

Journal of Odontological Research

Official Publication of Indira Gandhi Institute of Dental Sciences Nellikuzhy, Kothamangalam 686 691, Kerala, India







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REVIEW ARTICLE DENTAL APPLICATIONS OF LIQUORICE: A MEDICINE OF YORE

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ABSTRACT

Oral health influences quality of life and general well-being. Oral diseases can be debilitating and are a major health concern worldwide. Considering the emergence of multi-drug resistant pathogens and financial difficulties in developing countries, there is an urgent need for developing new antimicrobial compounds which are safe, efficient and cost effective. Medicinal plants have been used for time untold for treating human diseases. Liquorice is rich in secondary metabolites which are used in traditional and modern medicine. It has well known properties such as anti-ulcerative, antiviral, anti-inflammatory, glucocorticoid, antioxidant, anti-carcinogenic and many more. Liquorice extracts and bioactive ingredients have shown beneficial effects in preventing and treating oral diseases.

This paper reviews the potential beneficial effects of liquorice as a prevention and treatment modality in oral diseases. Clinical trials, review of literature and case reports evaluating the effect of liquorice on oral diseases and oral microbes are included.

Key words: Liquorice, drug resistance, oral diseases.

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INTRODUCTION

Medicinal plants are a source of potential bioactive compounds for the management of various diseases. Because of the resistance and side effects that pathogenic micro-organisms build against the antibiotics, much attention has been paid to extracts and active compounds isolated from plant species used in herbal medicine.¹

Glycyrrhiza glabra Linn., widely known as liquoriceor sweet wood, is one such traditional medicinal plant used by different cultures for centuries to relieve coughs, sore throats, and gastric inflammation.² The term Glycyrrhiza comes from the Greek words; glycos meaning sweet and rhiza meaning root.³ In China, it is called "gancao" (meaning "sweet grass") and has been recorded around 2100 BC in the Shennong's Classic of Materia Medica.⁴ The Food and Drug Administration (FDA) lists liquorice as GRAS (generally regarded as safe) when used as food seasoning and sweetening agent.⁵

G. glabra is a perennial shrub. It has compound, alternate leaves. Its fruit is a compressed legume or pod, with reticulous pitting containing 3-5 brown seeds. Its root system is a long taproot with horizontal stolons which are the source of commercial liquorice. Glycyrrhizin consists of 10%-25% of liquorice, which imparts sweetness. It is fifty times sweeter than refined sugar.^{3,6} The yellow colour of liquorice is due to the flavonoid content.⁶

Liquorice is abundant in secondary metabolites linked with various health benefits.⁷ Recently, the benefits of liquorice in oral diseases has been of interest. Clinical trials have been performed to evaluate the effects of liquorice in preventing and treating oral diseases.⁸

The antimicrobial efficacy of liquorice has been accounted by various researchers. The organoleptic properties of liquorice stimulate salivary flow. Stimulated saliva contains greater concentration of bicarbonate ions having increased buffering capacity.⁹ Added to its potential to clear acids and substrates from plaque and its improved pH, stimulated saliva increases the resistance to caries. The antimicrobial activity may be due to tannins, triterpenoid saponins, and flavonoids.^{2,10}

Mode of Delivery

The mode in which liquorice is delivered is a major criterion to effectuate prolonged duration of action. Liquorice candy or chewing gum, would have an extended release in the mouth enhancing its sustained action. It can be used as a suspension or a gel to increase its action. Liquorice roots have been conventionally used as chew twigs and also as teething sticks which exert a numbing effect on infants' gums. Liquorice can also be incorporated in infant swipes and pacifiers, serving as a non-cariogenic sweet-tasting alternative to honey-dipped pacifier. Liquorice powder also has reduced the metabolism of sucrose, fructose, and glucose. Further, controlled-release devices, mucosal adherent patches, and even as liquorice-containing resorbable fibres which can be inserted into diseased periodontal site and healing sockets. However, when delivered as a rinse, the duration of action was too short to provide optimum contact of the extracts with the oral cavity. Moreover, the sweet taste promotes early swallowing of saliva and consequent washout of the residual drug from the oral cavity.⁹

Dental caries and Liquorice

Various factors contributing to the risk of the development of caries are consumption of dietary sugars, non-exposure to fluoride, decrease in the salivary flow, and oral hygiene behaviour of individuals.¹¹ Various preventive measures such as fluoride, xylitol, CPP-ACP etc are available for preventing dental caries are being followed from a very long time. Herbal products such as Ocimum sanctum, Aloe barbadensis, and Liquorice which have been found to inhibit dental caries.¹²

Liquorice has the highest anti-microbial activity against SM when compared to other bacteria.^{2,12} Glycyrrhizol A, from the extract of liquorice roots, which employed strong antimicrobial action against cariogenic bacteria.⁹ One of its main component, glycyrrhizin, dose-dependently hinders the glucosyltransferase activity, which is necessary for the production of insoluble glucans involved in biofilm formation. Gedalia et al. described that glycyrrhizin, when added to an acidulated phosphate-fluoride solution, increases fluoride uptake and deposits in the demineralized enamel.⁹ Moreover, the presence of alkaloids, tannins and flavonoids prevent the bacterial adherence to the tooth surfaces, inhibit glucan production and have inhibitory effect on amylases. Glabridine is active against both gram-positive strains and gramnegative strains. Glycyrrhetinic acid, Glycyrrhizin, flavonoids, isoflavonoids, asparagineand chalcones improves its antiadhesive and antimicrobial properties. Flavonoids isolated from G. uralensis have shown to completely inhibit biofilm formation hence recommended in gargling solutions and in dentifrices for prevention of dental caries. Isoflavonoids along with Glycyrrhizol A and B have shown antimicrobial activity against Streptococcus mutans. A sugar-free flavoured glycyrrhizol A containing liquorice lollipop when consumed for 10 days twice daily led to a marked reduction in salivary S. mutans.¹² Liu et al. reported that glycyrrhizic acid inhibits the multiplication and acid production of S. mutans in vitro.

Sugar-free lollipops containing liquorice were given to children twice daily for 3 weeks and the high-risk children had the maximum decrease in Streptococcus count. At end of the follow-up period, the SM count which decreased moved the high-risk group down to moderate-risk level. Oznurhan et al. evaluated the effectiveness of a herbal cariesprevention protocol for reducing salivary SM levels in children and found that Liquorice made a significant decrease in the streptococcus count.¹² Söderling et al. reported that liquorice-containing gel inhibits acid production.¹³ The use of liquorice extractcontaining lollipops can be as a simple and effective way to reduce the risk of dental caries in children. Liquorice extracts can be utilized as a preventive routine in paediatric practice under supervision. The supervision by dentist or parents would limit accidental over consumption by children as high doses of liquorice is associated with respiratory and renal diseases. Moreover, the candies and lollipop way of providing liquorice can be well accepted by the children.12

Gingivitis and liquorice

Gingivitis is characterized by presence of clinical signs of inflammation confined to gingiva. P. gingivalis is most strongly associated with the progression of gingivitis and onset of periodontitis in children . Aqueous extracts of polysaccharides from G. glabra have shown anti-adhesive effects against P. gingivalis. A supercritical extract of Chinese liquorice along its major isoflavones have shown inhibitory effect on growth, volatile sulfur compounds (VSCs) production and protease activity of P. gingivalis therefore controlling halitosis.¹⁴ These studies implicate that liquorice can be used in oral hygiene products to maintain oral and gingival health.

Periodontitis and liquorice

Periodontitis is an inflammatory disease of the supporting tissues of the teeth resulting in progressive destruction of periodontal ligament and alveolar bone. The treatment of periodontitis involves removal of plaque and calculus and maintenance of good oral hygiene.

The ability of liquorice root polysaccharides to reduce bacterial binding to host cells was observed by Wittschieret al. Polysaccharides from G. glabra are potent against bacterial adhesion and can be potential prophylactic tools in alternative treatment regimens against bacterial infection. Bodetet al. found that liquorice extract inhibit the periodontopathogensexhibiting potent antiinflammatory properties. According to La et al. licorisoflavan A and licoricidininhibit matrix metalloproteinases (MMPs) and inflammatory cytokines and can be used in the treatment periodontitis. Licochalcone A inhibits P. gingivalis biofilm formation, the key risk microbefor the progression of periodontitis. Recently an in vivo study demonstrated that liquorice extract can prevent the production of MMPs and can be as effective as doxycycline in patients with chronic periodontitis.⁸ Pyrano-isoflavans from G. uralensis has shown antibacterial activity against S. mutans and P. gingivalis.15

Oral candidiasis and Liquorice

Oral candidiasis, caused by Candida albicans is an opportunistic infection of the oral cavity. Candida albicans is an inhabitant of normal flora of the oral cavity and the gastrointestinal tract and causes no infections in healthy persons.

Licochalcone A, liquiritigenin and glabridin have shown to be effective in preventing biofilm formation, growth and yeast-hyphal transition of C. albicans.¹⁶ Motseiet al. reported the antifungal effect of aqueous extract of G. glabra on C. albicans. Glabridin also showed resistance modifying activity against drug resistant mutants of C. albicans. Animal studies conducted by Lee et al. concluded that Liquiritigenin can protect mice against disseminated candidiasis by the CD4+ Th1 immune response. These compounds can act with nystatin against C. Albicans. Thus, liquorice can be a useful alternative for the management of oral candidiasis.⁸

Recurrent aphthous ulcer and liquorice

Recurrent aphthous ulcers are the most common oral mucosal disease seen in children and adults . Burgess et al. documented that commercially available Canker Melts GX patches containing liquorice decrease the lesion size, duration and pain thereby improvising healing.¹⁷ Martin et al. observed an improvement in pain using an oral patch impregnated with liquorice extract when used for up to 8 days. An in vivo study demonstrated the effectiveness of liquorice bio adhesive in the pain control and the inflammatory halo and necrotic centre of aphthous ulcers.⁸ All of these investigations emphasize on the therapeutic benefits of liquorice on aphthous ulcers.

Oral cancer and liquorice

Liquorice has been investigated as a chemotherapeutic agent for its role in treatment of oral carcinomas. Isoliquiritigenin, isolated from liquorice is a novel inhibitor of tumor angiogenes is and possesses great remedial potential for Adenoid cystic carcinoma and oral squamous cell carcinoma.^{8,10}

Licochalcone A induces apoptotic cell death of oral squamous cell carcinoma cells. Kim et al. proposed that Licochalcone A decreases the number of viable oral cancer cells. Shen et al. advocated that licochalcone A significantly inhibited the cellinvasion capacities of SCC-25 cells.

Water-soluble polysaccharide from the roots of Glycyrrhiza inflata specifically decreased cell viability of human oral cancer SCC-25 cells via the induction of apoptosis . All the above studies show that liquorice has the potential to be a safe chemotherapeutic agent in the management of oral cancer.⁸

Root canal irrigant, medicament and Liquorice

Intracanal irrigants have been used for cleaning and shaping to bring down bacterial load in the root canal. Enterococcus faecalis is the chief microorganism recovered from root canals of the teeth where previous endodontic therapy has failed and is the paramount cause of failure of root canal therapy. Studies have focused on finding herbal alternatives which are effective against E. faecalis.^{2,18}

Badret al. estimated the antibacterial and cytotoxic effects of liquorice as a root canal medicament and compared its action to calcium hydroxide Ca(OH)₂. Liquorice extract either by itself or in conjunction with Ca(OH)₂ had superior inhibitory effect against E. faecalis compared to Ca(OH)₂ alone.¹⁹

Role of Liquoricein Radiotherapy Induced Mucositis

Oral mucositis is the main adverse effect of radiotherapy of the head and neck region, which is painful. The mode of action of Glycyrrhiza extract on mucositis may be mediated through inhibition of activated macrophages leading to hindrance in the prostaglandin E2 production, and formation of superoxide and hydroperoxide in macrophages. The anti-inflammatory effects of glycyrrhizin are mediated by its ability to decrease generation of reactive oxygen species, and direct scavenging of free radicals.

In a double-blind, randomized prospective trial, liquorice mucoadhesive films were effective in the management of oral mucositis. Also, lyophilized liquorice extract containing mouth wash before and immediately after each session of radiotherapy have shown reduction in mucositis.²⁰

CONCLUSION

The focus for the using natural alternatives are cost viability, accessibility, low harmfulness, expanded time span of usability and absence of microbial protection reported up until this point. Ayurvedic medicinal plants are good candidates for development of novel medicines in future. The present review provides a direction for future investigators to carry out research on the various phytochemicals of G.glabra so that its constituents can be added in dental products making it beneficial to oral care. The studies should be directed to explore, evaluate and test the therapeutic benefits of G. glabra in dentistry.

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REVIEW ARTICLE PRECISION DENTISTRY -A PERSONALIZED APPROACH

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ABSTRACT

Precision medicine is an expanding area in which physicians make use of diagnostic tests in identifying biological markers, often genetic, that aid in planning medical treatments, as well as technique, that works best for each patient. Presently, researches are undertaken related to using diagnostic tests in medical diagnosis based on genomics, proteomics, and metabolomics to enhance and prophesy patient's reactions to targeted therapy. Precision Dentistry is an innovative technique in the field of oral health. It is derived from the concept of precision medicine. Similar to precision medicine, precision dentistry refers to a contemporary, multifaceted, data-driven approach to oral health care that utilizes individual characteristics to stratify similar patients into genotypic groups. This review focuses on an introduction to precision medicine and precision dentistry, its applications and future aspects.

Key words: Precision medicine, precision dentistry, personalised medicine, genomics, biomarkers.

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INTRODUCTION

Precision medicine is an expanding area in which physicians make use of diagnostic tests in identifying biological markers, often genetic, that aid in planning medical treatments, as well as technique, that works best for each patient. Presently, researches are undertaken related to using diagnostic tests in medical diagnosis based on genomics, proteomics, and metabolomics to enhance and prophesy patient's reactions to targeted therapy. This area is designated as precision medicine. It conglomerates the human genome, information technology, and biotechnology with nanotechnology to provide specific and personalized cures based on specific differences set against population trends. This approach will allow doctors and researchers to predict treatment and prevention strategies for a particular disease, more accurately.1

This evolving discipline is resulting in a muchneeded change in the approach towards health care delivery by a transition towards disease prevention, early intervention, and risk assessment.² In this new form of treatment, a thorough analysis of the genomic profile of the patient and environmental and cultural influences that impact the risk of disease are considered. Given dentistry's historical commitment to disease prevention, the dental profession must position itself to embrace this innovative approach to patient care.^{3,4}

Precision Medicine Vs Personalized Medicine

There is considerable overlap between the terms 'precision medicine' and 'personalized medicine.' The word 'personalized' could be misinterpreted as prevention and treatment modalities developed uniquely for each individual, whereas in reality, it is based on the genetic, environmental, and lifestyle factors of the patient.⁵ Personalized medicine is an approach that considers patient's genetic make-up but with attention to their preferences, beliefs, attitudes, knowledge, and social context. In a broader contextprecision medicine describes a model for health care delivery that relies heavily on data, analytics, and information. This model is beyond genomics and has broader implications for our nation's research agenda and its implementation and adoption into health care.⁶ Hence the term 'precision medicine' is preferred. However, both terms are used interchangeably.⁵

Precision Medicine- Definition

The National Research Council's Toward Precision Medicine adopted the definition of precision medicine from the President's Council of Advisors on Science and Technology in 2008 as: "The tailoring of medical treatment to the individual characteristics of each patient...to classify individuals into subpopulations that differ in their susceptibility to a particular disease or their response to a specific treatment. Preventative or therapeutic interventions can then be concentrated on those who will benefit. sparing expense and side effects for those who will not". As this definition suggests, the power of precision medicine lies in its ability to guide health care decisions toward the most effective treatment for a given patient, and thereby improving quality of care, while reducing the need for unnecessary diagnostic testing and therapies.⁶

Precision Medicine Ecosystem



Role of Biomarkers

A biomarker is a defining characteristic that is measured as an indicator of normal biological processes, pathogenic processes, or responses to an exposure or intervention, including therapeutic interventions. The three types of biomarkers include diagnostic biomarkers, prognostic biomarkers, and predictive biomarkers.⁷

Biomarker testing is a way to look for genes, proteins, and other substances that can provide information about the disease. Each person's disease has a unique pattern of biomarkers. Some biomarkers affect how certain treatments work. Hence, biomarkers are an integral component of precision medicine.⁸

Precision Medicine - Potential Applications

The general goal of present-day disease management is demand-orientated, and to reduce morbidity, mortality, and disability, precision medicine is a technical innovation.⁹ Precision medicine has its role to play at many points during the entire life span of an individual. Before conception, genetic screening can be used in identifying genetic disorders in the offspring.^{6,10,11} During pregnancy, the mother can have genetic testing to assess the fetus for any chromosomal abnormalities. The genome sequencing of the fetus can also be performed.^{6,12} At birth, genome sequencing can be done to diagnose many critical conditions.^{6,13} Later in life, it can be applied to diagnosing a large number of diseases especially chronic diseases and cancer.⁶ Currently, the applications of this approach have been documented in the literature in different clinical specialties including oncology, pulmonology, cardiology, pathology, clinical neurology, nuclear medicine, medical imaging, urology and nephrology, endocrinology, and psychiatry.¹⁴ The following is a summary of potential applications of precision medicine.⁹

Examples of diseases presently managed by precision medicine include (bio-markers for each disease is provided within brackets) cancers - chronic myeloid leukemia (BCR+ABL) and lung cancer (EML4-ALK); infections – HIV/AIDS (CD4+ T cells, HIV viral load), hepatitis C (hepatitis C viral load); hematology - thrombosis (factor V leiden); cardio-vascular disease - coronary artery disease (CYP2C19); pulmonary disease - cystic fibrosis (G551D); renal disease - transplant rejection (urinary gene signature); endocrine disease - multiple endocrine neoplasis - type 2 (RET); metabolic disease - hyperlipedemia (LDL cholesterol); neurological disease - autoimmune encephalitis (CXCL13); psychiatry - alcohol use disorder (GRIK1); pharmacogenomics - smoking cessation (CYP2A6), ophthalmology - Leber's congenital amaurosis (RPE65).⁹

Precision Dentistry

Precision Dentistry is an innovative technique in the field of oral health. It is derived from the concept of precision medicine. Similar to precision medicine, precision dentistry refers to a contemporary, multifaceted, data-driven approach to oral health care that utilizes individual characteristics to stratify similar patients into genotypic groups.¹⁵

Precision dentistry, thus, is a dental management model that proposes the customization of dental/oral care, with clinical decisions, practices, and/or products being tailored to the individual patient. This approach will bring dentistry in line with current medical practice whereby individuals are assessed, and targeted treatments are developed, based on specific data gathered during the examination and treatment phases of patient management. At present dentistry falls way behind medicine in this model of management.¹⁶

Complex dental diseases such as dental caries, gingivitis, and chronic periodontitis, orofacial pain, and oral cancer, are conditions where, the application of precision medicine can mitigate the chronic and often destructive nature of these conditions and aid in taking a more proactive approach to diagnosis and treatment of these diseases, compared to our present reactive, wait and see approach.¹⁷ Despite these complexities, evidence suggests identification of biomarkers can be of use in precision treatment. Thus, the cornerstone for successful precision depends on the identification of clinically validated biomarkers, which can be reliably linked to a specific disease and provide reliable targets for therapy. These biomarkers will also enable more precision drug manufacturing.¹⁷

Precision Dentistry - Potential Applications

Periodontal diseases: Periodontitis is a polymicrobial infection. Research has the variability in the disease could well be clarified through genetic factors. Genes can affect host-bacterial interactions in the periodontal tissues due to elevated levels of proinflammatory cytokines, such as interleukin-1 (IL-1). IL-1 plays a dynamic role in the pathogenesis of periodontitis, by host inflammatory response regulation. The genes that encrypt IL-1 production in recent times received utmost attention as likely predictors for periodontal disease progression. Promising results have been shown with IL-1, which is the pro-inflammatory cytokine, and the presence of the IL-1 positive gene is associated with the increased inflammatory response. Although presently, the studies have identified IL 1, in the future, further genetic markers may be recognized in due course of time.¹

Dental caries: Dental caries is regarded as a public health problem worldwide. With the multifactorial etiology, various factors influence the disease process, which can be broadly categorized into environmental and host factors.¹⁸

Various researches have reported that 40-60% of dental caries susceptibility is genetically determined. It is also reported that dental caries is, infact, influenced by numerous genomic and loci factors, like a mutation in the single-nucleotide polymorphism of Amel X gene responsible for normal enamel development, defect in KLK4 gene responsible for enamel maturation, LYZL2 that involves in antibacterial defenses, and AJAP1 that may influence tooth development.^{1,19,20} Hence, early detection of these specific genes benefits the patient but and the dentist, who can render better treatment to the patient with thorough knowledge concerning its diagnosis and prognosis.¹

The role of genomics has also been researched about Early Childhood Caries (ECC). The first-ever genome-wide association study (GWAS) of primary dentition caries (children ages 3-12) discovered suggestive evidence of association for 7 genetic loci, two of which (MPPED2 and ACTN2) were replicated in a subsequent investigation. Additional key findings from this new line of research utilizing the GWAS methodology is that genetic influences on dental caries may differ between the primary and the permanent dentition, as well as between tooth surfaces (i.e., smooth versus pits and fissures).²¹

Oral cancer: Oral squamous cell carcinoma (OSCC) is one of the leading cancers in the world. OSCC patients are currently managed mostly, with surgery and/or chemoradiation. Prognoses and survival rates are dismal, however, and have not improved for more than 20 years. Recently, the concept of precision medicine was introduced in the management of oral cancer, with promising outcomes.²²

Recent developments in the influential omics tools, which include genomics, epigenomics, transcriptomics, proteomics, metabolomics, and lipidomics are initiating novel paths in the direction of biomarker detection for prompt diagnosis of oral cancer. The detection of these biomarkers facilitates in determining and discriminating the behavior of oral cancer in each of the affected patients thus, providing personalized therapies for these patients.^{1,23}

Orthodontics: Genetics has a very important role to play in the field of orthodontics. Genetics has a pivotal contribution in understanding the etiology of malocclusion. The comparative influence of genetics and environmental factors in the etiology of malocclusion has been a matter of debate.²⁴

The present researches in this field focus on the genomic basis of craniofacial growth and genetic variants of dentofacial abnormalities. In orthodontics, for instance, mandibular prognathism (Class III) and cleft lip and palate are primarily genetic in origin, and also a certain number of them are environmental in origin.¹

Class III malocclusion mandibular protrusion obvious in Spain Charles royal families, also called as Hapsburg jaw is considered as a monogenic dominant phenotype, and is also an expression of certain genes that encode specific growth factors (Indian hedgehog homolog, parathyroid-hormone like hormone, insulin-like growth factor-1, vascular endothelial growth factor, harbor genes [chromosomal loci 1p36, 12q23, and 12q13], etc.) accountable for Class III malocclusion.^{1,25}

Certain genes transmembrane protein 1 and GAD1 are responsible for the occurrence of cleft lip and cleft palate and also certain genetic variants REF IRF6, PVRL1, and MSX1 are involved in the formation of syndromic-associated cleft lip and palate.¹

Precision Dentistry and Dental Public Health

On the surface, the precision oral health movement seems to be at odds with dental public health. While Precision dentistry focuses on the individual patient, dental public health addresses the oral health needs of populations. Thus, the concept of precision public health will have a profound impact on the future of health care and how dental public health will be practiced. With the opportunity for epidemiological methods to be applied to big data sets, dental public health specialists can look at these "omic" biomarkers and demonstrate generalizable, potential causal relationships between oral disease and certain factors observed in our genome.Precision public health literature about oral health identifies possible threats that could inadvertently increase health inequities and proposes potential opportunities that precision public health could utilize to reduce oral health inequities. Precision public health is a recently evolving field that proposes synergistically integrating public health data with other health information sources to improve health status and reduce costs. Precision public health expands precision medicine's recent call for a new taxonomy of disease and a knowledge network of integrated biomedical research, from an emphasis on diagnosis and curative medical treatment to also include prevention and health promotion.²⁶

PRECISION DENTISTRY - THE FUTURE

If the dental professionals can successfully implement personalized medicine in their practice, dental professionals will have a deeper understanding of oral and systemic health, a working knowledge of genomic medicine - its strengths and weaknesses, proficiency in the use of newer diagnostic tools such as salivary diagnostics. As with any emerging field, dentistry has to overcome a few challenges such as gaps in knowledge, lack of an integrated health record, lack of motivation to adopt the new technique. Despite these transient challenges, the dental profession is in a strategic position to embrace and adopt precision medicine.¹⁷

Opportunity, challenges, and feature of personalized medicine that could be implemented to personalized dentistry are the following:

- Directing targeted therapy and reducing trialand-error procedures
- Decreasing adverse drug reactions
- Increasing patient willingness to treatment
- Reducing high-risk invasive testing procedures
- Facilitating to control the overall cost of health care¹

CONCLUSIONS

As the science of personalized medicine continues to advance, there will be better tailor made treatment options available for the management of diseases. The advent of personalized medicine marks a transition from the traditional 'One size fits all approach. With an in-depth understanding of the disease process through genomics and biomarkers, precision medicine has a huge potential in the prevention and treatment of disease in a customized way. As personalized medicine becomes more widely implemented within our healthcare environment, the dental profession must demonstrate its leadership in advancing personalized medicine into the practice environment as there are potential applications of precision medicine in oral health care.

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CASE REPORT TOOTH SUPPORTED OVERDENTURE - A PREVENTIVE CONCEPT TO REHABILITATE THE RUINS

ABSTRACT

Preventive prosthodontics emphasize the importance of any procedure that can delay or eliminate future prosthetic problems. Overdenture is essentially a preventive prosthodontic concept since it attempts to conserve the few remaining natural teeth. The success of the overdenture treatment depends upon the proper attachment selection for each case. Attachment selection is based on available buccolingual and inter arch space, amount of bone support, opposing dentition, clinical experience, personal preferences, maintenance problems and cost. This is a case report of a successful prosthetic rehabilitation of a patient with attachment retained overdenture utilizing stud attachment.

Keywords: Cast metal coping, Overdenture, Stud attachment, Tooth supported.

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INTRODUCTION

The concept of overdentures is a positive means for delaying the process of complete edentulism and helps in the preservation of bone.¹As it involves preservation of teeth and alleviate consequences of conventional complete denture, it is a preventive therapy.^{1,2}

An over denture is any removable dental prosthesis that covers and rests on one or more remaining natural teeth, tooth roots, and/or dental implants. Synonyms are Over lay denture/Hybrid Prosthesis/ Tooth Supported Denture/ Superimposed dentures/ Onlay denture.^{3,4}

The basic principles of overdenture therapy are the continued preservation of alveolar bone around the retained teeth and improved masticatory efficiency, retention & stability of the prosthesis. The continuing presence of periodontal sensory mechanisms guide jaw functions in a better way.¹

CASE REPORT

A57 years old male patient presented with chief complaint of difficulty in chewing food due to multiple missing upper and lower teeth. Intra oral examination revealed root stumps in relation to 36,37.Grade 1 mobility was noticed for 34,43. All the remaining teeth were extracted years back as reported by the patient. Various available treatment options including tooth supported overdenture, implant supported overdenture, conventional complete denture was explained to the patient. With patient consent it was planned to make an attachment retained tooth supported overdenture in mandibular arch and conventional complete denture in the maxillary arch. Root stumps were extracted. A tentative jaw relation was done to assess interarch space. Intentional endodontic therapy of 34 and 43 was done and postspace was prepared after periodontal evaluation (figure1,2). The selected root abutments were reduced to 2-3 mm height and contoured to convex or dome shaped surface(figure3). Impression was made in addition silicone elastomeric impression material (figure4). Cast post and coping with rhein 83 attachment (male part)was fabricated and cemented on the abutment with glass ionomer



Fig. 1: Post space of 34



Fig. 2: Post space of 43



Fig. 3: Preparation of abutments



Fig. 4: Elastomeric impression

cement. (figure5). The complete denture-try- in and processing was done. The metal encapsulator with O- ring(female part) was attached to denture base with autopolymerising acrylic resin.(figure 6).

The patient was given the usual home-care instructions about wearing and home care of dentures. The importance of maintaining the health of retained teeth was stressed upon, since all the advantages of overdentures solely depend upon their continued presence. Gentle cleaning and massage with soft tooth brush using fluoride tooth paste, removal of denture at night and meticulous denture hygiene with denture brush and mild soap were explained.

The immediate recall visit was scheduled after 24 hours, later 2 weekly visits, then fortnightly visits and thereafter once in every six months. At recall visits, the oral health status was monitored. Dentures were assessed for retention and stability and occlusion was refined whenever required (Fig 7-9).



Fig. 5: Cast post and coping with attachments cemented on abutments



Fig. 6: Metal encapsulator attached to denture base



Fig. 7,8,9 : Post insertion images of stable and retentive denture

Passivity of contact between denture and gingival area of the abutments was assessed. Less post insertion sore spots were noticed. Overdenture showed short adjustment period, better retention, stability, high chewing performance and good patient acceptance.

DISCUSSION

When few firm teeth are present in an otherwise compromised dentition, they can be retained and used as abutments for overdenture fabrication. This helps to improve the retention and stability of the final prosthesis significantly. Also it gives the patient the satisfaction of having a prosthesis with natural teeth still present.⁵ Ledger and Atkinson advocated leaving 'stumps' under artificial dentures for support. Schweitzer et al reported that the approach dates back to 1800's. Prothero described prosthetic devices retained by telescopic crowns, bars and screws. Brill reported on overdentures and termed the appliance as hybrid.⁶

The general requirements of overdenture abutments are: $^{^{7}}$

- 1. Bilateral distribution of endodontically treatable abutments
- 2. >5mm periodontal attachment
- 3. Healthy attached gingiva >3mm
- 4. No bony undercuts
- 5. 4mm abutment height.

The rationale for short round coronal surface is to eliminate or minimize lateral occlusal stress and the objective of giving an attachment is to improve the retention of denture. The use of attachments can redirect occlusal forces away from weak supporting abutments and onto soft tissue. They act as shock absorbers as well as provides superior retention.⁶

Treating the abutment endodontically improves the crown root ratio and provides sufficient interocclusal clearance for placement of artificial teeth. Mobility of abutment is a minor concern because modifying crown root ration usually result in its remission.^{2,7}

In a 4-year-study, Renner and his co-workers showed that 50% of roots, used as overdenture abut-

ments remained immobile. In addition, 25% of roots that were initially mobile became less mobile.^{1,8}

As far as location of abutment teeth is considered, two teeth in each quadrant present an ideal situation so that stress is distributed over a rectangular area. Cuspids, or first premolars and second molars in each quadrant, mandibular cuspids are most often utilized since they are usually the last teeth to be lost. Mandibular incisors can be used as over denture abutments if mandibular arch is intact.⁹ Next most favourable form for support and stability is a tripod configuration. Ex: 2 canines and a second premolar.³

Since edentulous ridges and the remaining roots are often compromised, the prosthesis that relies on resilient attachments is better able to divert occlusal forces away from weak abutment teeth.³ The metal O-ring attachment system is considered to be a good resilient attachment for overdentures. Also Stud attachments occupy a small vertical space and the male units on the different roots do not require parallelism.¹⁰ Small head of the attachment limits the amount of material that has to be removed from the denture. The nylon cap provides 3-5 pounds of retention. Thus, this concept is cost effective.¹⁰

CONCLUSION

An over denture has many advantages compared with conventional complete denture. Prosthodontic rehabilitation of cases like partial anodontia not only improves function and aesthetics dramatically, but also psychologically boosts the morale of the patients more. The retained teeth apart from supporting and anchoring the appliance, contribute towards continued preservation of alveolar bone and periodontal proprioception. The success depends upon proper case selection with critical monitoring of various steps involved.

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CASE REPORT

ONE-STEP-APEXIFICATION OF AN IMMATURE TOOTH USING MTA: A CASE REPORT

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ABSTRACT

Apexification is a treatment protocol well recognized and accepted by clinicians worldwide for the management of an immature tooth with necrotic pulp. Traditionally, calcium hydroxide has been the material of choice for the apexification of immature permanent teeth. But the disadvantages of long treatment time, fracture of teeth and incomplete calcification of apical bridge have led to the development of other biomimetic materials such as MTA. This case report is based on the successful treatment of a 21-year-old female patient with an immature open apex, with MTA for apexification procedure.

Key words: Apexification, mineral trioxide aggregate, open apex, apical barrier, one-visit.

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INTRODUCTION

A tooth with an immature open apex presents the problems of overfilling and poor apical seal of obturation¹. Cleaning and disinfection of the infected root canal cannot be done with standard root canal protocols. An apical barrier is much desired to enable optimal obturation of the root canal system. Calcium hydroxide has been used successfully to effect an apical barrier formation^{2,3} i.e. apexification in these teeth. Apexification can be defined as a 'method to induce a calcified barrier in a root with an open apex or the continued apical development of teeth with incomplete roots and a necrotic pulp' (American Association of Endodontists $2003)^4$. Apexification with calcium hydroxide is the most common treatment option for necrotic teeth with immature roots. However, calcium hydroxide shows certain limitations like incomplete calcification of dentinal bridge and prolonged treatment duration which may present problems with patient compliance. MTA has been described as a good material this procedure due to its good canal sealing property, biocompatibility and ability to promote dental pulp and periradicular tissue regeneration. It has been reported that MTA root fillings placed at the cemental canal limit showed better results than overfilling's.^{5,6} The aim of this report was to present the short-term follow-up of a nonvital teeth and open root apex which was managed with an MTA apical plug technique.

CASE REPORT

A 21 year- old female presented to the department of conservative dentistry and endodontics, with discolored upper left central incisor that is tooth number¹¹. On asking leading questions patient gave no history of pain or discomfort associated with¹¹. Patient had noticed the discoloration since two years. The patient had history of trauma ten years before. Clinical examination revealed a discolored central incisor and radiographic examination shown a wide open apex and a radiolucent area (fig.1). A diagnosis of immature non-vital tooth with periapical radiolucency was made. A one step apexification preceded by canal disinfection for two weeks with calcium hydroxide was planned for this tooth.



Fig.1

After application of rubber dam and access cavity preparation, working length was obtained with 80k file which was 14 mm. Cleaning and shaping of the root canal was done with irrigation with 5.25% of sodium hypochlorite, a slurry of calcium hydroxide mixed with Chlorhexidine and was placed in the canal and temporized. The patient was asked to return after two weeks. After two weeks the tooth was opened, instrumented and irrigated (fig.2)





MTA angelus is the MTA used here. It was mixed to a paste consistency with sterile water and delivered to the canal using the messing gun in about 4mm thickness. A hand plugger was used to condense the MTA at the apex. A moist cotton pellet was sealed inside to allow the MTA to set. (Fig 3)





Remaining canal was sealed with thermoplasticised gutta- percha the next day. A corono-radicular composite restoration sealed the access preparation. (Fig 3). Six months follow up demonstrated a radiographic decrease in the periapical radiolucency.



The tooth was asymptomatic, and clinically functional.

DISCUSSION

Calcium hydroxide has been used with great success to form an apical hard tissue barrier in immature open apices⁷. The time interval for calcium hydroxide apexification has been reported to be variable, ranging from 3-24 months⁸. In this case, the speedy barrier formation could be attributed to the frequent calcium hydroxide dressing replacement⁹. The barrier produced by calcium hydroxide apexification has been reported to be incomplete having Swiss cheese appearance and can allow apical micro leakage. Thus a permanent root canal filling is still mandatory. Pulp revascularization remains a good treatment option for such cases but the patient was not agreeable to the time constraints. So, one step apexification with MTA was decided for this case. MTA has been widely recommended for plugging open apices^{10,11,12}. It has good apical seal, biocompatibility, pulpal and periodontal tissue regenerating capabilities^{13,14,15,16}. Authors have reported that MTA root fillings placed at the cemental canal limit showed better results than overfilling's^{12,16}. Various materials have been used to prevent MTA extrusion into the periodontal tissues, including hydroxyapatite, collagen, calcium phosphate cement and calcium sulphate¹¹. In this case, the apical stop gained by calcium hydroxide use was used to obtain a dense MTA plug contained within the apical limit of the tooth. The anatomy of the canal dictated the use of a plastic filling material. Access was sealed with composite restoration starting from 3 mm below the cervical line to reinforce this tooth against fracture. The six- month follow up showed clinical and radiographic signs of healing. Long term follow up is however necessary to ensure success, especially since this therapy would probably increase chances of tooth fracture.¹⁷

CONCLUSION

In this case, MTA helped to make an apical barrier within the immature necrotic maxillary central incisor and showed a progressive clinical and radiographic success. The use of MTA apical plug after gaining a matrix with the use of calcium hydroxide showed a positive clinical outcome for the immature tooth. The use of adequate irrigantsalong with calcium hydroxide as an intracanal medicament aided in the periapical healing of the chronic apical periodontitis.

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CASE REPORT PYOGENIC GRANULOMA IN THE ORAL CAVITY-A CASE REPORT

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ABSTRACT

Pyogenic granuloma is a commonly occurring inflammatory hyperplasia of the skin and oral mucosa. It is not associated with pus as its name suggests and histologically it resembles an angiomatous lesion rather than a granulomatous lesion. It is commonly seen on gingival and rarely on other parts of oral cavity such as lips, tongue, palate and buccal mucosa. It is seen predominantly in second to third decade of life in young females. Clinically manifesting as a small red erythematous exophytic lesion must be biopsied to rule out other serious conditions. This article presents a case report of a pyogenic granuloma of the gingiva and its management.

Key words: Pyogenic granuloma, gingiva, excision, benign lesion

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INTRODUCTION

Pyogenic granuloma (PG) is a benign lesion of vascular origin¹⁻⁴. In English literature it was described by Hullihen⁵ and Hartzell⁶ called pyogenic granuloma or granuloma pyogenicum. PG is also known as: eruptive haemangioma, granulation tissue - type haemangioma, granuloma gravidarum, lobular capillary haemangioma, pregnancy tumour or tumour of pregnancy. It is located on the skin and mucous membrane, especially on the lips, gums, cheeks and tongue. Often singular but sometimes multiple. PG develops most frequently from an ulcerations, trauma, small wound, chronic irritation or rough patches following dental care¹⁻⁴. The etiology for lesion by local irritation, chronic irritation, minor trauma, hormonal factors, drugs and hormonal imbalance⁷. It is difficult to diagnose or confused with parulis, fibroma, peripheral gaint cell granuloma, peripheral fibroma, peripheral ossifying fibroma, leiomyoma, hemangioendothelioma, hemangiopericytoma, kaposi's sarcoma, pregnancy tumour and post-extraction granuloma. Final diagnosis of pyogenic granuloma made only after by histo-pathological investigation. Management of pyogenic granuloma is surgical excision, curettage of the root surface^{8,9}. This case report shows a pyogenic granuloma in a female patient along with histological findings and management.

CASE REPORT

A 44 years old female patient presented with a chief complaint of growth of gingiva on left tooth region. The lesion was of negligible size when the patient first noticed it 6 months ago. There was a gradual increase in size causing discomfort while brushing and closing her lips. She had stopped brushing the area due to bleeding from the area. The patient was unaware of any initial trauma to site of the lesion .Her past medical history was non-contributory and her extra oral examination did not reveal any abnormalities.

Clinical examination revealed an exophytic, red pedunculated lesion measuring approximately 1.5*1.5 cm in size, having a smooth lobulated surface situated on left maxilla below the line of occlu-

sion in relation to 11-12 region (figure 1). The lesion was firm in consistency, non-tender, noncompressible, and no pulsation were seen. It appeared ovoid in shape. There were bleeding points on the lesion and the lesion was easily bleeding on touch. Oral hygiene was poor and the mouth showed large amount of calculus.

Hemogram of the patient was within the normal limits. The patient did not have any systemic problems, so the case was prepared for surgery on the basis of clinical evidence. Oral prophylaxis was completed and the lesion was excised under aseptic conditions. Excision of the lesion up to and including the mucoperiosteum was carried out under local anaesthesia using a scalpel and blade followed by curettage (figure 2). The excised tissue was sent to the









Fig.5

proliferating blood vessels .Endothelial cell proliferating is seen. Fibrinous exudate is seen in focal areas. Chronic inflammatory cell infiltrate is also evident in the connective tissue stroma. The above histopathology features are suggestive of pyogenic granuloma (figure 5).

DISCUSSION

Pyogenic granuloma is an inflammatory response that follows chronic irritation (poor oral hygiene, calculus/plaque, excessive restoration etc.) Trauma or a hormonal change in pregnant women^{1,10}. As etilogy in our cases includes calculus. Ainemo11et al discovered that recurrent trauma causes release of various endogeneous and angiogenic which contributes and increase vascularity of the lesion.

The gingiva is most common site mainly the maxillary gingiva more than mandibular gingiva. The typical growth of the site involvement is the interdental papilla and increase in size to cover a portion of the adjacent teeth. It is rarely located on the hard palate .the gingival location represents more than 75% of reported cases, with a predilection to the interdental papilla $region^{6,12,13}$.

Clinically pyogenic granuloma often presents as a painless, pedunculated or sessile asymptomatic mass with a smooth or lobulated surface, soft in consistency, red to purple in colour that bleeds at the slightest touch. The lesion may ulcerate and he cov-





department of oral pathology for histologic examination (figure 3). Periodontal dressing was placed and the patient was recalled after 1 week for removal of pack and review. The progression was favourable, with no recurrence after 8 months (figure 4).

Microscopic Apperance

Haematoxylin - eosin - stained section shows stratified squamous parakeratinized epithelium that is proliferating in to the underlying connective tissue stroma. Epithelium is ulcerated in focal areas. Connective tissue stroma is loose with numerous

ered with a fibrinopurulent layer. The size varies from a few millimetres to a few centimeters^{7,12,14}.

Pyogenic granuloma occur in all ages but predominant in the second decade of life in young adult female, possibly because of vascular effects of female hormone. Incidence is increased in pregnancy which is related to be increased level of estrogen and progesterone^{14,15}. The prevalence of pyogenic granuloma in pregnant women varies between 5% and 8% .it is most commonly seen after the first trimester of pregnancy and is considered a hormone dependent lesion. Most pyogenic granulomas occurring during pregnancy will decrease after delivery^{1,16}. Treatment during pregnancy is recommended in the second trimester, with ongoing checks after delivery³.

The line of treatment recommended is excision and biopsy of the lesion¹⁷. Conservative surgical excision of the lesion is removal of irritants such as plaque, calculus. Excision of the gingival lesions up to the periosteum with through scaling and root planning of adjacent teeth to remove all sources of irritation¹³. Various other treatment modalities are, the use of Nd: YAGlaser, carbondioxide laser, flash lamp pulse dye laser, cryosurgery, electrodessication, sodium tetradecylsulphates clerotherapy¹⁵.

Through follow up, especially in pyogenic granuloma of the gingiva cases is needed because of its higher recurrence rate Vilmann, et al14our case was followed up for a period of 1 year with sequent intervals and no recurrence was observed.

CONCLUSION

PG is a benign lesion of the skin and mucous membrane. The case report shows that pyogenic granuloma can be nicely treated with the correct diagnosis and proper treatment planning and follow up of the lesion.

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CASE REPORT NEUTRAL ZONE APPROACH TO A BALANCED DENTURE FABRICATION

ABSTRACT

Dentures fabricated using neutral zone technique is considered a better treatment option in subjects with enhanced muscle activity. The neutral-zone technique is based upon the concept that there exists a potential space where forces of the musculature are neutralised and the forces exerted by the tongue and cheek will not displace denture but rather will improve the retention and stability. The technique of balanced denture in neutral zone is not widely practiced due to lack of knowledge and complex procedure involved. This article discusses fabrication of balanced denture using neutral zone technique in a simplified way for day today practice, for stable denture with increased chewing efficiency.

Keywords: Neutral zone, addition silicone, balanced occlusion.

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INTRODUCTION

The role of a dentist for the restoration of lost teeth is still challenging as it demands a denture that functions comfortably and efficiently in harmonious with the musculature of the stomatognathic system with same masticatory efficiency as natural dentition. Selection of occlusal scheme in completely edentulous case depends on the aesthetic concern, maxillomandibular relation, ridge resorption, neuromuscular activity, presense of displacive tissue. A balanced articulation is most appropriate due to contacts observed during parafunctional movements for improved stability of denture. Neutral zone is described as that potential space in which the forces between the musculature including tongue and cheeks or lips are neutralized or equal¹. Different types of material are used to record neutral zone like tissue conditioners², Impression compound³, Waxes⁴, Impression plaster⁵. This article discusses addition silicone as the material of choice for recording neutral zone. Earlier the neutral-zone technique approach to complete denture procedure fabrication was as followed, on the primary cast customised trays are constructed. The trays are adjusted in the mouth so that they are not overextended and should remain stable during mouth opening, speaking and swallowing. Thereafter occlusion rims are fabricated using modeling compound. These occlusal rims made of impression compound are molded by muscle function to locate the patient's neutral zone. Then the tentative vertical jaw relation and horizontal jaw relation is established. Once the tentative relation is done, final impression is recorded with a closed mouth procedure. The vertical dimension and centric relation are determined in compounded rims where there was lacking predictability of esthetics, retention and jaw relation.

CASE HISTORY

In this case report, a new neutral zone approach is combined to produce a balanced dentures which is more stable and esthetically pleasing. A 70 years old female patient came with the chief complaint of loose mandibular complete denture. Intra oral examination revealed well round completely edentulous maxillary and mandibular arch, prominent mentalis and buccinator muscle which on activation led to shortening of labial and buccal vestibule. The muscle attachments were close to the ridge crest. Therefore neutral zone technique to fabricate the denture in accordance with the surrounding musculature. As the patient desired for more efficient chewing denture with improved aesthetics decision was made to provide denture with balanced occlusion.

Stages in neutral zone technique were as followed

- Maxillary and mandibular denture preliminary impressions are recorded using impression compound. (DPI PINNACLE, Mumbai Burmah Trading Company, Mumbai).
- Border molding and then the final impression of the custom resin tray was recorded with putty and light body of addition silicone impression material (Coltex, Coltene, Alstätten, Switzerland).
- 3. Jaw relations were recorded using modelling wax (HIFLEX- Modelling Wax). Then Vertical dimension and centric relation were established.
- 4. Face bow transfer is carried out (Fig 1) and mandibular cast was articulated in semi adjustable



Fig 1. Facebow transfer



Fig 2. Extraoral tracing

articulator (Hanau Wide-vue). Extraoral tracing (Fig 2) was performed to verify mandibular movements in horizontal plane. Articulator was programmed.

- 5. Anterior teeth were set for upper denture. Wax try- in of upper anteriors were performed.
- 6. To determine the neutral zone occlusion rims were made with addition silicone putty elastomer (Aquasil, putty/Regular set, Dentsply DE TREY, Germany). For holding addition silicone on the special tray retentive loops are given with stainless steel wire. A pillar of wax block was kept in the posterior part to maintain vertical dimension. (Fig 3) Adhesive agent was applied. Addition silicone was loaded over the denture base and inserted in the patient mouth. Then the patient was asked to perform all kind of muscle functions like swallowing and sucking movement and to make exaggerated 'OOO' and 'EEE' sounds (Fig 4 & 5). Patient was instructed to pucker the lips forward and smile broadly. Indexing was made on the side and center of the land area of cast to make matrices. Using plaster index, the buccal or the facial matrices and the lingual matrices of this denture space was recorded. Once the plaster matrices gets set it is removed from the cast. Addition silicone material was removed from the base and was replaced with modelling wax using plaster matrices. These plaster index are used to set the teeth (Fig 6). Then using conventional methods



Fig 3. Mandibular denture base with retentive loops and two vertical pillars of wax.



Fig 4. Neutralzone recording with addition silicone.



Fig 5. Recorded neutralzone in the cast.



Fig 6. Teeth setting completed with plaster index



Fig 7. Intraoral view of denture

Flasking, processing, finishing and final polishing of denture was done (Fig 7). Selective grinding was performed to remove any interference.

DISCUSSION

The ultimate purpose of restorative treatment is to revive the aesthetics and masticatory efficiency of the subjects. Dentures are involved in normal physiologic movements like mastication, smiling, swallowing, speech, and swallowing. Denture should be in harmonious with these functions as physiologically unacceptable denture causes poor stability, retention, insufficient tissue support, less tongue space and compromised phonetics⁷. Denture fabricated using neutral zone impression technique will ensure, the musculature help in retention and stabilization of the denture instead of dislodging the denture during function^{8,9}. These dentures have other advantages like good aesthetics because of facial support, proper positioning of the teeth in the denture which allows enough tongue space and reduced food lodgement beneath the denture¹⁰.Clinicians must locate and record the functional dynamics of the oral tissues and definitive prosthesis should exist within the stabilizing boundary of the neutral zone.

On an average, a normal individual makes masticatory tooth contact only for 17 minutes in one full day compared to 4 hours of total tooth contacts during other functions. Balanced occlusion is necessary for these 4 hr of tooth contact to maintain denture stability¹¹. Bilateral occlusal balance provides an equilibrium on both side of denture due to simultaneous contact of teeth in centric and eccentric contacts. Minimum of three contacts are required, the more the contacts the more assured the balance. This article presented a simplified approach for recording neutral zone using addition silicone impression material. The border molding, jaw relation and neutral zone recording were carried out in separate stages not clubbing with neutral zone resulting in accuracy in each step. However the number of patient visits to the dentist for denture fabrication doesn't differ from conventional fabrication. Balanced occlusion provides a definitive teeth arrangement of teeth contact in harmony with mandibular movement¹². Arrangement of modified anatomic teeth with face bow transfer, horizontal condylar guidance and anterior guidance, every individual can be provided with customised denture with the highest level of satisfaction.

CONCLUSION

The neutral zone impression technique can be incorporated into fabrication of balanced complete denture for superior stability both under centric and eccentric mandibular movements.

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CASE REPORT SURGICAL MANAGEMENT OF RANULA : A CASE REPORT

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ABSTRACT

Ranula is a retention cyst of the sublingual gland, which enlarges progressively and extends into the surrounding soft tissues1. We report a case of oral ranula involving the floor of mouth treated successfully by surgical excision following detailed clinical examination, radio-logical interpretation and histopathological diagnosis. The patient was followed up on a regular basis and was disease free.

Keywords: Ranula, Sublingual gland, pesudocyst.

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INTRODUCTION

Ranula refers to a collection of extra-glandular and extraductal saliva in the floor of the mouth originating from the sublingual salivary gland. It may rarely originate from injury to the submandibular gland (SMG) duct². It is a pseudocyst, as it does not contain an epithelial lining. It classically presents as a soft submucosal swelling in the floor of the mouth . The term ranula originates from the Latin word for frog (rana) as the cyst is said to look like the underbelly of a frog.

Ranula was first described by Hippocrates. Clinically ranula is of three types. Most common of which is the "Sublingual ranula" which presents as an intraoral sublingual swelling. The second commonest is the "Plunging ranula" which is located cervically and extend beyond mylohyoid muscle, and those having both cervical and oral component is known as "sublingual plunging ranula"³. It has an unknown etiology but it may be seen in association with congenital anomalies, trauma, and disease of sublingual gland⁴. An intra oral radiograph was taken to rule out any bony involvement with the lesion. The mucosa is incised over the ranula taking care not to enter the sac. A submucosal dissection plane is established over the wall of the ranula. Using sharp and blunt dissection, the cyst is excised, taking care not to injure the submandibular duct or the lingual nerve(fig 3). A portion of sublingual salivary gland was excised to avoid the chances of recurrences (fig 2). After proper irrigation the wound was sutured (fig 4). The patient was kept on periodic follow up and the wound healed uneventfully (fig 5).

INTRA - OPERATIVE PHOTOS



Fig 2

CASE REPORT

A 30 year old male patient reported to a private dental clinic at Kodaly, Thrissur, with a chief complaint of swelling in relation to right floor of the mouth with a history of two weeks duration. On clinical examination, intraorally there was a 2.5cm *2.5 cm swelling in relation to right floor of the mouth. The swelling had smooth and regular margins and was non tender on palpation (fig1).











Fig 4





The specimen was sent for histopathological examination and the lesion was reported as Ranula.

DISCUSSION

Ranula appears as tense, dome-shaped vesicle, which is fluctuant and characterized by size larger than 2 cm and sometimes may present with a bluish hue. It accounts for around 6% of oral sialocysts and its prevalence is around 0.2 cases of 1000. Out of all the cases diagnosed as ranula only 1 - 10% are truly retention cysts⁵. The peak age of occurrence of ranula is second decade and normally found in children and also young adults.

Two theories have been proposed regarding the development of ranula. According to the first theory it develops as a consequence of mucus extravasation, whereas the second theory proposes mucus retention, both due to rupture or damage of a duct of salivary gland6. But the current review and opinions support mucus extravasation secondary to developmental factor as ranula are devoid of lining epithelium.

Sometimes ranula may mimic some benign and malignant lesions, so the clinical diagnosis of ranula is very important. The differential diagnosis of all the clinical types of ranula includes inflammatory, neoplastic lesions of major salivary glands except the parotid gland, of the lymph nodes, granulomatous diseases, diseases of the adipose tissue, thyroglossal duct cysts, cystic hygroma, dermoid, epidermoid cysts and laryngocele⁷.

No specific diagnostic tests are there for ranula. At times it present as a cystic fluctuant lesion, which gradually increases in size with time. The fluid contents of ranula are composed of salivary amylase and protein in higher contents when compared to serum. This indicated that ranula originates from sublingual gland as it produces highly protein saliva in contrast to submandibular gland.

Histopathologically, ranula consists of a central cystic space, which contains mucin and a pseudocyst wall and is composed of loose and vascularized connective tissues. Predominantly there is presence of histocytes within the pseudocyst wall, which decrease in number over a period of time⁸. There is absence of epithelial tissues in the wall of ranula. A histopathological examination of the cystic wall is mandatory, to rule out the presence of malignant carcinoma arising from the cyst wall and papillary cystadenocarcinoma of the sublingual gland, which may mimic ranula.

There are several different methods for the treatment of ranula. These include excision of the lesion via an intraoral or cervical approach, marsupialisation, intra oral excision of the sublingual gland and drainage and excision along with sublingual gland⁹.

The recurrence rate with the various treatments was 100% in cases of incision and drainage, 61% in cases of simple marsupialization, and 0% in the case of Enucleation of the ranula with or without sublingual gland excision Surgical excision is best treatment for ranula¹⁰.

CONCLUSION

This case report suggested that a combined clinical, radiographic and perioperative findings play an important role for selection of different surgical procedures in the management of ranula. No morbidity, no recurrence and good patient tolerance was noted for this procedure. We concluded that partial sublingual glandectomy with excision of the ranula is a good conservative treatment option for the management of simple intra oral sublingual ranula.

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