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Editorial

Since March 2020, the dental education in India has experienced a major disruptive change as a consequence of COVID-19 pandemic and nation-wide lockdown. Measures to prevent spread and hence to ensure social distancing have led to the closure of dental colleges and have compelled the situation of working from home for both dental faculty and students. The routine lecture classes, practical, tutorials, seminars, clinical postings and internal assessment examinations have become dreams of the past. Also, the physical attendance of teachers at symposia, conferences and workshops, has ceased. The uncertainty of situation during this period in the country has led many medical colleges and health universities to initiate steps to start teaching and learning using various online platforms on their own. There were no definitive directives other than the encouragement to initiate the use of online teaching methods from Dental Council of India (DCI) or any other statutory bodies.

At present, undergraduate teaching is being conducted using various online platforms by many colleges without any uniformity. A few colleges are still exploring online teaching platforms, and have already chosen the best platform and invested in it. There are many challenges which have to be discussed at the earliest and to be solved by the eminent educators along with statutory bodies. Some among them are bringing uniform online teaching/learning technology platforms for all the dental colleges across the country and training/faculty development workshops for teachers in regard to new technologies. Efforts should also be made for amendments in the pattern of conduct of examinations and relocating the students back to the colleges. The future of dental education is uncertain once the pandemic resolves, but several potential technologies are available if adequately explored. Need of the hour is to conduct multiple studies across the country to know the effectiveness of such teaching and learning tools both from students and medical teachers.

Dr Manoj Kumar KP
Chief Editor

STEREOMICROSCOPIC EVALUATION OF APICAL SEALING ABILITY OF MTA PLUS AND AH PLUS SEALER: AN IN VITRO STUDY

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Abstract

Aim: To evaluate the apical microleakage of MTA based sealer; MTA plus and to compare it with AH Plus using a stereomicroscope. **Materials and Methods:** Twenty extracted lower premolars were taken and decoronated at cemento-enamel junction. The access cavities and biomechanical preparation were performed using hand protaper files. The teeth were randomly divided into two groups with n=20 ,Group I - Gutta-percha and MTA sealer; Group II - Gutta-percha and with AH plus sealer. All the specimens were stored at 37 oC with 100% humidity for one week. All root surfaces except the apical 2mm were covered with two layers of nail varnish and then immersed in an aqueous solution of 2% methylene blue dye for 72 hours. Roots were longitudinally split using a diamond disk. Linear apical dye penetration was measured under Stereomicroscope at 40X magnification. **Results:** MTA plus demonstrated less microleakage and better sealing ability compared to AH plus. **Conclusion:** The results concluded that MTA plus showed minimal dye penetration when compared to AH plus . Thus, concluding that MTA plus is better in apical sealing than AH plus.

Keywords: AH Plus; apical microleakage; bioceramic ;MTA plus; methylene blue, sealers

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Introduction

The goal of root canal obturation is to obtain a three dimensional seal of the root canal system. An inadequate filling during obturation can results in reentry and re-growth of microorganisms in the root canal system which irritates the periapical tissue and compromises the treatment success.[1] To accomplish this many endodontic obturation materials and sealers are being used . Sealers aim to prevent ingress of bacteria in the root canal space properties. Sealer accomplishes the objective of providing fluid tight seal.[2]

The traditional zinc oxide eugenol sealers have been replaced with resin-based, silicone based, MTA based and bioceramic based sealers. In particular, bioceramic-based sealers are gaining popularity because of their alkaline pH, chemical stability within the biological environment, lack of shrinkage and are more biocompatible.[3] MTA based sealers have been reported to

deposit calcium phosphates in form of apatite and carbonated apatite when in contact with simulated body fluid.[4]

AH Plus is an epoxy resin-based sealer with properties including easy handling, potential for better wettability of the dentine and Gutta-percha surfaces, and good sealing property. Resin-based root canal sealers are considering as the material of choice due to their ability to penetrate into dentinal tubule and the possibility of creating monoblocks between the root canal filling material and intraradicular dentin. These properties are considered to be of paramount importance among root canal sealers.[5]

Aim: To evaluate the apical microleakage of MTA based sealer; MTA plus and to compare it with epoxy resin based sealer; AH Plus using a stereomicroscope.

Materials and Methods

A total of 40 extracted premolars with single root were used as study samples . Teeth with root fracture, root caries, open apices, developmental anomaly and external and internal root resorption were excluded from the study. These teeth soaked in 5.25% sodium hypochlorite for two hours and then stored in normal saline. The teeth were decoronated using diamond disk at the cement-enamel junction uniformly. The root canal access was prepared using endo access bur and working length was determined using 10 K-file. Then the biomechanical preparation was done with the use of hand protaper files till size F2.

The irrigation protocol followed was use of 5.0% sodium hypochlorite in between each instrumentation and 17% Ethylene diamine tetracetic Acid (EDTA) was left in the root canals for four minutes, followed by final rinsing with normal saline. The root canals were then dried with paper points. The teeth were randomly divided into two groups of 20 specimens each and obturation was done as follows :

Group I: - Gutta-percha and MTA plus sealer.

Group II: - Gutta-percha and AH plus sealer

After canal obturation, the teeth were then stored in phosphate buffer solution for one week to allow the sealers to get fully set. All the root surfaces, except the apical 3mm were covered with two layers of nail varnish. Teeth were then immersed in 2% methelene blue dye for 72 hrs.The roots were rinsed in running water and dried with paper towels. The varnish was removed with a scalpel blade and a guide groove was prepared with a diamond disc. The roots were split longitudinally using a chisel.The linear dye penetration was measured from root apex to the most coronal extent under Stereomicroscope (Labo Med CMZ4, India) at 40X magnification. The depth of dye penetration was evaluated] using criteria given by Ballullaya et al., For the convenience of explaining the vertical dye penetration, the samples were scored as follows: Score 1 : 1-3 mm;Score 2: 3-5 mm; Score 3: >5 mm.

Results

All the samples of MTA Plus had a score of 2 and 70% of AH plus sealer group had scores of 3.

Discussion

The sealing of the root canal apically by the sealer is important to prevent communication of root canal contents with periapical tissue. The properties of sealers like flow, consistency, setting characteristics, solubility and adhesion to root canals are important in obtaining a hermetic seal of the root canal.[6] Though, hermetic seal is not always attainable by the currently used sealers, fluid tight seal is atleast desirable.

The antimicrobial property of the sealers play a role in providing the sealing by limiting the proliferation of bacteria within the root canal and preventing the development of periapical pathology.[7] The incomplete obturation of root canal with poor apical sealing has been one of the major causes of endodontic failures.

Different methods are used to evaluate the apical sealing ability of root canal sealers. Linear measurement of dye penetration is the one such method which is most common, relatively easy and fast to gauge the microleakage of the sealers.[8] Different dyes are used like Methylene Blue (MB), India ink, eosin, Procion, brilliant blue, 50% silver nitrate and pelican ink. Of all, the Methylene Blue is widely used dye and the concentrations of MB used are 0.25, 1 and 2%. Ahlberg KM et al., studied the linear leakage patterns of two dyes, MB and India ink [9]. It was concluded that MB is superior in terms of penetration and has low molecular weight similar to that of bacterial toxins.[9,10]

Among various types of sealer used today AH plus has gained popularity due to its radiopacity, biocompatibility, ease to use and availability. AH Plus is an epoxy-bis-phenol resin based sealer that also contains adamantine and bonds to root canal.[11] It is a two-component paste/paste root canal sealer. Since it contains resin and has faster setting time AH Plus tends to shrink and cause early debonding from the root canal wall.AH Plus has better penetration into the micro-irregularities because of its creep capacity and long setting time, which increases the mechanical interlocking between sealer and root dentin.[12,13]

But to contradict this there is inadequate bonding between the sealer and the gutta-percha point, allowing fluid leakage at this interface. On other hand, AH Plus sealer does not bond to gutta-percha and has been shown to lack hybrid layer. The disadvantage noted was that there may be significant amount of polymerization shrinkage.[14] This was observed in our study, which could be one of the reason Group 2 recorded significantly more vertical penetration of dye compared to Group 1.

MTA based sealers have been reported to deposit calcium phosphates in form of apatite and carbonated apatite when in

contact with simulated body fluid. MTA forms calcium and hydroxyl ions which are important for stimulation of hard tissue deposition.[15] Sealability is also improved due to presence of MTA because of possibility of setting expansion.[16]

Hydration of anhydrous mineral oxide compounds occur to produce calcium silicate hydrate and calcium hydroxide phases,[17] which produces expansion against its confining margins and improves the seal and minimize microleakage. According to Torabinejad et al.,[18] MTA sealed the root canal very superiorly and no gaps were found in any of the experimental specimen. MTA has also proved itself to be superior in the bacterial leakage test by not allowing the entry of bacteria at the interface.

Conclusion

Sealing of the canal with the use of gutta percha core and the sealer remains the main stay for the obturation of the root canal. Traditional, zinc oxide eugenol based sealers have been surpassed by the Bioceramic based sealers which have better sealing ability, chemical bonding with dentin, ease of placement and osseoconductive property all of which enhances the sealing of the root canal. With the recent introduction of a fast setting MTA which also offers excellent handling properties, MTA-based products are likely to remain at the heart of good dental practice for many years to come.

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COVID-19 PATIENT PROTOCOLS IN DENTISTRY

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Abstract

Ever since the coronavirus disease 2019 (COVID-19) outbreak was declared a pandemic on 11 March 2020 several dental care facilities in affected countries have been completely closed or have been only providing minimal treatment for emergency cases. However, several facilities in some affected countries are still providing regular dental treatment. This can in part be a result of the lack of universal protocol or guidelines regulating the dental care provision during such a pandemic which on one hand may increase the nosocomial COVID-19 spread through dental health care facilities, and on the other hand deprive patients' in need of the required urgent dental care. Moreover, ceasing dental care provision during such a period will incense the burden on hospitals emergency departments already struggle with the pandemic.

This work is aimed to develop guidelines for dental patients' management during and after the COVID-19 pandemic. Guidelines for dental care provision during the COVID-19 pandemic were developed after considering the nature of COVID-19 pandemic, and were based on grouping the patients according to condition and need, and considering the procedures according to risk and benefit. It is hoped that the guidelines proposed in this work will help in the management of dental care around the world during and after this COVID-19 pandemic.

Key words: Coronavirus, SARS-CoV-2, COVID-19, dental care, triage, guideline development, pandemic

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Introduction

The COVID-19 pandemic represents an unprecedented global public health crisis. Oral health professionals, dental associations and regulatory bodies are facing diverse challenges to continue providing dental care and promoting the oral health of the population, while at the same time protecting patients and practitioners from the health threat posed by SARS-CoV-2.[1]

In January 2020, a familial cluster of 5 patients with fever and respiratory symptoms who were admitted to the Fifth People's Hospital of Anyang, Anyang, China, and 1 asymptomatic family member were enrolled for a study. A detailed analysis of patient records was performed.[2]

Direct contact, face-to-face communication, and constant exposure to body fluids were the major risk factors identified from the study. All these along with fluids such as blood and saliva are the major predisposing risk factors among dental health-care professionals (DHCPs) in view of 2019-nCoV infection. Dental practice can also pose a potential risk to dental personnel as there is a high probability of cross-infection. Hence, the knowledge of the strategies to be put in place to perform dental procedures is a fundamental prerequisite at this crucial hour. All the oral health-care providers need to follow safety protocols with precision to ensure minimal risk to themselves and the patients.[3]

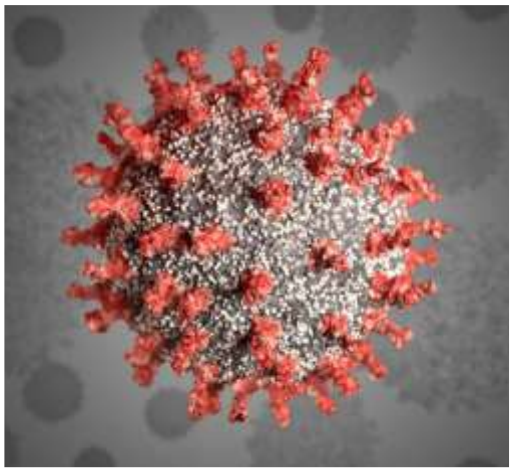

Figure 1: The novel corona virus

Possible transmission routes of 2019-NCOV in dental clinics

Direct or Indirect Transmission:

The virus can be passed directly from person to person by respiratory droplets; emerging evidence suggested that it may also be transmitted through contact and fomites.

Dental patients and professionals can be exposed to pathogenic microorganisms, including viruses and bacteria that infect the oral cavity and respiratory tract. Dental care settings invariably carry the risk of infection due to the specificity of its procedures, which involves face-to-face communication or direct transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes). In addition, studies have shown that respiratory viruses can be transmitted from person to person through direct or indirect contact, or through coarse or small droplets, and 2019-nCoV can also be transmitted directly or indirectly through saliva.[4,5]

Zones and dental clinics [6,7]

The dental clinics will remain closed in the CONTAINMENT ZONE; however, they can continue to provide tele triage. Patients in this zone can seek ambulance services to travel to the nearby COVID dental facility.

In the RED ZONE, Emergency dental procedures can be performed. The dental clinics in ORANGE AND GREEN ZONE will function to provide dental consults.

Dental operations should be restricted to Emergency and Urgent treatment procedures only. All routine and elective dental procedures should be deferred for a later review until new policy/guidelines are issued.

Protection mechanisms to avoid infection with COVID-19 in the dental environment

Although it remains unclear which devices are most effective for protection against Sars-CoV-2 infection, all dental patients should be considered as potentially infected. Therefore, the use of Personal Protective Equipment (PPE), such as disposable waterproof scrubs and bonnets, gloves, eyewear protection, face shields, disposable shoe-covers and masks, is highly recommended.

Mechanisms to prevent spread of COVID-19 in the dental environment

During the pandemic, updated local guidelines have suggested avoidance of dental treatments, except for patients with emergencies. Each dental professional must understand the transmission pathways of Sars-CoV-2 and must perform all essential procedures in a manner that prevents the spread of infection.

All patients should be regarded as potentially infected because only symptomatic individuals exhibit fever and breathing symptoms. As a general rule, patients affected by COVID-19 with a body temperature of >37.5 °C (99.5 °F) cannot be treated in a dental clinic, and should be confined to their home or hospitalised if they exhibit severe symptoms.

A triage area is mandatory for initial evaluation of patients, and this area should be set up in such a way that close contact between individual patients and between patients and healthcare personnel is avoided. Preliminary evaluation of patients should consist of body temperature measurement and a brief survey to investigate possible fever, respiratory issues, cough or dyspnea in the past 14 days, as well as contact with individuals who could have been potentially infected.

Patients answering ‘yes’ to any of the survey questions and who have a body temperature of >37.5 °C (99.5 °F) should be confined to their home or hospitalised.

Patients answering ‘yes’ to any of the survey questions to the survey and who have a body temperature of <37.5 °C (99.5 °F) should not be treated for at least 14 days. Patients who have recovered from COVID-19 can be treated 30 days after symptom remission.

Patients answering ‘no’ to the survey questions and who have a body temperature of <37.5 °C (99.5 °F) can be treated, but procedures that cause aerosol production should be avoided.

Environmental disinfection

Each potentially contaminated surface should be cleaned and then disinfected with hydro-alcoholic disinfectants containing an alcohol concentration of >60% .

Tele-consult tele-screening

I. Telephone screening is encouraged as the first point of contact between the patient and the dentist or reception office is encouraged.

II. Current medical history and past history particularly pertaining to symptoms of Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath) or All symptomatic ILI (fever, cough, sore throat, runny nose) must be analysed.
III. Any positive responses to either of the questions should raise concern, and care should be postponed for 3weeks except in dental emergencies.

IV. Encourage all to download the Arogya Setu App. [7]

Dental history and remote triage

Obtain m Oral Health(Mobile Phone-based Oral Health) screening about dental history and try to manage problems with advice and analgesics and local measures. Clinics can evolve a web-based form which can also include a consent form. Comprehend dental treatment according to the urgency of the required treatment and the risk and benefit associated with each treatment. Only pre-appointed patients should be entertained in the clinic whose history, problems and procedures are already identified to some extent through previous telephone and remote electronic or web-based systems.[7]

What can patients do before arrival at a dental clinic?

1 .Minimise or eliminate wearing a wrist watch, hand and body jewellery and carrying of additional accessories bags etc.

2. Use their own wash rooms at home to avoid the need of using toilets at the dental facility
3. Have a mouth wash rinse with 10 ml of the 0.5% solution of PVP-I solution (standard aqueous PVP-I antiseptic solution based mouthwash diluted 1:20 with water).

Distribute throughout the oral cavity for 30 seconds and then gently gargle at the back of the throat for another 30 seconds before spitting out
4. Wear a facemask during transport and before entering the premises.
5.Have the body temperature checked and use a sanitiser on the entrance.
6. Patients consent and declaration to be obtained in a physical print out or electronic system
7. Maintain social distancing.[7]

Protocols of patient handling in the clinic area

For appointments that do not result in aerosols, and need examination only

Implement Teledentistry and Triage Protocols

Contact all patients prior to dental treatment.

Telephone screen all patients for symptoms consistent with COVID-19. If the patient reports symptoms of COVID-19, avoid non-emergent dental care and use the Phone Advice Line Tool for Possible COVID-19 patients. If possible, delay dental care until the patient has ended isolation or quarantine.

Telephone triage all patients in need of dental care. Assess the patient's dental condition and determine whether the patient needs to be seen in the dental setting. Use teledentistry options as alternatives to in-office care.

Request that the patient limit the number of visitors accompanying him or her to the dental appointment to only those people who are necessary.

Advise patients that they, and anyone accompanying them to the appointment, will be requested to wear a cloth face covering or facemask when entering the facility and will undergo screening for fever and symptoms consistent with COVID-19. 5

Conclusion

Dental procedures necessitate close-proximity, face-to- face practices and involves the use of rotary instruments, high-speed handheld tools, air–water syringes and sharp surgical instrument. These procedures create visible aerosol sprays containing droplets with an admixture of water, saliva, blood, and other debris that are potentially contaminated with SARS-CoV-2, which increase the infection risk among dental personnel.

There are concerns associated with asymptomatic carrier transmission so a strict well-designed triage and workflow protocol is needed for dental professionals to screen against high-risk patient infection transmission and reduce the potential risk of nosocomial COVID-19 transmission developed from the dental department.

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Case report

DENTURE RELINING USING ALL GREEN IMPRESSION TECHNIQUE IN SEVERELY RESORBED MANDIBULAR RIDGE

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Abstract

Restoration of comfort, esthetics and masticatory function in severely resorbed atrophic ridges is challenging to the clinician. Extreme resorption of the mandibular denture bearing areas results in unstable and non retentive dentures with associated pain and discomfort. This article attempts to present a modified physiologic impression technique in severely atrophic mandibular ridge using contemporary materials to reline a non retentive and unstable mandibular denture.

Key words: All green impression technique, atrophic mandibular ridge, special impression technique, relinning

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Introduction

The management of severely resorbed mandibular ridge cases is always challenging to the Prosthodontists. Various special impression techniques are being followed to effectively record the resorbed mandibular ridges. Some among them are admixed, functional, all green, and cocktail technique.[1-3]

This case report presents a special impression technique – "the all green impression technique" used to reline a mandibular denture which was unstable and non-retentive in patient's mouth. The all green impression technique is the recording of entire ridge with the greenstick compound followed by final impression using zinc oxide eugenol impression paste.[4]

Case report

A sixty six year old male patient reported to the Department of Prosthodontics with the chief complaint of loose lower denture since one year. Medical history revealed uncontrolled diabetes for the past fifteen years and was under medication. The patient

was using the mandibular complete denture for the past 4 years.

On examination, the mandibular denture was found to be unstable and non retentive with severely resorbed mandibular ridge. The maxillary arch was kennedy class 1 edentulous space which was rehabilitated with a cast partial denture in good condition. The mandibular edentulous ridge could be classified as Atwood classification order V (Figure 1).[5] The patient was not willing for any surgical procedures to improve the denture bearing area. Hence special impression techniques were advocated to improve the retention and stability of denture. Since the centric relation, vertical dimension and esthetics were satisfactory, it was decided to reline the mandibular denture.

As the accurate recording of impression of the severely resorbed mandibular ridge using conventional impression technique was difficult, a modified impression technique- "the all green impression technique" was used. Here the existing mandibular complete denture was trimmed at the borders by 2 millimeters. The green stick compound was kneaded to a homogenous mass and was loaded on the impression surface of the denture and border movements were done (Figure 2). Final impression was made using zinc oxide eugenol (Figure 3).

During these recordings the patient was asked to occlude in centric relation to prevent any change in jaw relation in the relined denture. The denture was disinfected by immersing in 2 % gluteraldehyde solution for ten minutes.

Figure 1: Atwoods order V mandibular ridge

Figure 2: All green impression technique

Figure 3: Final impression

The denture was invested directly in the dental flask. Once the gypsum investments were set, the flask was immersed in boiled water for five minutes to soften the impression materials under the impression surface of the denture. The denture and the investment were thoroughly cleaned to remove any remnants of greenstick compound and zinc oxide eugenol impression paste that could interfere with the polymerization reaction of acrylic resin. Acrylic resin was packed into the mold space under pressure (compression molding technique) and was heat cured.

The relined denture was trimmed and polished. It was inserted in the patient's mouth and correction of occlusal errors was performed. Post insertion instructions were given. The one week follow-up visit revealed that the denture was retentive, stable and satisfactory for the patient.

Discussion

The success of every complete denture relies on achievement of retention, stability, and support. Mandibular dentures usually present more difficulties in achieving these properties due to anatomic limitations, which need to be specially addressed. Hence various special impression techniques are inroduced into prosthodontics.[1-3] The all green impression technique is one among them. The border molding in severely resorbed mandibular ridge is difficult to record using green stick compound, especially when various wax spacer designs are provided under the custom impression trays.[6] But when a homogenous mix of green stick compound is added, it is possible to record both the impression surface and the borders clearly.[4] The careful execution of this technique would prevent overextensions which otherwise is inevitable in border molding of severely resorbed mandibular ridges.[7]

Conclusion

This case report illustrates the impression techniques which are needed to achieve effective retention, stability, and support for Atwood's Order V and VI ridge deformities. This technique incorporates theoretical principles to record the impression of such tissues and overcomes the practical difficulties commonly encountered during such procedures.

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Case report

ODONTOGENIC KERATOCYST: INTERACTIONS IN THE MAXILLA

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Abstract

Odontogenic keratocyst (OKC) is a benign odontogenic cystic neoplasia characterized by its thin, squamous epithelium with superficial parakeratosis. It has the potential for infiltration and local aggressiveness and has a high rate of recurrence. The mandible is the most frequently involved site, in particular the third molar region, mandibular angle, and ramus. It has a mandible-maxilla ratio of 2:1. This study presents a case of OKC localized in the posterior region of the maxilla in relation to the upper right third molar region.

Key words: odontogenic keratocyst, keratocystic odontogenic tumor, benign neoplasia
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Introduction

Odontogenic keratocyst (OKC) is aggressive in nature but controversy exists in its nomenclature. It was first described by Philipsen in 1956 as "Odontogenic Keratocyst". In 2005 it was renamed Keratocystic Odontogenic Tumor (KCOT) by the World Health Organization (WHO). The entity was reverted back to be classified as a cyst in 2017 for lack of evidence of it being a tumor. It constitutes approximately 4% - 16.5% of all cysts of the jaws. This aggressive cystic lesion has a high predilection for recurrence which is higher than other odontogenic cysts.

Many studies have shown that OKCs occurs more frequently in the mandible than the maxilla, with the posterior mandible being the commonest location. It usually presents in the mandible as a lateral radiolucency, and the entity spreads mesiodistally.[1] This paper highlights a case of OKC occurring in the posterior maxilla, with mild swelling of the maxillary vestibule.

Case Presentation

A 34-year-old female patient reported to the outpatient Department of Oral medicine and Radiology with a chief complaint of pain and swelling of the upper right back teeth region since two weeks. She reported a history of fluid discharge from the right back teeth region for the past 5 years which she neglected due to the absence of

pain/discomfort. The pain started 2 weeks back and was sudden in onset, continuous, localized, of a dull aching nature and was relieved on taking analgesics. The swelling was sudden in onset, gradually enlarged and is not of a noticeable size. She does not report any constitutional symptoms and no other swellings were present anywhere else in the body. The patient consulted a health center and was prescribed antibiotics and analgesics following which the pain subsided. There was no reduction in discharge but pain and swelling recurred after 4 years. The patient does not report any significant medical or dental history.

Figure 1: Diffuse expansion of the alveolar bone extending into the depth of the buccal vestibule

On local examination, a small diffuse swelling of size 1 cm x1 cm is seen on the buccal aspect of 16 and 17 region with sinus opening between 16 and 17. The overlying mucosa appears normal in colour but there was obliteration of the mucobuccal fold. On palpation, the swelling was non-tender, fluctuant, compressible but not reducible and with a smooth surface. There is loss of the buccal cortical plate with drainage of a serous, foul smelling discharge from the aforementioned sinus opening. No periodontal pocket or tooth mobility was noted.

Figure 2: IOPAR showing a hazy radiolucency distal to the third molar and approximating the maxillary sinus

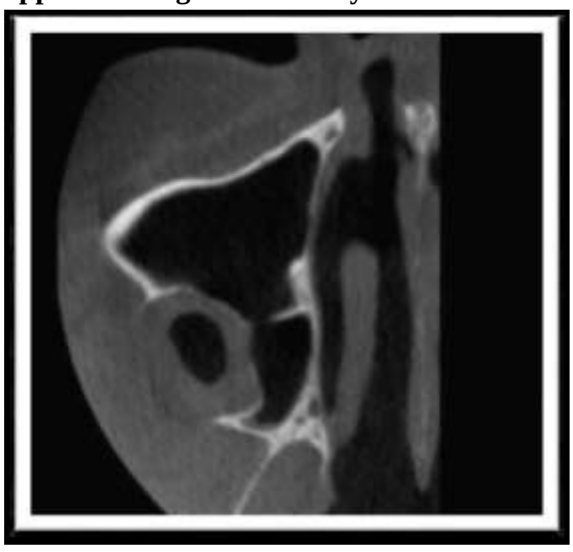

Figure 3: Axial CBCT section. Bold arrow indicates the lesion thinning and encroaching the lateral wall of the maxillary sinus. Hollow arrow indicates the lesion.

Intra-oral periapical radiograph and panoramic radiographs were taken and reveal a well-defined, corticated,

multilocular radiolucency of size 5 cm x 5 cm with a scalloped margin in the right maxillary posterior region extending anteroposteriorly from the distal aspect of 16 to the maxillary tuberosity and superioinferiorly from the floor of the maxillary sinus to the alveolar ridge with thin septae separating each locule.

Figure 4: Sagittal CBCT section shows the lesion encroaching and raising the inferior wall of the maxillary sinus. Bold arrow indicates the lumen of the lesion

On fine needle aspiration, a straw-colored fluid was obtained which showed inflammatory cells in a background of RBC. A CBCT was taken and the axial section shows a hypodense mass encroaching and thinning the lateral wall of the maxillary sinus. The lumen of the lesion is of mixed density. The sagittal section shows the lesion raising and thinning the floor of the maxillary sinus.

Surgical management included cyst enucleation and chemical cauterization using Carnoy solution under general anesthesia and the biopsied tissue was submitted for histopathologic examination.

The macroscopic examination showed it to be a soft tissue specimen, firm in consistency with irregular borders and surface measuring 1.0 cm x 0.8 cm x 0.2 cm. The specimen was then processed for routine hematoxylin and eosin staining and the microscopic examination revealed cystic lining with connective tissue wall and a lining epithelium composed of corrugated, parakeratinized stratified squamous epithelium of 6-10 cell layer thickness. The basal cells showed nuclear hyperchromatism with a palisaded tombstone appearance at focal areas.

A final diagnosis of odontogenic keratocyst was made based on the physical examination, histopathologic findings and radiographic examination.

Discussion

The Odontogenic keratocyst (OKC) was first introduced in the 1950s to describe keratin-containing jaw cysts. This cyst is considered an important odontogenic cyst because of its aggressive behavior, high recurrence rate, and specific histopathologic features, and it accounts for about 5% - 15% of all odontogenic cysts. In 2005, the World Health Organization reclassified OKC as "keratocystic odontogenic tumor" (KCOT).[2] Recently, this tumor was reclassified as a benign neoplasm of odontogenic origin and

not as a cyst and is defined as a "benign uni- or multi-cystic, odontogenic intraosseous tumor, with lining of parakeratinised stratified squamous epithelium and aggressive behavior".[1-3] The cystic lumen is filled with creamy proteinaceous material or clear yellowish fluid, which is also an important diagnostic marker for KCOT.[3]

Several investigators agree that KCOT arises from the cell rests of dental lamina, and that its growth is related to enzymatic activity or unknown factors in the fibrous cystic wall. Clinically, the posterior body of the mandible and ascending ramus especially related to impacted third molar were the prevalent occurring sites of KCOT. There is a slight male predilection with peak incidence in patients between 10 to 40 years of age. Radiologically, differently sized radiolucent lesions with displacement of impacted or erupted teeth, root resorption, or root displacement were easily detected in the jaw bones. The treatment strongly recommended for KCOT consists of complete enucleation and curettage of the lesion to reduce the recurrence rate, although more conservative methods including marsupialization and decompression have also been tried in many cases.

Interestingly, several recent studies observed the increased expressions of cell proliferation and anti-apoptosis related proteins such as MKI67 (Ki-67), tumor protein 53 (p53), tumor protein 63 (p63), B-cell lymphoma 2 (BCL2), and cyclooxygenase-2 (COX-2) in the basal cell layer of KCOT specimens, indicating that these proteins could be used as biological markers to diagnose KCOT.[3]

This neoplasia is predominantly found in males and people of white origin. It occurs mainly in the mandible, in particular the third molar region, mandibular angle, and ramus, with a mandible-maxilla ratio of 2:1.1. It can appear at any age; however, it is more frequent between the ages of 20 and 30. Its incidence rate ranges from 3% to 12% of odontogenic tumors. Similarly, this lesion can appear suddenly as a single clinical entity or as a complication of Gorlin-Goltz Syndrome.[2]

The typical radiographic features of OKC are unilocular, multilocular, or multiple well-circumscribed radiolucent lesions surrounded by a thin radiopaque border with a smooth or loculated periphery. The lumen is frequently densely filled with keratin, causing the image to show a hazy appearance.[1]

Histological examination accounts for the definitive diagnosis. The epithelial lining in the keratocyst is highly characteristic with its features being unchanged even in different specimens. Five-to-eight-cell-layer thick, regular keratinized stratified squamous epithelium without rete ridges lines the cyst. The form of keratinization is usually parakeratotic (80% - 90%), but it is sometimes orthokeratotic. The keratin formation amounts to no more than a thin eosinophilic layer of parakeratin in the

parakeratotic variant. The squamous epithelium has a clearly defined, palisaded layer of tall basal cells. The cells superficial to the basal layer are polyhedral and often exhibit intracellular edema.[1]

The radiological imaging techniques most commonly used in the study of OKCs are conventional radiography (mainly panoramic radiography), computed tomography (CT) and cone beam computed tomography (CBCT). These imaging modalities differ significantly in their technical characteristics, acquisition modalities, indications and information provided.[4]

Conclusion

Odontogenic keratocysts though quite common are a rare finding in the posterior maxilla. This case provides a good opportunity to study the interaction between the lesion and adjacent structures like the maxillary sinus and the cancellous bone. The OKC behaved like a cyst by expanding and displacing the inferior and lateral walls of the maxillary sinus rather than invading into it as a tumor would do. It also caused expansion of the bone which is a rare finding when it presents in the mandible.

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Case report

RIDGE-SPLIT PROCEDURE FOR HORIZONTAL AUGEMENTATION OF BONE

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Abstract

For the support of dentures many dental techniques has been introduced to modify the alveolar ridge around many years. Now a days the dental implants and preimplant preparation of the bone has become common procedures. The ridge-split procedure is one such method of widening and augmenting the alveolar ridge in case of atrophic ridges. Insufficient alveolar ridge width often prevents the ideal implant placement. For the lateral augmentation of the alveolar ridge Guided bone regeneration, bone grafting, alveolar ridge splitting and combinations of these techniques are usually used. Ridge splitting is a minimally invasive technique that is indicated for alveolar ridges with adequate height, which enables immediate implant placement. This case report describes about management of implant placement in narrow mandibular ridge using ridge splitting technique by means of microsaw with immediate placement of implants in the osteotomy site.

Key words: alveolar ridge augmentation; dental implants; ridge expansion; ridge splitting; narrow alveolar ridge; osteotomy

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Introduction

The alveolar ridge is the bony ridge on both the upper and lower jaws that contains the sockets of the teeth. The ridge-split procedure described in this article is a form of ridge widening or augmentation technique.It has been proven that in cases of narrow alveolar ridges this technique is consistently successful. Use of this minimally invasive technique has many advantages in case of a preprosthetic stage of dental implant placement. The benefits includes, low risk of inferior alveolar nerve injury, less pain and swelling, and no need for a second surgical site as donor.

Augmentation of the bucco-lingual dimension of the alveolar ridge can be done using ridge splitting technique, which was first described by Tatum. The ridge splitting technique involves a longitudinal osteotomy

on the residual ridge with the use of hand instrument, microsaw or ultrasonic device. A controlled greenstick fracture is created and the alveolar ridge is split in 2 parts. Osteotomes, chisels, horizontal spreaders or screw spreaders can be used for ridge expansion and lateral repositioning of the buccal bone plate in order to create a wider implant bed. The intrabony defect between the 2 bone plates is filled spontaneously with newly formed bone similarly to the healing procedure of an extraction socket.

However, filling the space with bone grafts alone or in combination with barrier membranes has been suggested in some clinical reports. Compared with guided bone regeneration or bone grafting, the ridge splitting technique enables simultaneous implant placement.. After the initial incision is made by the micro-saw, pilot burs create the appropriate depth for implant placement. A series of non-cutting bone spreaders of increasing diameters are used for the gradual densification of the cancellous bone and the expansion of the osteotomy. Dental implants can be placed simultaneously in the pre-planned positions. This technique involves ultrasonic devices for creation of horizontal and vertical osteotomies in combination with the use of conventional osteotomes for the gentle lateralization of the buccal segment. On the other hand, this technique can be used for horizontal deficiencies, but not for vertical augmentation. Thus, it can be applied for augmentation of alveolar ridges with adequate height.

Furthermore, the ridge splitting technique requires a minimum of 3mm of bucco-lingual width with at least 1 mm of cancellous bone between the 2 cortical plates, which would allow introduction of instruments and the maintenance of good blood supply to the split parts

Aim

The purpose of this article is to thoroughly describe the ridge splitting technique in clinical case of narrow alveolar ridges.

Case report

A 60 year old lady reported to the Dept. of Prosthodontics for the replacement of missing tooth. On clinical examination partial edentulous area found in relation to 24,25,27,34,36,37,45,46,47; Root canal treated teeth in relation to 15,14,23 and 35; Grade II mobility of 31 and 32. Patient was instructed to take Orthopantomogram. Various treatment plans were explained to the patient which includes upper and lower CPD and fixed partial prosthesis in relation to the upper and lower arch. Patient opted for the fixed partial prosthesis.

So the treatment plan included extraction of 31 and 32, intentional RCT in relation to 16,13,26,32,33,42,43 and 44 and implant placement in relation to 36, 45 and 46. CBCT was taken in relation to 36, 45 and 46. Tooth preparation was done in relation to 16,15,13,23,24,26 after completing root canal treatment then fixed prosthesis were given from 16 to 26 region.

First stage implant surgery was done in relation to 45 and 46, and implant was placed (DENTIUM 4.3*9(46), ADIN 3.75D 8L(45)) using Ridge split technique.

Figure 1a,b: Introral views

Procedure

The patient was asked to rinse 0.12% chlorhexidine solution for a minute pre-surgically. Local anesthetic solution was administered using 2% lidocaine with 1:100,000 epinephrine, Inferior Alveolar Nerve Block was given. A full thickness mucoperiosteal flap was raised after crestal and intracrevicular and vertical incisions.

Using a surgical guide, osteotomy sites were marked and split ridge using microsaw was initiated via one crestal cut and two vertical cuts through cortical bone . Ridge split was further enlarged using bone expanders until buccal and lingual plates were separated.

Osteotomy was performed using sequential drilling under copious saline irrigation and dental implants (4.3 x 9 mm DENTIUM,3.75D 8L(45) ADIN) were placed at 30Ncm. After the implant placement sutures were placed in position and post surgical instructions were given. Then the radiograph was taken in relation to 46,47 region after the implant placement.

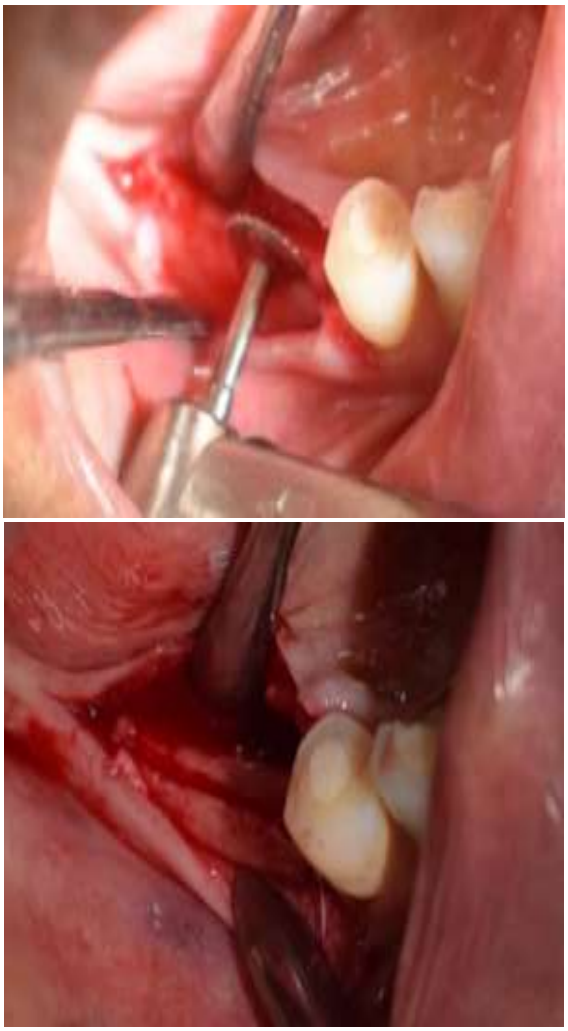


Figure 2a,b: The armamaentarium and the split created

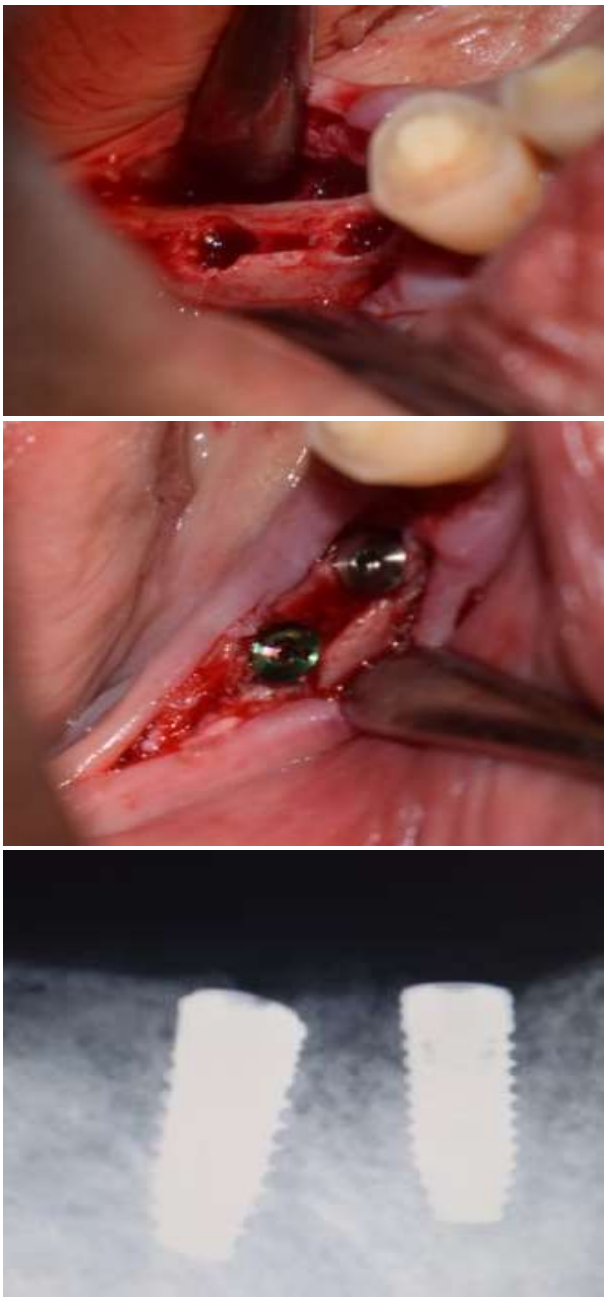


Figure 3a,b,c: The osteotomy sites and the implants inserted in place, along with the post operative IOPAR

Discussion

Horizontal atrophy of the alveolar ridge usually complicates adequate implant placement. GBR, bone grafting, alveolar ridge splitting and combinations of these techniques have been suggested as treatment modalities to increase bucco-lingual dimension of the residual ridge. Low morbidity and short treatment time are the major advantages of this technique compared to GBR and bone grafting procedures.[1]

The classical approach of the technique involves splitting the alveolar ridge into 2 parts with use of ostetomes and chisels. Modifications of this technique include the use of rotating instrument, screw spreaders, horizontal spreaders and ultrasonic device. Alveolar ridge split technique can be carried out by inserting implants simultaneously or it can be done in two steps. A staged split ridge expansion can be used to place implants in atrophic ridges, with the aim of avoiding malfracture of the osteomized buccal plate in the mandible. This technique is accomplished through two surgical procedures, performed six months apart. The first surgical procedure is utilised for bone augmentation and the second procedure for the implant placement. This technique has the same survival rate as one-step split ridge expansion, which is completed in a single surgical procedure.[2]

Alveolar ridge splitting is classically performed by means of chisels and hammer, rotary burs, diamond disk, reciprocal saw, or piezoelectric device. The use of bone chisels is time consuming and requires technical skills and a long learning curve. The alveolar

ridge split technique performed with burs or rotating saws is more rapid, but soft tissues and delicate anatomical structures can be damaged; close access to adjacent teeth can be difficult, and there is a high risk of losing control over the cutting device.

The piezoelectric surgical instrument offers three important advantages17 for osseous surgery: First, the cut is precise because it is produced by micro vibrations of the cutting tip. Second, the cut is safe because the ultrasonic frequency used does not cut soft tissue.18 Third, the cutting action is less invasive, producing less collateral tissue damage, which results in better healing. The patient discomfort is also minimal.[4]

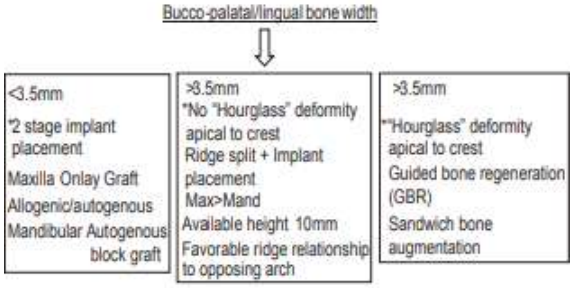
The process of ridge split is a vertical osteotomy i.e. cutting of bone downright in the vertical direction to provide space within bone for incorporation of graft material or implants. The alveolar bone is known to be viscoelastic in nature. For very thin alveolar ridges (< 3mm), ridge expansion procedures are very beneficial, as bone in such cases are very soft, have lower elastic modulus, which reinforces their viscoelastic nature and can result in better bone expansion.[5]

The most common complications observed during, or on completion of the ridge expansion procedure, was bone fracture. The mandibular bone has thicker cortical plate and is less flexible than the maxilla, hence the rate of bone fracture during ridge expansion is more for mandibular region. Studies have shown that ridge expansion with osteotomes or implant insertion may lead to fracture of the cortical plate. Hotzclaw et al used a modified technique whereby apical hinge cuts were used, which were not fully in the buccal plate so that some mobilization of the buccal plate could be achieved.[5]

Decision making[3]

This technique allows dental implant placement in areas involving insufficient bone width by moving the labial external cortical plate labially and is more suitable in maxilla rather than mandible because of thinner cortical plates and softer medullary bone.[7]

Table 1: The decision tree



Alveolar ridge splitting might be considered a predictable approach that demonstrates a high implant survival rate, adequate horizontal bone gain, and minimal intra and postoperative complications.[8]

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