedures e.g laboratory tests where required.

Predisposing factors to RAS

- Psychological factors: stress
- Dietary allergies: cochineal red (62.5%), azorubine(45.8%) and amaranth (25%)
- Trauma in patients who have genetic susceptibility
- Chemical reactions e.g sodium lauryl sulfate(SLS) commonly found in toothpastes and other oral health care products.

Systemic diseases associated with oral aphthae

- Behçet's syndrome
- Nutritional deficiencies i.e hematinic deficiency in iron, folate or vitamin B12
- Malabsorption in Gastrointestinal disorders(GI):

celiac disease (gluten- sensitive enteropathy),
crohn disease, pernicious anemia and
dermatitis herpertiformis

- Immunologic factors: HIV, neutropenias
- Reiter syndrome
- Magic syndrome
- PFAPA(periodic fever, aphthous pharyngitis and cervical adenopathy)
- Sweet syndrome

Etiology

Etiology of RAS remains unclear however it has been suggested that immune alterations have caused an unknown antigenic stimulation of keratinocytes and resulting in activation of T lymphocytes, cytokine secretion (including tumor necrosis factor- alpha (TNF- α) and leukocyte chemotaxis.

TNF- α is believed to play an important role in the development of new RAS lesions and has been found to be increased 2-5 fold in saliva of affected patients.

Changes have also been reported in the elements of the salivary defense system, such as the enzyme superoxide dismutase (SOD), which participates in the inflammatory response of RAS.

There is an increase in the expression of vascular and keratinocyte adhesion molecules giving rise to the accumulation of lymphocytes and lymphocyte infiltration

Clinical subtypes



Minor aphthous ulcers

- Minor RAS
- Most common
- 70-85% of cases
- Small rounded/ oval lesions covered by a grayish-white pseudomembrane and surrounded by an erythematous halo
- Each minor RAS episode usually involves appearance of 1-5 ulcers measuring under 1cm in diameter
- Self-limiting, resolve within 4-14 days without leaving scars.

Major aphthous ulcers



Major RAS

- Most severe presentation of the disease
- 10% of all cases
- Ulcers measure over 1cm in size
- Commonly found on lips, soft palate and pharynx
- The lesions persist for over 6 weeks and leave scars
- A single major ulcer can mimic a malignancy

Herpetiform RAS



Herpetiform aphthous ulcers

- 1-15% of cases
- Recurrent outbreaks of small, deep and painful ulcers
- Upto 100 aphthae can develop simultaneously, measuring 2-3mm in size, though they tend to merge to form larger ulcerations with an irregular contour
- Common in women and patients in older age

How can you tell the diagnosis?

Thorough history taking and clinical evaluation.

No specific diagnostic test, though it is essential to rule out possible underlying systemic causes.

Investigations that may be needed:

Laboratory tests, including a complete blood count and evaluations of iron, vitamin B12 and folic acid.

A biopsy of the lesions is only recommended in the case of diagnostic uncertainty since the findings only indicate a simple nonspecific inflammatory lesion.



Latest trends in approach to management

In all cases, management is symptomatic and seeks to reduce inflammation of the aphthae and afford pain relief by administering topical with systemic treatments. Usually advised to start with non-pharmacological treatment.

Due to the relationship between RAS and vitamin deficiencies (Volkov et al), treatment with vitamin B12, apart from being simple, inexpensive and of low risk proves effective in application to RAS, even independently of the serum vitamin B12 levels.

Treatment with 2g of vitamin C a day during 3 months has also shown to be effective. Yasui documented a decrease of atleast 50% in frequency of RAS outbreaks with such therapy.

However other authors consider that daily multivitamin supplements are unable to reduce either the number of duration of RAS outbreaks and therefore consider that physicians should not recommend such supplements on a routine basis as preventive treatment.

Factors affecting treatment prescribed

- Severity of disease (pain)
- Medical history of the patient
- Frequency of outbreaks
- Patient tolerance to medication

Management according to patients' clinical presentation

Type A

Brief episodes occurring a few times during the year and characterized by tolerable pain levels.

Predisposing factors should be identified and controlled (e.g. avoiding local trauma, using a soft toothbrush, providing brushing instructions).

Advisable to question about eating habits in order to evaluate possible association between the disease outbreaks and certain foods.

Advisable to avoid hard foods e.g hard toasted bread and all types of nuts(walnuts, hazelnuts etc), chocolate, acid beverages or foods(fruit or citric juices, tomato), salty foods, very spicy food (pepper,curry) and alcoholic or carbonated beverages.

Type B

Episodes develop on a monthly basis, lasting 3-10 days, and the pain causes the patient to modify habits of hygiene and diet.

If a predisposing factor is identified (trauma, stress, diet, hygiene etc) it should be discussed with the patient and controlled.

It's important to question about prodromal manifestations (itching or swelling) in order to provide topical treatment when these occur.

Type C

Very painful episodes, with chronic aphthae. Some lesions develop while others heal and the patient does not respond to topical treatment. Systemic therapy is indicated in such cases.

NB: treatment should always start with topical medication.

First line treatment options comprise of antiseptics and anti-inflammatory drugs/ analgesics e.g 0.2% chlorhexidine in gel or rinses, triclosan, topical 3% diclofenac with 2.5% hyaluronic acid for pain relief. Benzidamine hydrochloride also offers temporary pain relief

Amlexanox offers short term efficacy particularly when used in prodromal phase. Has both anti allergic and antiinflammatory properties.

Efficacy has also been proven for topical antibiotics e.g. tetracyclines and derivatives(doxycycline and minocycline). These act through local inhibition of collagenases and metalloproteinases(MPs) that contribute to tissue destruction and ulcer formation.

Doxycycline has shown the best inhibition of MPs.

Mucoadhesive form of doxycycline has been proved to be effective.

Other authors recommend its application at a dose of 100mg in 10ml of water, performing rinses 2-3 times a day

NB: caution not to swallow any of the topical medications.

Topical use of tetracyclines and retinoic acid exerts both antiinflammatory and antibiotic actions.

Most widely used drugs in immune-mediated oral diseases are the topical corticosteroids aimed at



elimination of symptoms and shortening aphthae healing time.

In RAS, the indicated drugs are triamcinolone acetonide (0.05-0.5%), fluocinolone acetonide (0.025-0.05%) or clobetasol propionate (0.025%) in order of lesser to greater potency according to severity.



Some authors consider the most effective concentration of triamcinolone being at 0.1%.

The above 3 drugs can be administered as a promade in orabase for localized lesions or rinse format when the lesions are diffuse/ numerous.

Fluocinolone acetonide is used in patients with more aggressive lesions while clobetasol propionate is reserved for moderate to severe disease presentations.



In order to facilitate healing, it is advisable to apply medication directly onto the lesions, keeping it in direct contact for as long as possible, taking care not to eat / drink 20 minutes after application or touch treated zone. Topical dexamethasone promade has been proved effective.



Other topical treatments that have been used in RAS are 0.2% hyaluronic acid in gel formulation, topical anesthetics such as 2% lidocaine(as a spray or gel); adhesive toothpaste containing polydocanol; or benzocaine tablets.



Nd:YAG laser has been found to afford immediate pain relief and faster healing, and is well tolerated by patients with RAS, since it is a brief form of treatment, results in lesser pain after application and fewer side effects.



Other treatments include natural substances e.g myrtle (Myrtus communis), possesses blood glucose-lowering, antibacterial and antioxidant properties hence anti-inflammatory and anti-allergic properties.



Quercetin, a flavonol found in fruits and vegetables with antioxidant properties useful in shortening aphthae healing time when applied as daily topical treatment. Bioadhesive patches containing licorice hydrogel, which reduce the diameter of the inflammatory halo and the necrotic center of aphtha and associated pain. Oral rinses containing an aqueous extract of Damask rose, which possesses antiinflammatory and antinociceptive properties.

Systemic pharmacological treatment

The outbreaks of RAS are normally resolved with topical treatments, though in some cases these measures prove insufficient because of the severity of the lesions or for unknown reasons.

This is when second line therapy with systemic drug substance is indicated.

Studies have been made of potassium penicillin G in 50mg tablets q.i.d for 4 days in reduction in ulcer size and pain. The oral antipoliomyeltic vaccine has also been found to reduce the duration of aphthae, the frequency of outbreaks and severity.

The most effective treatments include corticosteroids and immunosuppressors.

Pentoxifylline, colchicine, dapsone and thalidomide have also been used but require caution because of possible adverse effects. These are all palliative and none provides permanent disease remission.

Corticosteroids are the first choice systemic treatment especially in acute severe RAS outbreaks.

Oral prednisolone has been used at a starting dose of 25mg/day and stepwise reduction during 2 months. Montelukast has also been found equally effective and safer than prednisolone.

Colchicine has also been used but with more side effects. Even 5mg/day of prednisolone seems to be a better option in reducing the signs and symptoms of disease. Zinc is an essential cofactor with effects upon wound reepithelization and healing at a dose of 150mg compared with dapsone for leprosy at a dose of 50mg. Zinc sulfate produced much faster and sustained effects. Clofazimine 100mg/day during 6 months has been used in severe RAS to avoid appearance of new lesions.

Pentoxifylline has been found with numerous gastrointestinal adverse effects therefore not a first line drug.

Immune modulators may be useful as second line treatment in RAS and oral lichen planus i.e. thalidomide (50-100mg/day) though has adverse effects like tetragenicity, polyneuropathy, drowsiness, constipation etc.

Levamisole (150mg tds a week during 6 months) restores normal phagocytic activity among macrophages and neutrophils and modulates T cell mediated immunity.

Other systemic treatments have been described including homeopathic medicines containing borax, mercurius solubilis, natrum muriaticum, phosphorus, sulfuric acid, nitric acid, arsenicum album, nux vomica and lycopodium. These diluted in 100ml of water administered orally bd for 6 days.

In conclusion, management of RAS starts with a comprehensive history taking plus examination, ruling out systemic diseases. Primary management is symptomatic and based on clinical presentation.

Only in cases of severe RAS would one prescribe systemic medication since most cases resolve with topical medications. Most importantly patient education should not be neglected as it plays a pivotal role in management of these problematic ulcers.

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PREVALENCE AND TREATMENT NEEDS OF DENTAL CARIES AND GINGIVITIS AMONG 3-5 YEAR OLD CHILDREN IN RURAL RUKUNGIRI, UGANDA

NORMAN MUSINGUZI¹, ARTHUR KEMOLI², ISAAC OKULLO², NATHAN PSIWA²

Abstract

Introduction

The World Health Organisation (WHO) has defined Oral health as a state of being free from mouth and facial pain, oral and throat cancer, oral infections and sores, periodontal disease, tooth decay, tooth loss and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial wellbeing. Consequently, the health of an individual should be viewed as being inclusive of his/her oral health.

An integrated approach to healthcare should therefore be developed with the aim of reducing the risk to oral diseases, as part of the promotion of the health of the individual. Dental caries and gingivitis are the most prevalent oral diseases affecting children of all ages. This usually is as a result of mainly the inappropriate dietary measures and poor oral hygiene practices. These diseases have been found to cause a lot of pain and discomfort in the affected children in addition to affecting their feeding, speech and psycho-social wellbeing.

For the oral health provider to be able to plan for oral health-related services in a given region, an assessment to determine the prevalence of oral diseases in that region and their treatment needs is paramount. Further, children are a vulnerable group within any community and their health should be given priority so as to allow for proper growth and enable them live fulfilled lives regardless of their socio-economic standing and background.

Study Objective

The aim of this study was to determine the prevalence and treatment needs of dental caries and gingivitis among 3-5 year old children in a rural community in Rukungiri District, Uganda.

Study Area: Eight (8) Primary schools in Nyakagyeme Sub-county, Rukungiri District.

Study design: This was a descriptive cross-sectional study in which 432 children aged 3-5 years participated. The children were randomly selected from eight (8) primary schools in Nyakagyeme Sub-county, and consent to participate in the study obtained from their parents and/or guardians. The socio-demographic data (age, gender) was obtained from the school registers and recorded. The Principal investigator (PI) then carried out an intra-oral examination on every child under field conditions using natural light, to assess their oral hygiene status, gingival health status and dental caries experience, using the plaque score, gingival index and dmft index respectively. A modified periodontal treatment needs index (*mPTNI*) and modified intervention urgency were used to assess the normative treatment needs. All information gathered was appropriately recorded on individual forms modified from that used in the assessment of oral diseases for children as described by the World Health Organisation.

Data Analysis: The data obtained was entered into a computer and analysed using Windows SPSS Version 23.0. The results were subjected to descriptive and inferential statistical tests. Independent samples t-test,



The findings of the study showed that the majority of the children in the study had mild-to- moderate plaque score and mild gingivitis, indicating greater need for oral hygiene measures to be instituted among the participants.”

Fisher's exact test, ANOVA, Spearman's Rank-Order correlation coefficient and linear regression model were used to compare and relate the variables, with the $P < 0.05$ considered statistically significant. The confidence interval was set at 95%. The findings were presented in tables and figures.

Results: A total of 432 children participated in the study, with 118 (27.3%), 145 (33.6%), 169 (39.1%) aged 3, 4, and 5 years old respectively. Majority of the children had mild to moderate plaque deposits with a total mean plaque score of 12.83. The plaque score was noted to increase with the increase in age of the child. The children generally had mild gingivitis with a total mean gingival index score of 6.36, (SD= 4.14). The severity of gingivitis was classified as, mild 378 (87.5%), moderate 53

(12.3%) and severe 1(0.2%). A statistically significant association was noted between plaque score and gingival index ($p < 0.001$). Majority of the children 338 (78.3%) needed oral hygiene instructions, 33 (7.6%) had no periodontal treatment need and 61 (14.1%) needed prophylaxis to be done in addition to being given oral hygiene instructions. The overall prevalence of dental caries was 52.6%. The prevalence was 23.8%, 37.9% and 38.3% among the 3-, 4-, and 5-year olds respectively. The mean dmft was 2.33 (SD=3.20) and the decayed component (dt) contributed the most to the dental caries experience (M=2.04, SD=3.01). Some children (8.1%) were affected by the practice of 'Ebiino'. Tooth filling was the most needed dental treatment followed by pulp therapy.

Conclusion: The prevalence of dental caries among the participants was (52.6%) with decay contributing the most to the dental caries experience. Most of the affected children needed fillings as their dental treatment need. Further, the findings of the study showed that the majority of the children in the study had mild-to- moderate plaque score and mild gingivitis, indicating greater need for oral hygiene measures to be instituted among the participants. It was also noted that the practice of Ebiino amongst the children appeared to be endemic in this community.

Recommendations: More research is needed across different age-groups in the country such that sufficient data about oral health diseases affecting the population in the country is made available. This information could also be used by the authorities when committing resources for the improvement of oral health and prevention of oral diseases of the children in Nyakagyeme sub-county and possibly other regions. Oral health education campaigns should be organised in this region to help inform the parents and their children about the effects of oral diseases and how to prevent such diseases, including campaigns geared towards addressing the practice of 'Ebiino'.

CRACKED TOOTH SYNDROME (CTS)

DR. NELSON KALYESUBULA

Definition

CTS is a transient and progressive condition in which dental tissues (enamel, dentine and cementum) undergo fracturing(Fig 1). The fracture lines can be incomplete or complete in nature. CTS is also referred to as cuspal fracture odontalgia (Gibbs in 1954) , cracked cusp syndrome.



Fig 1

Commonly presenting signs and symptoms seen in cases of CTS

- Sudden, sharp pain on biting/chewing and in some cases on release: 'rebound pain'.
- Inconsistent ability to localise the affected tooth.
- Symptoms may be present for periods ranging from weeks to months.
- Fracture lines may be seen clinically (sometimes upon removal of the restoration), aided by magnification, dyes or transillumination.
- Sensitivity to cold thermal stimuli; in some cases hyper-reactivity to hot/sugary stimuli may also occur.
- Positive response to vitality tests; exaggerated response to cold thermal stimuli.
- Pain may be elicited by lateral cusp pressure, as evoked by 'bite tests' and tooth grinding.
- Radiographs of the suspected or offending teeth are usually inconclusive.

Epidemiology of CTS

CTS is a condition that generally affects adult dental patients, in the age range of 30-60 years. Cameron

reported that 80% of 102 cracked teeth occurred with patients over 40years of age. Both sexes are equally affected. CTS is more likely to occur in teeth with carious lesions or teeth containing dental restorations due to compromised dental tissue structure. Hiatt et al reported 35% of cases presenting with CTS were found to be in sound and caries-free teeth. Mandibular molars appear to be the most commonly involved teeth, followed by maxillary premolars and maxillary molar teeth, while mandibular premolars seem the least affected. It has been hypothesized that since lower first molars are usually the first permanent teeth to erupt into the dental arch, they are most likely to be affected by caries thus likely to be rendered with large and extensively deep restorations thence becoming more vulnerable to subsequent CTS and fractures due to the compromised dental tissue structure. Additionally the 'wedging effect' inflicted upon the lower first molar teeth from the prominent mesio-palatal cusp of the maxillary first molar teeth may also be contributory to the high CTS occurrence rate in mandibular molar teeth.

Aetiology of CTS

CTS is usually caused by multiple factors. **Guersten et al** stated that " excessive forces applied to a weakened tooth can cause an incomplete fracture of the enamel and dentine."

Lynch et al subdivided the causes of CTS into four major causative categories as **Restorative procedures/ iatrogenic causes, Occlusal factors, Developmental teeth conditions, and miscellaneous factors.**

Restorative procedures/ iatrogenic causes include placement of 'friction-lock' or 'self threading dentine pins' into dentine, non-incremental applications of composite resin, excessive hydraulic pressure when luting inlays, onlays, crowns or bridges, excessive teeth preparation prior to conservation or restoration, high spots on restorations, overfills during restorative therapy, excessive canal preparation/filing during endodontic therapy.

Occlusal factors may include 'masticatory accident'. **Truchowsky** stated that the most common cause of CTS is 'masticatory accident' which refers to biting suddenly on hard subject such as bone or piece of stone with excessive force resulting into enamel or dentine or cementum fracture of the involved tooth. **Helkimo et al** determined maximum biting forces between natural molars to range from 10-72kg with an average of 45.7kg for males and 36.4kg for females. The ratio of forces on molars:premolars:incisors is 4:2:1 respectively with far higher forces being applied the closer the tooth is to the temporal mandibular joint (TMJ). Parafunctional teeth grinding habits can as well lead to generation of considerable occlusal forces thence increasing the susceptibility to CTS in particular nocturnal bruxism.

Developmental conditions leading to CTS may include areas of localized structural weaknesses within the tooth, arising as a result of incomplete fusion of areas of calcification either in enamel or dentine. Morphological factors with increased risk of CTS include deep occlusal grooves, pronounced vertical radicular grooves/ bifurcations, steep cusp angulations, prominent mesio-palatal cusps of upper maxillary first molars as well as prescence of lingually inclined mandibular molar teeth.

Miscellaneous factors may include cracking/crazing of tooth tissue due to use of high speed rotary instruments, erosive tooth wear, thermal cycling which may induce enamel cracks.

Classification of CTS

The **American Association of Endodontists (AAE)** has classified five specific variations of cracked teeth; Craze lines, Fractured cusp, Cracked tooth, Split tooth and Vertical root fracture.



CLASSIFICATION	ORIGIN	DIRECTION	SYMPTOM	PULP STATUS	PROGNOSIS
CRAZE LINES (Fig 2i)	Crown	Variable	None	Vital	Excellent
FRACTURED CUSP(Fig 2ii)	Crown	M-D and/or F-L	Mild and generally only to biting and cold	Usually vital	Good
CRACKED TOOTH(Fig 2iii)	Crown and root	M-D often central	Acute biting pain, occasional sharp pain to cold	variable	Questionable, dependant on depth and extent of crack
SPLIT TOOTH(Fig 2iv)	Crown and root	M-D	Marked pain on chewing	Often root filled	Poor unless crack terminates subgingivally.
VERTICAL ROOT FRACTURE (Fig 2v)	Root	F-L	Vague pain, mimics periodontal disease	Mainly root filled	Poor, Root resection in multi-rooted teeth

DIAGNOSIS OF CTS

A careful history taking and assessment of the symptoms, in particular that of cold sensitivity and sharp pain on biting hard or tough food which ceases on release of pressure should be critically taken note of.

Occasionally cracks (craze lines) may be detected by visual inspection. The use of **magnifying loupes and trans-illumination** with the aid of a fibre- optic devise may be useful (Fig 3).



Fig 3

An un-authenticated technique often used involves placement of composite resin over affected tooth without etching and bonding; the material is added at a minimal thickness of 0.5mm and wrapped over across the external line angles of the tooth onto the axial walls. The set material acts as a splint and the patient can bite down on this with an intervening bite test; although high, it may result in greatly reduced symptoms as the fracture no longer opens on clenching, perhaps confirming the diagnosis of an incomplete fracture. It must be emphasized however that there is NO evidence in available literature to scientifically validate this approach.

The use of **stains/delineation dyes** to highlight fracture lines such as gentian violet or methylene blue have been described by various authors. However it should be noted that the stain technique to delineate cracks may take several days to be effective and may require placement of provisional restoration in the cavity, which may further undermine the structural integrity of the tooth and thereby aid in the process of crack progression. Another complication of the use of delineation dyes is subsequent difficulty associated with placement of definitive aesthetic restorations.

The use of **bite tests** to mimic symptoms associated with incomplete fractures of posterior teeth may also be use-

ful. However, such tests may cause cuspal fragmentation thence patient should be told and consent sort from the patient prior to the test. Objects used for bite tests may include wood sticks, cotton wool rolls, rubber abrasive wheels/ Burlew wheel, rubber plungers of anaesthetic carpules suspended from a length of floss and commercially available diagnostic tools such as fract finder and tooth sloth (Fig 3).



Use of bite sticks is advocated for and the stick is usually rested on suspected tooth and the patient is asked to bite; by subsequent application of the stick to each individual cusp inturn it may be possible to localize the affected cusp.

The use of cotton wool rolls involves placing the roll on suspected tooth and requesting patient to bite down and then suddenly releasing the pressure has been suggested by **Kruger** to confirm the diagnosis of CTS.

Pulp vitality tests for the involved teeth are usually positive, although sometimes affected teeth may display signs of hypersensitivity to cold thermal stimuli due to presence of inflammation; a feature that may help to confirm CTS diagnosis.

Use of copper rings, stainless steel orthodontic bands and acrylic provisional crowns to confirm the diagnosis of incomplete tooth fracture a posterior tooth has also been found to be of major importance in diagnosis of CTS.

Differential diagnosis of CTS

A vast number of dental problems may mimic as CTS. These may include;

- Endodontic abscess
- Periodontal abscess
- Pericoronitis
- Sinusitis
- Pulpitis
- Discomfort associated with orthodontic teeth movements



- Dentine hypersensitivity
- Poorly placed composite restorations
- Galvanic pain post amalgam restorations
- Restorations impinging on the attachment apparatus
- Loose temporary restorations/crowns
- Open interproximal contacts
- Bruxism and teeth clenching/ parafunctional habits.

Prognosis of teeth affected by CTS

Generally CTS prognosis is dependant on location and extent of the crack.

Clark et al reported that cracks that are confined to dentine layer, or those fractures which are limited to a single marginal ridge and donot extent more than 2-3mm below the periodontal attachment have excellent prognosis.

Fractures that involve both marginal ridges, communicating with dental pulp or fractures that extend vertically through the pulp or involve the sub-pulpal floor have poor prognosis.

Affected teeth with complete mesio-distal fractures or where the fractured segment cannot be removed or be exposed by gingivectomy or by alveoloplasty are considered to have hopeless prognosis.

Other factors which may impact on prognosis include the anatomy of the tooth and roots, the previous operative/ restorative history of the tooth as well as the functional forces applied to the tooth.

Management of CTS

Management should involve recognition of predisposing factors, recognition of signs and symptoms and the provision of adequate restorations that protect the tooth from fracture.

Treatment requirement is dependant on the position as well as extent of the fracture. Assessment of the stimuli, character and duration of the pain is key for CTS management.

Cracks that enter the pulp indicate the need for endodontic treatment as well as full crown coverage of

the implicated tooth.

Fractures that involve the periodontal attachment may require extraction or root amputation may be appropriate in cases of multi-rooted teeth.

Gutmann and Rakusin suggested that treatments consist of an initial investigative and sedative stage followed by definitive treatment and restoration. Initial treatment involves removal of all existing restorations to fully assess the extent of the fracture. Trans-illumination is a usefull guide at this phase. In the initial phase the use of copper or stainless steel bands, stainless steel crowns and acrylic resin crowns is advocated. Placement of temporary sedative restorations is not advocated for as this approach doesnot stabilize the fracture leaving the tooth susceptible to further crack extension.

In absence of irreversible pulpitis, many techniques have been described to bind or remove the fracture so as to prevent flexure of the cusp, crack progression and bacterial micro-leakage. Definitive treatment includes pin retained amalgams, bonded amalgams, bonded composites, cusp overlay restorations and full coverage crown restorations.

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ASSESSING RESTORABILITY OF A TOOTH: To restore or not to restore!

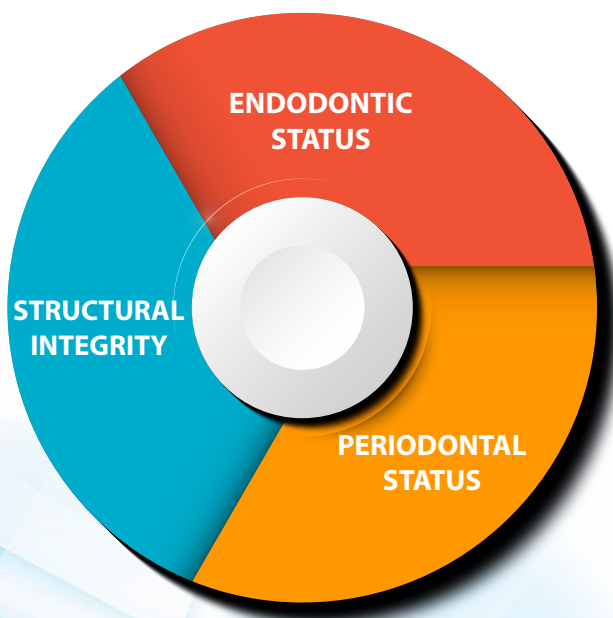
DR. JACQUELINE NAMBATYA BDS (MaK)

Dentistry is growing by leaps and bounds, and as a clinician there are numerous restorative options available in any given circumstance, both with mildly carious teeth and severely damaged ones. But the question stands, when do you not restore, what are the guiding parameters? Yes the patient may insist on not losing their tooth, can you guarantee the treatment and its longevity?

The restorability index or Dental practicality index

Provides a framework for assessing teeth and planning treatments. The index aids in management of patients' expectations and when deciding to refer for secondary or tertiary dental treatment.

The restorability index compares three components of the tooth



Structural integrity

The extent of the remaining tooth structure is among the most important and critical factors in determining the prognosis for restoration of a damaged tooth. Evidence indicates that the dimensions of the remaining crown dentin are important. Some studies agree that

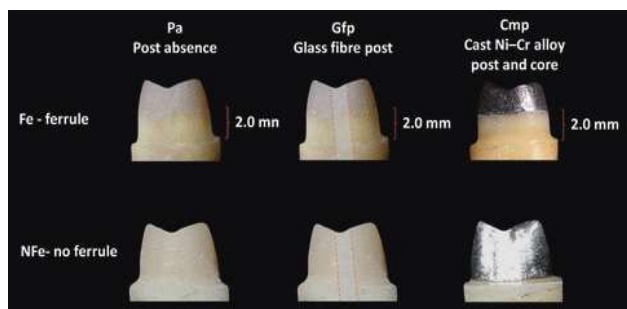
a dentin thickness < 1 mm increases the risk of failure. This minimum thickness is more often assessed in buccal or palatal/lingual than interproximal areas after endodontic treatment and tooth preparation.

Structural integrity can also be determined by assessing,

- Relation of crown to root ratio
- Margin location
- The ferrule effect

The need for a 360° collar 2 mm in height (1.5 mm minimum) band of tooth on the remaining crown surrounding the parallel walls of dentine, extending coronal to the shoulder of the preparation as described by Sorensen and Engelman. Smaller dimensions are associated with a greater failure. In this illustration, green shows the tooth and silver the core build up. The third tooth indicates presence of sufficient ferrule which guarantees more predictable results with the restoration.



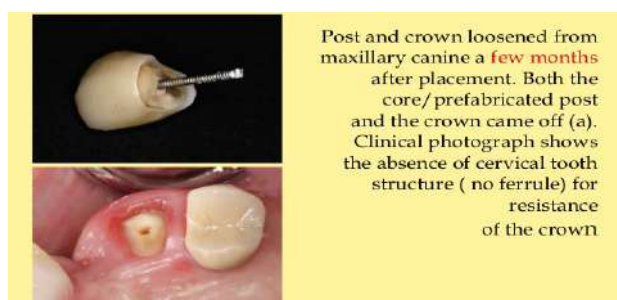


With insufficient tooth structure (absence of a ferrule), more tooth height may be achieved by crown lengthening, gingivectomy or orthodontic extrusion.

Crown length involves surgically reducing tooth soft tissues (coronal portion of the periodontium) and crestal bone using a standard periodontal flap procedure to allow proper restoration on a tooth. Otherwise if clinical crown is shorter than the anatomical crown, we then can consider gingivectomy.

It is important to note there must always be about 3mm distance between the most apical extension of any restoration and the alveolar crest bone. Encroachment on Biological width causes resorption of crestal bone and migration of junctional epithelium. Then gingival inflammation followed by recession, exposing crown margins which were placed within the sulcus.

Margins can be placed up to 0.5mm into the sulcus.



Periodontal status

In assessing the periodontal status, we consider;

- Gingival attachment level
- Bone loss and mobility of teeth
- Pocket depth
- Furcation involvement

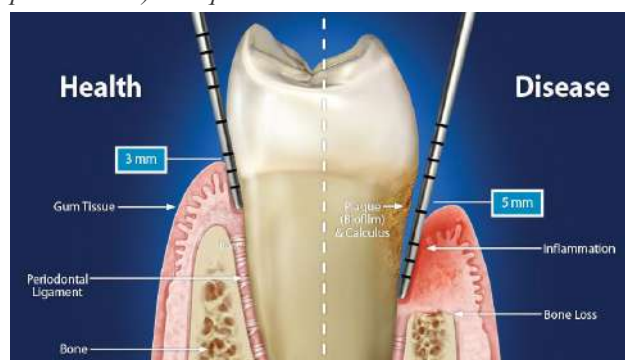
Tools such as the Basic Periodontal Examination (BPE) and the 6- point pocket chart for advanced cases may be used. BPE is recorded by dividing the dentition into sextants, and the highest score for each sextant recorded. For a sextant to qualify it must have at least 2 teeth, all teeth are probed with the exception of 3rd

molars unless 1st and 2nd molars are missing. A World Health Organization BPE probe is used.

Below is a table showing scoring codes according to the British Periodontal society.

0	Pockets <3.5mm, no calculus/overhangs, no bleeding on probing
1	Pockets <3.5mm, no calculus/overhangs, bleeding on probing
2	Pockets <3.5mm, supra or subgingival calculus/overhangs
3	Pockets 3.5mm-5.5mm
4	Probing depth >5.5mm (black band disappears, indicating a pocket of 6 mm or more)
*	Furcation involvement

For patients with BPE codes of 3 or 4, a 6PPC (6-point pocket chart) is required.



Endodontic status

Simple cases could include single/ multiple root canals with curvature < 150° to root axis that are considered negotiable from radiographic or clinical evidence through their entire length. No root canal obstruction or damaged access.

The tooth is assessed and checked for the following;

- Perforations, Resorption, Endo-Perio Lesions
- Horizontal / Vertical Root Fracture
- Broken Files / Pins / Post Issues
- Presence, size and duration of initial Endodontic lesion
- Need for surgical and non-surgical treatment approaches like apicectomy

The context

This category refers to the oral environment, both

- Local context; patients ability to maintain dentition
- General context; social, dental and medical history



The categories that the tooth should be assessed in; structural integrity, periodontal and endodontic treatment need as well as context are summarised below. Each row shows examples of different levels (0,1,2,6) of complexity for each category. An overall DPI score of >6 indicates that treatment may be impractical, this is reduced to 4 if the tooth to be treated is to be used as a bridge abutment

Weighting	Structure integrity	Periodontal treatment need	Endodontic treatment need	Context
0 No treatment required	Unrestored or existing well-adapted restoration	Probing <3.5 mm (BPE 0-2) previously successfully treated periodontal disease	Vital pulp previously successfully treated endodontic disease	Local: Isolated dental problems where adjacent teeth are healthy General: Replacing of a strategic tooth may be excessively complex History of IV bisphosphonates, head & neck radiotherapy
1 Simple treatment required	Simple (in) direct restoration	Probing 3.5-5.5 mm (BPE 3) root surface debridement indicated	Simple root canal system with endodontic disease (eg, radiographically easily identifiable root canal[s], easily retrievable root canal filling material)	Local: Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment General: Radiotherapy of head and neck region planned Immunocompromised patient
2 Complex treatment required	Minimal residual sound tooth structure (eg subgingival margins, post-core restoration required etc)	Probing >5.5 mm (BPE 4) compromised support (eg short root, crown lengthening required, grade 2 mobility). Grade 2-3 furcation involvement	Complex root canal system with endodontic disease (eg, sclerosed root canal, acute curvatures). Complex re-root canal treatment (eg, fracture instrument removal, perforations) Difficulty in obtaining anaesthesia	Local: Prosthodontic treatment planned of multiple, including adjacent teeth General: High caries rate Poor oral hygiene Parafunctional habits, extensive tooth surface loss Active periodontal disease
6 Impractical to treat	Inadequate structure for ferrule	Untreatable periodontal disease	Untreatable root canal system	Local: Retention of the tooth be

In conclusion we see the index and how to score any given tooth. In all categories a score of '0' means that no intervention is required, '1' means that simple treatment is needed, '2' suggests that treatment is more complex, perhaps requiring treatment delivered by a specialist. A score of '6' in any category means that treatment would not generally be considered to be practical.

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OCCLUSION DISEASE: A Common Misdiagnosis

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Common terms commonly used in occlusion are described as below:

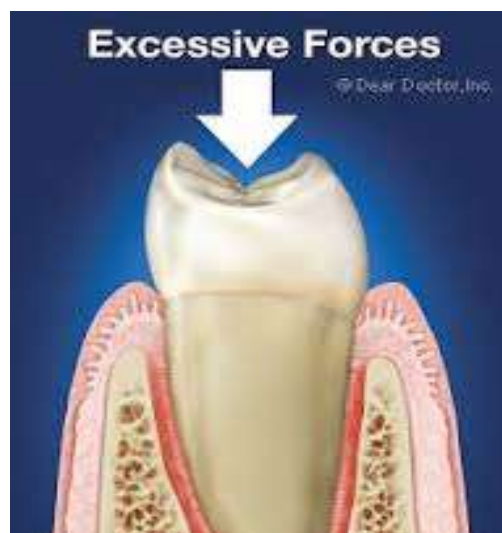
- Occlusion - Relationship between the maxillary and mandibular teeth when they approach each other during chewing or at rest.
- Static occlusion - contact between teeth when the jaw is closed and stationary
- Dynamic occlusion - occlusal contacts made when the jaw is moving.
- Centric occlusion - Maximum intercuspation / habitual bite OR Centric occlusion is the occlusion of opposing teeth when the mandible is in centric relation.
- Centric Relation – Relationship of mandible to maxilla with the head of condyle in the most superior part of the fossa
- Canine guidance - a dynamic occlusion that occurs on the canines during a lateral excursion of the mandible.
- Ideal occlusion – CO coincides with CR

Occlusion disease

A destructive process evident in any part of the masticatory apparatus (joint, muscles, periodontium or teeth), as a consequence of occlusal disharmony or parafunction.

Occlusion disease is the third member of the triad of factors that cause tooth loss; the other two factors are tooth decay and periodontal disease.

Occlusion disease is affected by the magnitude, duration and direction of the force.



Signs and symptoms of occlusion disease

Occlusal wear and fractures of teeth and restorations
Tooth hypermobility
Abfractions
Fremitus
Cervical dentin hypersensitivity (CDH)
Pain and tired facial and masticatory muscles or TMJ



Stages of tooth wear

Development Stage: Newly erupted dentition
Mamelons present; cusps unworn.

Non-disease Stage: Adaptive state
Absence of mamelons. All lateral excursions on the canines only. Protrusive excursions on the central incisors only.

Stage I: Early occlusal disease

Group function in the anterior region. Generally, enamel only is involved.

Stage II: Moderate occlusal disease

Lingual abrasion from gritting and clenching with re-stricted movement. May be coupled with more advanced disease.

Stage III: Advanced occlusal disease

Posterior working and nonworking group function. Dentin heavily involved and abraded below enamel level.

Stage IV: Total occlusal destruction

Unsupported enamel grossly chipped or broken. Loss of significant crown form. Contact areas may be open. Ghost image reveals extent of disease process.



MANAGEMENT OF OCCLUSION DISEASE

1) Extra-oral examination

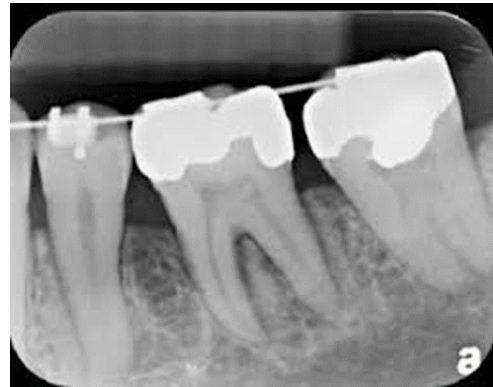
The following are checked:

- Facial symmetry
- Deviations on opening or closing
- Palpation of the TMJ on opening and closing: Clicks, opening range
- Muscles of mastication: Tenderness

2) Intraoral examination

One should examine the:

- Existing restorations
- Incisal angle and molar relationships
- Enamel integrity of the teeth
- Dynamic movements of the mandible and its guiding elements
- Centric occlusion
- Relationship of CO and MIP



3) Patient Education

4) Occlusal splint therapy

This is defined as the art and science of establishing neuromuscular harmony in the masticatory system by creating a mechanical disadvantage for parafunctional forces with removable appliances

- Occlusal splints work by:
 - Distribution of forces
 - Posturing of the mandible

Purposes of occlusal splint therapy

- Normalizing the proprioceptive forces of periodontal ligament
- Relaxing the muscles
- Allowing for Centric Relation
- Cognitive awareness theory
- Increased peripheral input to CNS

MOA of splints

1. Distribution of forces: The forces generated during bruxism can be as much as six times the maximal force generated by normal chewing. The splints distribute these forces across the masticatory system. These appliances can decrease the frequency of bruxing episodes but not the intensity.
2. Normalizing periodontal ligament proprioception: PDL proprioceptive fibers send messages to CNS, triggering muscle patterns that protect the tooth from overload. The occlusal splint dissipates the forces placed on individual teeth by utilizing a larger surface area covering all teeth in the arch. Thus a splint balances the load and allows for muscle symmetry.

3. Relaxing the muscles: Tooth interferences to the CR arc of closure hyperactivate the lateral pterygoid muscles, and posterior tooth interferences during excursive mandibular movements cause hyperactivity of the closing muscles. A splint with equal intensity contacts on all of the teeth, with immediate disclusion of all posterior teeth by the anterior guidance and condylar guidance in all movements, will relax the elevator and positioning muscles.
4. Allowing the condyles to seat in centric relation: This reduces risks for TMJ pain and disorders
5. Increase in the vertical dimension of occlusion: Occlusal splints can be adjusted with a vertical height that exceeds the physiologic interocclusal distance.
6. Cognitive awareness theory: According to this theory, the presence of the splint as a foreign object in the mouth would likely change the oral tactile stimuli, decrease the oral volume and space for the tongue and make the patient conscious about the position and potentially harmful use of their jaw. As cognitive awareness is increased, factors that contribute to the disorder are decreased. The result is a decrease in the symptoms.
7. Increased peripheral input to the central nervous system: Nocturnal muscle hyperactivity appears to have its source in the CNS. When an occlusal splint is placed between the teeth, it provides a change in peripheral input and thus decreases CNS induced bruxism.

Types of occlusal splints

Classification according to Okeson

Stabilization appliance

Anterior repositioning appliances

Others:- Anterior bite plane

- Posterior bite plane

- Pivoting appliance

-Soft/resilient appliance

According to Dawson:- Permissive splints/ muscle deprogrammer

-Directive splints/ non-permissive splints

Permissive splints (muscle deprogrammers)

Designed to unlock the occlusion to remove deviating tooth inclines from contact. This eliminates the cause and effect of muscle in co-ordination. The condyles are then allowed to return to their correct seated position in centric relation if the condition of the articular components permits.

They include:

Anterior midpoint contact splints e.g. Lucia jig,

Nociceptive Trigeminal Inhibitor (NTI) splint and B splint

Full contact splint e.g. CR splint



Directive splints

Are designed to position the mandible in a specific relationship to the maxilla.

e.g anterior repositioning splint

Stabilization splint

Also known as the superior repositioning splint, the Tanner appliance, the Michigan splint, the Fox appliance or the centric relation appliance. It is a hard acrylic splint that provides a temporary and removable ideal occlusion. Providing an ideal occlusion by the use of splint therapy reduces abnormal muscle activity and produces neuromuscular balance.

Patients are advised to only wear it at night.

Needs to be adjusted (rebalancing of the splint to the new position of the jaw by grinding some of its surface points, since the lower jaw will adopt a new position as a result of wearing the splint) over several visits as the masticatory muscles relax until a consistent jaw relationship is reached. The patient should be reviewed at regular intervals. After a period of successful splint therapy (between 2 to 3 months), patients can be weaned off the splint.

It provides centric relation occlusion, eliminates posterior interference, provides anterior guidance and

gives stable occlusal relationships with uniform tooth contacts throughout the dental arch.

Indicated for masticatory myalgia and TMJ arthralgia

Anterior repositioning splint

It induces a therapeutic mandibular position, forward to the maximum intercuspation position of the patient and affects the physiological topographical relationship of the disc condyle complex. The anterior repositioning splint places a patient's mandible and TMJ into an anterior position so as to reduce a TMJ click that occurs on opening and closing of the jaw.

Indicated for intermittent jaw locking with limited range of motion, persistent TMJ arthralgia not responsive to other therapy (including a stabilization splint).

They are recommended only for short-term use because they can cause occlusal changes if worn continuously or chronically.



Anterior bite plane

This provides contact with only the mandibular anterior teeth. It is primarily intended to disengage the posterior teeth and thus eliminate their influence in the function or dysfunction of the masticatory system. Anterior jig, Lucia jig, Hawley with bite plane, anterior deprogrammer and Sved plate are types of anterior bite plane.

Indicated for treatment of muscle disorders related to orthopedic instability or an acute change in the occlusal condition.

If worn continuously for several weeks or months, it is likely that the unopposed mandibular teeth will supraerupt.

Posterior bite plane

Has areas of hard acrylic located over the posterior teeth and connected by a cast metal lingual bar.

The treatment goals of the posterior bite plane are to achieve major alterations in vertical dimension and mandibular repositioning. e.g MORA (mandibular orthopedic repositioning appliance)

Indicated for severe loss of vertical dimension.

Pivoting splint

Also known as distraction splint. The pivot splint was introduced by Krough-Poulsen. It is a hard acrylic appliance that covers one arch and usually provides a single posterior contact in each quadrant. This contact is usually established as far posteriorly as possible. The proposed effect is that the condyles are pulled downward upon clenching on the pivot, thereby relieving traumatic load and giving the disc freedom to reassume a normal position.

The pivoting splint was originally developed with an idea that it would create a decrease in interarticular pressure, thus unloading the articular surface of the joint. This was thought to occur when the anterior teeth moved closer together, creating a fulcrum around the second molar and pivoting the condyle downward away from the fossa. However, this can occur only if the forces that close the mandible are located anterior to the pivot. Unfortunately, the forces of the elevator muscles are located primarily posterior to the pivot, which therefore does not allow any pivoting action. It was originally suggested that the therapy was helpful in treating joint sounds. It now appears, however, that the anterior repositioning splint is more suitable for this purpose since it provides more controlled repositional changes.

It has been advocated for the treatment of symptoms related to degenerative joint diseases of the temporomandibular joint. It has even been suggested that the splint be inserted and elastic bandages be wrapped from the chin to the top of the head to decrease forces in the joint.

Indications include: To unload the articular surface of the joint caused by decrease in inter-articular pressure and treating joint sounds.



Soft or resilient splint

Usually adapted to the maxillary teeth.

Treatment goals are to achieve even and simultaneous contact with the opposing teeth. It is quick to fabricate and can be provided as "emergency treatment" for a patient who presents with an acute TMD.

Hydrostatic appliance

It employs water to balance the biting pressure, to treat malocclusion and to relieve TMJ pain and symptoms associated with TMDs.

When the hydrostatic cell is inserted between the arches, a sequence of reorganization spreads throughout the stomatognathic system, all occlusal disharmonies are compensated automatically by distribution of fluid within the cell. Occlusal forces to every tooth contacting the cell there by becomes systematically equalized and axially oriented. The volume of fluid within the cells is adjusted to obtain the desired degree of increase in the vertical dimension of occlusion. Occlusal forces that normally arise individually as the result of many maxillary and mandibular tooth contacts now are created as a whole within the hydrostatic cell and distributed to each tooth that contacts the cell. The occlusal forces transmitted to each tooth are hypothesized thereby to become optimal, these forces now arise simultaneously and are perfectly equalized (in accordance with Pascal's law which states that an enclosed fluid distributes forces equally and simultaneously in all directions) and horizontally displacing contacts are reoriented axially.

It is worn 24 hours and removed only while eating, for a period ranging from several weeks to years. The cells retain their fluid an average of about two weeks. A new cell is installed when the enclosed fluid escapes.



NTI (Nociceptive Trigeminal Inhibition) Tension Suppression System

The direct stimulation of the periodontal ligament of the lower incisors activates a feedback loop, which significantly limits the contraction intensity of the closing muscles. This is because of the nociceptive trigeminal inhibition (NTI) reflex. The NTI appliance takes advantage of this reflex via an acrylic guard worn on either the mandibular or maxillary incisors. Stock NTIs are relined with self-cure acrylic.

Other protocols

- Limited or complete occlusal adjustment (equilibration)
- Splinting of mobile teeth
- Restorations fabricated to the new occlusal scheme.
- Injectable lignocaine free anesthetic solution in the muscles

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FACTORS INFLUENCING COMPLIANCE OF UGANDAN DENTAL HEALTH CARE WORKERS WITH INFECTION CONTROL PROTOCOL

A census of Dental Health Care Workers who attended Continued Dental Health Education on 28/06/2018 and on 06/07/2018 in Kampala by

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2015/HDO7/1507U

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ABSTRACT

Introduction: Compliance with Infection Control Protocol (ICP) by Dental Health Care Workers in the course of their work is very essential in the prevention of transmission of infections and a cornerstone for effective oral health care delivery (WHO, 2018).

In developing countries like Uganda limited data is available on compliance with ICP. A few studies conducted in the country report noncompliance with infection control guideline among Ugandan Dental Health Care Workers (DHCWs) without clear reasons for noncompliance (Nanfuka et al, 2015). Many DHCWs like knowledge, attitude and practices plus health facility factors would be influencing compliance with ICP among DHCWs. Although Limited data was available on how they influence compliance with this protocol. A survey was carried out to assess the above factors among DHCWs who attended the two different Continued Dental Health Education at Hotel Africana and Conference room of Makerere University Medical school, Kampala in order to generate information, which will be used by Ministry of Health to institute measures that will promote Infection control among DHCWs and their patients.

Materials and methods: The study was a census involving both quantitative and qualitative methods of data collection using a questionnaire having both structured and semi-structured questions. It was done at Hotel Africana and Makerere University Medical School conference room. Data on socio-demographic

characteristics, Knowledge, attitude, Practices and health facility factors influencing compliance with ICP was collected using an administered questionnaire. The study population consisted of all the DHCWs (61) who attended the continued Dental Health Education during the study period. The data collected was first reviewed and edited before it was entered using Microsoft Excel, cleaned and analyzed using SPSS computer statistical program. The results are presented in form of text, tables and pie charts.

Results: Out of 61 DHCWs, 58(95%) of DHCWs were aware of the notion ICP, 31(50.8%) lacked knowledge of the Uganda National IC Guidelines, 38% had ever performed a dental procedure without using Personal Protective Equipment and (60.7%) admitted that their health facility lacked an active Infection Control Committee plus only 47(77%) had ever received training in IC by their health facility.

Conclusion: There is good self-reported compliance with ICP among DHCWs. Awareness and adaptation of recommendations of the Uganda National Infection Control Guidelines needs to be created to increase compliance with ICP among DHCWs.

Recommendation: There is need to create awareness and enforce use of the Uganda National Infection Control Guidelines and health facilities need to have an active IC committee in order to increase the number of DHCWs complying to Infection Control Protocol.



FABRICATION OF UPPER AND LOWER COMPLETE DENTURES FOR A PATIENT WITH HIGHLY RESORBED RESIDUAL ALVEOLAR RIDGES; A CASE REPORT

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INTRODUCTION

The difference between the natural teeth and tooth analogues gives the basis for treatment of completely edentulous patients. The periodontal ligament for each arch has an approximate area of 45cm² compared to the mean denture-bearing area of 22.96 cm² in the edentulous maxillae and approximately 12.25 cm² in an edentulous mandible(1).

Residual ridge resorption (RRR), poses a clinical challenge toward the fabrication of a successful prosthesis because of decreased support and the encroachment of surrounding mobile tissues onto the denture border, thereby reducing the stability and retention. The atrophied ridges are more common in the mandible than the maxilla because the mandible resorbs at a faster rate(1, 2).

Inflammation follows extraction, then clot formation, epithelial cell immigration during week one final tissues integrity restored within 6 months with new bone formation. The rate of the contour changes of the alveolar ridge reaches peak activity within 4 weeks after tooth extractions. The size of the residual ridge is reduced most rapidly in the first 6 months, but the bone resorption activity continues throughout life at a slower rate.

Changes of the internal bony structure result in external changes in the shape of the ridges. The rate of RRR is different among different persons and even at different sites in the same person(3, 4). This produces different shapes, sizes and contour of the residual ridge ranging from knife edge, uneven to flat ridges especially in the mandible.

This report details the management of a patient who presented with resorbed alveolar ridges seeking replacement of his lost teeth with complete dentures.

CLINICAL REPORT

A 54-year-old male presented with a complaint of missing teeth that he wanted replaced. He lost these teeth due to periodontal disease having had the last teeth extracted more than a year before presentation and was advised he would need dentures fabricated after complete healing of the extraction sockets. He had had an immediate set of dentures fabricated a few weeks after the loss of teeth but they became loose and broke 6 months after getting them.

He is a smoker, smoking on average 10 cigarettes a day and drinks about 10 beers in a week.

On examination, he was a middle-aged man, with sunken cheeks and lips, but competent. Intraorally, the edentulous ridge was v shaped with a u shaped palatal vault and highly resorbed in both the upper and lower jaw, knife edge anteriorly(class IV Atwood's classification of 1988) and posteriorly for the lower being class V Atwood's classification, with a flat ridge(6). There were no undercuts noted and the genial tubercles were prominent almost at the same level of the ridge crest. The mucosa over the ridge was firm and, pigmented with no ulcerations. The tongue was found to rest in a favorable position when patient opens mouth, that is on top of lower ridge. The skeletal inter-arch relationship was class I and gag reflex was passive.

PRE-TREATMENT RECORDS

A digital OPG was taken which showed highly resorbed maxilla and mandible. The mandibular canal and the

mental foramina were seen and far from the crest of the mandible.

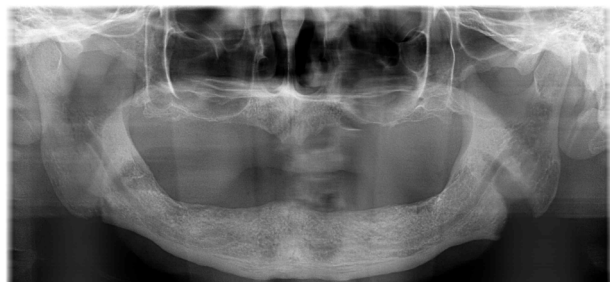


Fig 1- OPG Fig 2: Before and after treatment

A diagnosis of complete edentulism was made with highly resorbed ridges. Due to absence of compromising disease, the prognosis was good especially for the maxilla but the mandible was poor due to the resorption. Treatment objectives were to restore function and aesthetics.

The treatment options available were conventional removable complete denture which would be fabricated the conventional way using the residual ridge for stability, retention and support. It is a cheaper and a straight forward option of care but the retention, support and stability are not guaranteed. The other is a two-implant supported mandibular over-denture which would involve place two implants in the canine region of the lower residual ridge and using those to fabricate overdentures. This option is more expensive with surgery involved but

it would improve retention, stability and retention.

TREATMENT SEQUENCE

Primary impressions were taken using impression compound and a stock tray, large size. They were poured in Neelkanth plaster of Paris to make primary casts. Spaced special trays were made using auto-polymerizing acrylic resin (Acropas 200) and trimmed to 2 mm clearance from the of the vestibule.

Intraorally, the special trays were trimmed to fit, with no loss of retention on functional molding of the cheeks and movement of the tongue. Border molding was done using green stick compound (Kemdent Tracing Sticks) to achieve primary retention then secondary impressions were taken using zinc oxide eugenol impression material (SS White), closed mouth, minimal pressure technique. In the lab, the impressions were boxed with peripheral wax and poured using dental staone, type III gypsum(dental stone) and wax occlusal rims made using cold cure acrylic resin tray material(Acropas 200) and modeling wax. The rims were shaped and trimmed to standard dimentions. The rims were fitted in the patients mouth one at a time, the labial aspect of the upper rim was adjusted to ensure adequate lip support. The anterior occlusal plane was made to level with the resting lip, parallel to the inter-pupillary line and showing 2mm on smiling. The anteroposterior occlusal plane determined by a fox plane with the ala-tragus line was used for parallelism. Adjustments were done to ensure adequate resting occlusal dimension(RVD), and occlusal vertical dimension(OVD) difference which is known as freeway space. Phonetic tests for letters S, F and TH were used for confirmation. The lower rim was trimmed to coincide and be parallel with the upper and then the relationship of the mandible to the maxilla was recorded in retruded simultaneous contact position (RCP). The ala of the nose was used to determine the relative positions of the canines. The center lines and the high smile lines were also scribed on the anterior aspect of the rim. The posterior occlusal plane was made parallel to the ala-tragus line. The rims were sealed using staples melted into the lower rim wax and occlusion achieved in RCP. Tooth shade and mould selection was done suing the inter-canine distance, the face shape, sex and consultation with the patient and sent to lab for mounting on a semi-adjustable articulator (Denar) with plaster of Paris and to set the teeth.

On the articulator, the relationship of the trial dentures

teeth was assessed and it looked adequate. The palatal cusps of the posterior maxillary denture teeth and the central fossa of the posterior mandibular denture teeth overlay the mandibular ridge. The esthetic appeal of the dentures was also assessed. The dentures were separately placed in the mouth and assessed one at a time. The lip fullness was extent of the dentures assessed too and then the trial dentures' occlusion assessed in centric relation for simultaneous and even bilateral contact. Freedom in centric was also assessed to ascertain balanced occlusion even during articulation. The patient was also satisfied with the trial dentures and they were sent to the lab for processing and finishing.

Insertion of the finished, polished and well contoured dentures was done with emphasis on the occlusion, no shifts and retention of the dentures. Non-working side interferences were trimmed using the BULL (Buccal Upper, Lingual Lower) to achieve balanced occlusion and eliminate processing errors due to tooth movements. Patient was given instruction including denture cleaning and care, OHI and reduction in smoking. He was reviewed a week after insertion for ulceration and patients' complaints management, and then a month after. With no new complaints noted then.

Patient was happy with the new dentures and he reported using them for eating even nuts.

PHOTOGRAPHIC RECORDS

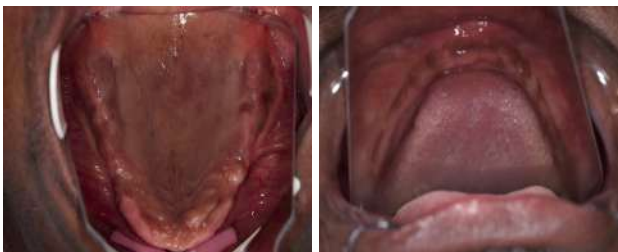


Fig 3: Edentulous ridges

Fig 4: Primary casts in POP



Fig 5: Secondary impressions Fig 6: Secondary casts above

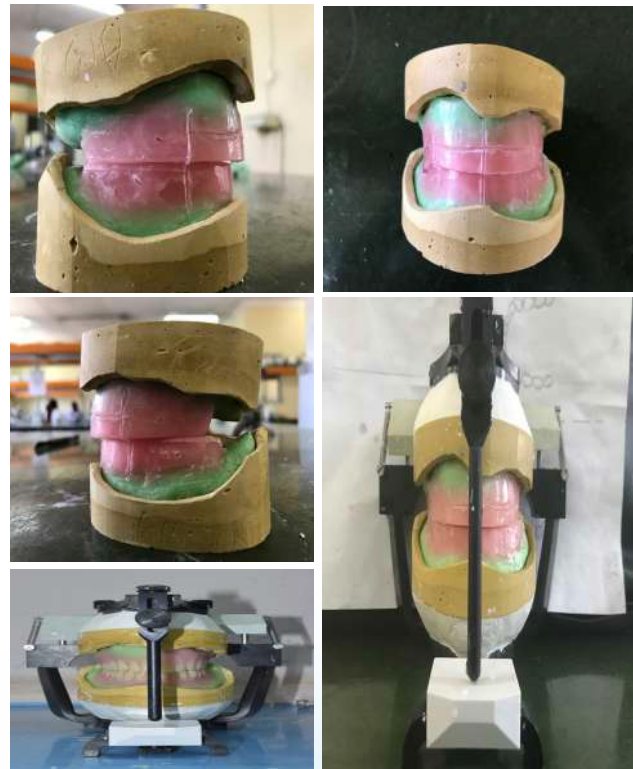


Fig 7: Sealed bite blocks after try in Fig 8: Articulated casts and tooth setup





Fig 8: Denture try-in

Fig 9: Denture delivery final smile

DISCUSSION

Edentulism as a state of oral disease is the situation where a person loses all or part of the teeth in the oral cavity. This has several consequences but if no replacement is done over a long time, there is resorption that starts at the point of loss rapidly but reduced by the replacement of the lost teeth with a prosthesis(1). The ideal denture-supporting residual ridge has been defined as one with adequate bone support for dentures, bone covered by adequate soft tissue, no undercuts or overhanging protuberances, no sharp ridges, adequate buccal and lingual sulci, no scar bands to prevent normal seating of a denture, no muscle fibers or frenula to interfere with the periphery of the prosthesis, satisfactory ridge relationships between the maxillae and mandible, no soft tissue folds, redundancies, or hypertrophies on the ridge or sulci, and a ridge free of neoplastic disease(7). Resorption of the alveolar bone and later cancellous bone occurs as a major sequel of tooth loss with no replacement over a long time and is described as residual ridge resorption(RRR). Atwood described the loss as changes in size (height and width), shape, and mucosal attachment or soft tissue attachment which greatly affect stability, retention and support of complete denture(3). The maxilla and mandible usually have differential bone resorption with the maxilla resorbing in a superior-posterior direction, and the mandible resorbs in an inferior and anterior direction in combination with both facial and lingual direction of resorption to reduce the ridge width in both none wearers but also in denture wearing patients(3, 4). Etiology of residual ridge resorption has been documented and classified into anatomic, metabolic, functional and prosthetic factors. Metabolic factors like include age, sex, hormonal balance

and conditions such as osteoporosis, the anatomic include size and shape of the ridge, the type of bone and the type of mucoperiosteum, functional factors include the frequency, direction, and amount of force applied to the ridge and prosthetic factors include the type of denture base, the form and type of teeth, the inter-occlusal relationship of the dentures(1, 3).

Due to the residual ridge resorption, support of the denture is compromised, there is encroachment of surrounding soft tissues, the vestibule and muscular attachments of the frenal areas and denture stability and retention are in turn affected making it hard to fabricate a successful prosthesis especially the faster rate of resorption of the mandible which is the commonest occurrence in practice.(2, 8). The probable reasons for this in edentulous patients is the difference in the square area of the maxilla and the mandible which is in the ratio of 1.8:1, the variation in the viscoelastic properties of the mucoperiosteum between the mandible and the maxilla and the variation in the quality of bone between the two. The clinical way of going around management of such patients with highly resorbed ridges especially in the lower jaw is by assessing three things which help in accentuation of support, retention and stability of the dentures or lack of them. These are; the position of the tongue upon opening of the mouth, the health of the ridge and the surrounding tissues, and the presence or absence of the three lingual spaces into which the denture border may be extended for increased retention(9). The ideal tongue position is forward and resting on the top of the lower anterior ridge when the patient casually opens their mouth, to effectively form lingual border seal. A retruded tongue would make it difficult to establish this seal but may be corrected by having the patient practice moving the tongue in and out and from side to side and having him/her learn to maintain the proper tongue position during the various functions of the mouth.

Failure to achieve stability, support and retention in denture fabrication results in ill-fitting dentures which distort the tissues over the ridge, set up irritations, and cause more resorption of the bone and some degree of inflammation even if clinically the tissues look normal(1). For better lower denture retention in the lower residual ridge due to smaller denture bearing area being half of the mandible yet it's the one that resorbs fastest and more, three distinct spaces on the



lingual side of the edentulous ridge may be available for extension for retention of the denture base i.e. the sublingual crescent space, the sublingual fossa and the retromylohyoid fossa(1, 10). All three of these spaces are seldom present in any one mouth but at least one space is always present. The sublingual crescent space is the anterior part of the floor of the mouth above the sublingual gland. Tissue bounding this space moves freely, so that the anterior lingual flange can be extended horizontally. The sublingual fossa follows the mylohyoid muscle extending down from the mylohyoid ridge when the muscle is relaxed. In swallowing, the muscle raises the tongue and brings the floor of the mouth upward. Frequently this muscle is flabby in the premolar-molar region, allowing extension of the lingual flange vertically. The retromylohyoid fossa is located below and behind the retromolar pad and so should be covered by the denture base as one of the primary denture bearing areas of the mandibular residual ridge. The problem with extension into this region is that it may develop a sore throat in the denture wearer(11). The sublingual and retromylohyoid fossa where available and where utilized for this case.

A way of enhancing retention as for the new advances in complete denture fabrication is use of implant retained over dentures with the implants placed strategically in the canine premolar area(1, 12). The strategic two implant placement has been seen and reviewed to improve retention and stability of dentures for highly resorbed mandibular ridges(1, 12).

All in all, the fabrication of a set of complete dentures needs meticulous procedures starting from primary impressions all the way to processing of the dentures. This gives a better result but cares should be taken for any pathology before the start of fabrication to address it and have satisfactory results. Denture stomatitis is seen in patients who smoke cigarettes(13). It is advised to have the patient reduce on the cigarette smoking when they have complete dentures fabricated or have more frequent reviews than non smokers to assess the mucosal response to smoking.

Conclusion

Treatment of an edentulous patient especially with highly resorbed ridges needs a good diagnosis, good impression taking starting with the primary impressions

and secondary impressions to capture the anatomical denture bearing area, interocclusal record taking and occlusal scheme selection to achieve balanced occlusion. These will in turn help to achieve retention, support and stability of the complete dentures.

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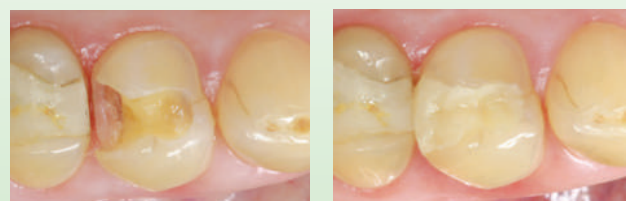
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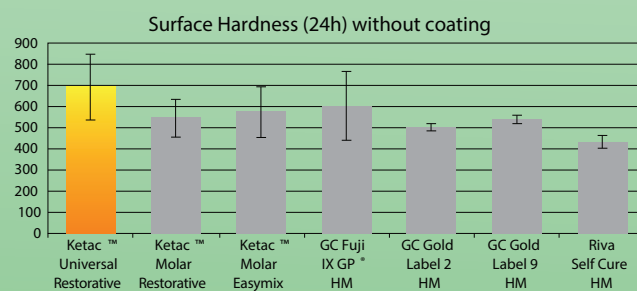
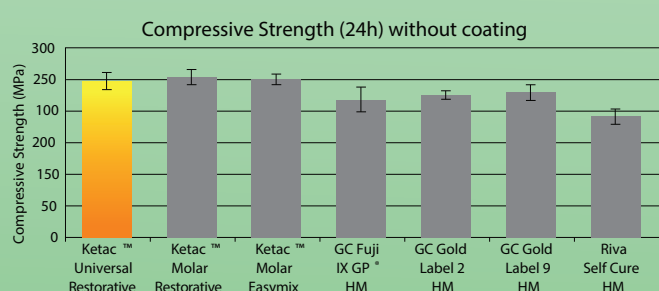
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