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CELEBRATING 12th ANNIVERSARY 2010-2022

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Editorial

From The Desk of Guest Editor....

Rubber Dam Isolation- A Boon To Dentists in Infection Control

The COVID- 19 pandemic forced the world to view infection control in a different light all together. Be it food industry, hospitality industry, personal home care or providing dental treatment to the patients, everyone had to review and re-access whether the infection control protocols being followed in their work zones were sufficient or not to be safe and keep others safe. Due to the high speed and magnitude of transmission of the novel coronavirus disease, our profession investigated and came up with guidelines to improve the infection control procedures. Products and gadgets ranging from HEPA filters to surface disinfectants, foggers to name a few, have been recommended by various dental associations and bodies across the globe, for better infection control in our practices.

A simple & efficient tool like rubber dam isolation, which is existing in the dental field since 1864, is a great isolation technique which is very helpful in infection control during dental procedures. It was first described by Dr. Barnum over 150 years ago, the rubber dam ought to have its place definitely within our restorative and endodontic armamentarium now more than ever before.

There have been studies conducted on simulated patients and the preliminary results suggest that isolation and high-volume suction are effective to reduce ultrafine dental aerosol particles.

But along with good infection control, which a rubber dam isolation provides with, it also has other benefits like the following-

1. Good moisture control, which is important in adhesive dentistry,
2. Retraction and protection of soft tissues.
3. Prevention of inhalation and ingestion of foreign bodies- thus making it a great safety tool during dental procedures.
4. Improvement of access and visibility by eliminating tongue, cheeks and saliva from the operating field.

Some dentists across the globe have been skeptical of using this technique, anticipating it to be cumbersome. But it has gained popularity since past few years much more than earlier decades.

Now with the ongoing COVID-19 pandemic, our fellow colleagues have shown more acceptance to this form of isolation for better safety of patients and the dental team. But it is also a fact that, along with infection control, a rubber dam provides us with many other benefits while performing various dental treatment procedures.

Also, in my experience, I have observed that every procedure has a learning curve and so does this technique of isolation. With some basic training and practice, usually this technique on a patient requires couple of minutes only. So, incorporating rubber dam in our dental practice is a great step from the point of view of asepsis, as well as for getting many other benefits while performing a dental procedure.

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CASE REPORT ARTICLE

Root Canal Treatment of Radix Entomolaris Mandibular First Molar in a Geriatric Patient - A Case Report

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Introduction

The target of an endodontic treatment, is to prevent and intercept pulpal / periradicular pathosis, to conserve a tooth affected by pathosis and to prevent recontamination after the treatment. In order to do so, a sound knowledge of basic root and root canal morphology as well as possible variation in anatomy of the root canal system is important in doing a successful root canal treatment. Careful radiographic examination and thorough clinical exploration of the tooth being treated is important in order to negotiate all the canals during an endodontic treatment.

Mandibular molars sometimes present a variation called radix entomolaris, with the tooth having an extra root attached to its lingual aspect. This third lingual root, first mentioned in the literature by Carabelli [1], is called the radix entomolaris (RE).

So, understanding the presence of this root and the angulation of the root canal, plays a vital role in endodontic management of the tooth.

This case report describes the successful diagnosis and treatment of mandibular first molar of left side, (that is tooth number 36) with a separate distal root.

Case Report

A 78-year-old female patient reported to our hospital with severe pain and tenderness in mandibular left posterior region for 15 days. On clinical examination, deep caries was observed in tooth number 36 and proximal caries was observed in 35 and 37 as well. Radiographic examination confirmed that caries was approaching pulp in 36 which showed severe tenderness to percussion.

So, RCT was planned for 36 followed by which rct of 35 and restoration of 37 would be done.

Radiographic evaluation revealed the following-

1. Deep mesiodistal proximal decay in 36 involving pulp.
2. Angulated radiograph showed the presence of an extra distal root on the lingual aspect, confirming that it's a radix ento molar is tooth.

The tooth was isolated using rubber dam isolation and caries was excavated completely.

Access prep was done and pre-endodontic build up was done using liquid dam material. Proper tactile examination and detailed study of the preoperative radiograph proved to be helpful. 4 canals were negotiated using 8K and 10K files.

Shaping Protocol

Coronal flaring was done using One flare file (Micromega, France).

10k file was used to instrument the canal till in became loose in all the canals.

Glide path preparation was done with the help of One G file (Micromega, France).

Shaping of the canals was done with 2 shape files (Micromega, France).

Irrigation Protocol

Throughout shaping, 5.25% sodium hypochlorite was used after each file. Side vented 30 gauge needles were used for irrigation.

After shaping, the following protocol in each canal, was used for irrigation and activation of irrigants-

1). 17% EDTA – 1 ml per canal – ultrasonic activation with endoultra (vista).
2). Normal saline used to flush the canals.
3). 5.25 % sodium hypochlorite –ultrasonic activation. (4 such cycles repeated per canal)
4). Normal saline.

Obturation Protocol

Canals were dried with paper points. Cone fit intra oral radiograph was made.

Canals were obturated with bio ceramic sealer – Ceraseal (meta-biomed) along with single cone. A lateral canal got filled up in relation with the distal canal which was observed on post-operative radiograph.

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Post Endodontic Restoration

Core build up was done using heated composite.

Since there was a huge loss of tooth structure and we wanted to conserve the buccal & lingual tooth structure, an overlay was designed and bonded.

Figure 1. Pre-Operative

Figure 2. Caries Excavated, Isolation Done. Pre Endo Build Up Done with Liquid Dam.

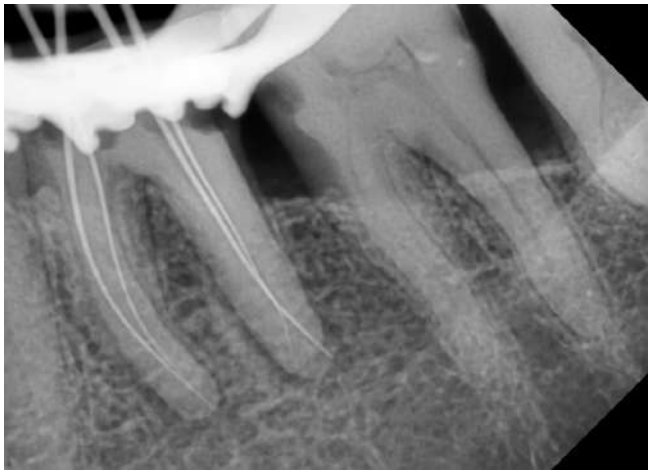

Figure 3. Working Length

4. Cone Fit

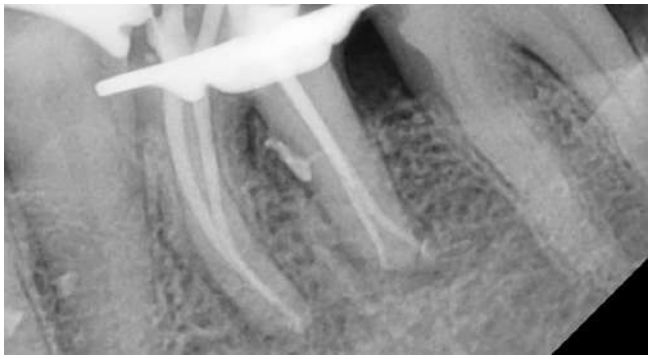

Figure 5. Obturation in Progress

Figure 6. Overlay

Figure 7. Overlay Bonded.

Discussion

A sound knowledge of root canal anatomy and its variations is important for satisfactory management of a tooth endodontically.

RE (Radix Entomolaris), can be classified into four different types depending on the location of its cervical part [2].

(I) Type A: The RE is located lingually to the distal root complex which has two cone-shaped macro structures.

(II)Type B: The RE is located lingually to the distal root complex which has one cone-shaped macro structures.

(III) Type C: The RE is located lingually to the mesial root complex.

(IV)Type AC: The RE is located lingually between the mesial and distal root complexes.

Angulated radiographs also play an important role in deciphering a lot of details about the canal anatomy. A good angulated pre-operative radiograph serves to be very helpful in endodontic treatment of such teeth.

Using magnification and good source of illumination helps in treating such teeth in a conservative manner, because of better visibility.

Irrigation plays a crucial role in proper cleaning of the root canal system. Thus, it's important to understand the actions of various irrigating solutions and their role in proper disinfection of canal systems.

Conclusion

Awareness of the variations related to configuration of canals and types in mandibular molars is important for a clinician. Tactile examination under magnification serves to be really helpful in locating a canal and being as conservative as possible during an endodontic treatment. A good quality pre-operative radiograph is of high value during the root canal treatment.

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REVIEW ARTICLE

Current Techniques in Interdental Papilla Augmentation: A Review

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Introduction

Black triangles linked with papilla defects have shown to be a notably displeasing aesthetic element for patients. It is the element of gingiva which resides between the proximal surfaces of the teeth, engaging the span created by the cervical embrasure as it packs the lingual, buccal, and occlusal space of the interdental space, emerging as a pyramid in shape. Title "pink triangle" has been given, due to its clinical appearance. Causes owing to numerous general and local aspects such as; periodontal disease, the culmination of the height of alveolar bone relative to the interproximal contact, length of embrasure area, root angulations, tooth loss, unsound oral hygiene procedures, interproximal contact position, and triangular-shaped crowns.

In perio-plastic procedures, papilla reconstruction or its augmentation is the utmost aesthetically challenging procedure.

Classification of Interdental Papilla

The classification put forth by Nordland and Tarnow in 1998 is in regards to the height of the papilla skirting the natural teeth, based on three anatomical landmarks- The interdental contact point, the apical extent of the facial cementoenamel junction (CEJ), and the coronal extent of the proximal CEJ.[(1)]

- **Normal:** Interdental papilla fills the entire embrasure space apical to the interdental contact point/area.
- **Class I:** Tip of the interdental papilla is located between the interdental contact point and the level of the CEJ on the proximal surface of the tooth.
- **Class II:** Tip of the interdental papilla is located at or apical to the level of the CEJ on the proximal surface of the tooth but coronal to the level of CEJ mid-buccally.
- **Class III:** Tip of interdental papilla lies level with or apical to facial CEJ.

Nemcovsky introduced a classification system as a papillae index score (PIS) based on a comparison with adjacent teeth:[(2)]

PIS 0: Papilla not present and no curvature of the soft tissue contour.

PIS 1: Present papillae height less than half the height of the papilla in the proximal teeth and a convex curvature of the soft tissue contour.

PIS 2: Presence of at least half the height of the papilla in the proximal teeth, but not in complete harmony with the interdental papilla of the proximal teeth.

PIS 3: Papillae able to fill the interproximal embrasure to the same level as in the proximal teeth and in complete harmony with the adjacent papillae.

The Papilla Presence Index (PPI)

A New System to Assess Interproximal Papillary Levels – proposed by Cardropoli et al. (2004) [(3)]

- **PPI score 1** - Papilla completely present
- **PPI score 2 -** Apical to contact point
- **PPI score 3 -** Apical and CEJ visible
- **PPI score 4 -** Apical to both CEJ

The prime focus of periodontal therapy is 'prevention of progression of periodontal disease and associated trauma by regeneration of the lost periodontal tissues. Lately, a respective number of surgical techniques have been continually proposed and investigated, being invasive and unpredictable, in most cases. Furthermore, the success rate of surgical augmentation of papilla depends on the thickness of the gingiva biotype.[(4)(5)(6)]

Factors that Determine the Presence or Absence of Interdental Papilla:

The presence or absence of interdental papilla can be attributed to multiple factors. These factors are composed of tooth alignment correction with the help of orthodontic treatment, periodontal ligament loss leading to gingival recession, interproximal loss of bone contour concerning interproximal contact areas, root angulations, and presence of prostheses. Ongoing microbial activity in the periodontium is closely linked with interdental papilla loss. Increased plaque retention, inflammatory reactions, and gingival recession is noticed in periodontal pockets with a probing depth of more than 3mm. Continued alveolar crest resorption accelerates gradual increase in the distance amidst the contact point and the alveolar bone crest leading to a compromised interdental papilla.

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Factors influencing the presence of interdental papilla are:

Underlying osseous architecture

The underlying bone and its architecture give rise to the shape and form of interdental papilla. In general, the positive architecture of osseous crest, observes the shape towards the cemento-enamel junctions, with interproximal bone being often positioned coronal to the radicular bone; is most commonly associated with interdental papilla. The distance of the contact point to the alveolar crest is considered to be a key factor for ascertaining the shape and form of the papilla. According to Tarnow et al (1992) when the distance from the contact point to the alveolar crest was less than or equal to 5mm, the papilla was present 98% of the time, while at 6mm it dropped to 56% and at 7mm it was present only 27% of the times.[7]

Distance between root surfaces

The appearance of interdental pink triangle is also dominated by the distance between root surfaces. In a study by Tal et al, they analysed the roots with interproximal between them and the generality of infra-bony defects. Thus, the distance between roots was comparatively more or equal to 3.1mm when, two distinct infra-bony defects were noted. In conclusion, a minimal of 3mm distance in the interdental area may be necessary for prolonging the papilla.[8]

Periodontal biotype

The morphological forms of interdental papilla and osseous architecture are considered to be thin or thick that is termed as periodontal biotype. It has been observed that a thick biotype is better as compared to a thin biotype due to the presence of interdental papilla. Thin biotype is composed of a frail periodontium that is favourable to recession. However, a thick biotype is considered fibrotic and resilient, imparting resistance towards surgical procedures along with a propensity of pocket development. The interdental gingival tissue harbours biological tissue memory, which in turn, under favourable situations allows the papilla to bounce back to its previous shape and form. The thick biotype has a higher predisposition for the rebound of gingival tissue as compared to the thin biotype.[9]

Periodontal bioforms:

The basic morphologies of the periodontal bioform are mainly of three types, described as; high, normal, and flat. The underlying bone architecture is determined by this gingival scallop morphologies. For instance, in a shallow gingival scallop, the interproximal bone is thin, and the interproximal gingival contour is practically parallel to the underlying bone profile. A flat scallop is preferable to a high scallop for pleasing aesthetics. The reason behind it is that, in a flat scallop, the bone has a congruous relationship with the free gingival margin and is less vulnerable to post-surgical recession. The high scallop has an extensive underlying interproximal bone, however; the disparity between the bone contour and free gingival margins may hamper the aesthetics due to the emergence of black triangles.

Contact points:

The form and shape of the interdental papilla are determined by the contact point pertaining to anterior maxillary teeth and the respective distance from the crest of the interproximal bone. Tarnow et al (1992), In a landmark study, described the '5mm rule'.[7] The rule asserts that if there is less or equal to 5 mm distance from the contact point between the teeth to the interproximal osseous crest, it will be accompanied by the complete fill of gingival embrasures with the respective interdental papilla. For every 1 mm above 5mm, the likelihood of complete fill gets decreased by 50%. In case of square-shaped teeth which are composed of wide contact points, the probability of black triangles; are negligible in comparison to triangular teeth composed of narrow, more incisively disposed contact points.

Crown morphology:

The crown's shape constitutes to be an essential factor in determining the form and shape of the papilla. The principal crown forms being: circular, square, and triangular. While a square crown provides finer interdental papilla preservation which can be imparted to its comparatively wider contact and a shorter interproximal distance from the crest of the bone to the point of contact, the triangular crown form provides a conspicuous gingival scallop and a thinner crestal bone. Hence, a triangular crown makes its corresponding interdental papilla prone to recession.

Single crown Esthetics:

To evaluate clinically the extent of recession and papillae regeneration pertaining to solitary implant restorations, Jemt et al (1997) introduced an index with the help of a clinical and photographic examination. The assessment measured from a line through the highest gingival curvatures of the crown restoration on the buccal side and the adjacent permanent tooth.[10]

Score 0: Papilla is absent, and no curvature of the soft-tissue contour adjacent to single implant restoration.

Score 1: Papilla is present but less than half of the height. A convex curvature of the soft-tissue contour adjacent to the single implant crown and the adjacent tooth is observed.

Score 2: At least half of the height of papilla is present. Acceptable soft-tissue contour, in harmony with adjacent teeth.

Score 3: The papilla fills up the entire proximal space. Optimal soft-tissue contour

Score 4: The papilla is hyperplastic. The soft-tissue contour is not regular.

As stated by Eugenio Romeo et al, the integrated approach of surgical and prosthetic plans represents the key factor to optimise predictability in single-implant aesthetics. The recommended interproximal distance between the implant and the adjacent tooth is 2.5 to 4 mm. The distance from the contact point to the interdental bone is recommended to be <7 mm. Papilla presence is also correlated with a thick gingival biotype.[11]

Vincent Choquet et al., demonstrated the influence of the bone crest on the presence or absence of papillae between implants and adjacent teeth. The data also showed a positive

influence for the modified surgical technique, aimed at reconstructing papillae at the implant uncovering.[12]

From the systematic review performed by Mario Roccuzzo et al. There is limited evidence that the vertical distance from the base of the interproximal contact point to the crestal bone level, at single implant adjacent to teeth, seems to affect the interproximal papilla height. As a general trend, the lower is the distance the higher is the percentage of papilla fill, even though it is not possible to set up a threshold value correlated with the complete presence of the papilla. Complete embrasure fill between an implant restoration and the adjacent tooth seems to be related to the integrity of the periodontal ligament, as assessed by the radiographic bone levels in the studies included in the review.[13]

Treatment Approach

Non-surgical

To prevent surgical intervention numerous Non-surgical propositions have been inculcated to encompass correction of traumatic oral hygiene procedures while providing oral hygiene instructions, restorative techniques, orthodontic movement, repeated scrapping of the papilla, and tissue volumizer.

Surgical

Papilla recontours and papilla reconstruction are the primary constituents of the surgical approach.

Recent Treatment Approaches

Tissue Volumizer: As observed in the extant approaches, tissue volumizers have been instituted in the non-surgical approach along with the minimally invasive surgical procedures.

Autologous Fibroblast injection: A randomised controll - ed trial by McGuire and Scheyer in 2007, set out to use autologous fibroblast injection conservatively a minimally invasive papilla priming procedure to aid in the augmentation of interdental papilla space. Achieving statistically significant results when compared to the placebo. Hence, inferred that using cell transplantation of autologous cultured and expanded fibroblasts with a papilla priming procedure is suggestive of a successful management approach for treating papillary insufficiency.[14]

Keep in mind that this procedure is composed of an extensive surgical step considering the tissue is taken from keratinized tissue of the maxillary tuberosity which is harvested with a 3-mm punch biopsy instrument.

Hyaluronic Acid as Tissue Volumizer: The hyaluronic acid derivative has been another major tissue filler in recent research and development.

HA derivatives are biodegradable fillers compromising of natural glycosaminoglycan known as HA which occurs in human skin.

A case series in 2019, aimed to advance a cosmetically enhanced surgery to reconstruct lost interdental papillae with the help of hyaluronic acid (HA) dermal filler. The cross-linked HA gel used by them was derived from Streptococcus species fermentation. In the case series, three female patients were treated for four interdental papilla defects. The surgery initiated with a horizontal incision which was placed apically to the area of papillary loss in the alveolar mucosa just beyond the mucogingival junction which was followed by an interdental subperiosteal tissue space which created by tunnelling towards and under the dental papilla, the tunnel was then filled by dermal filler beneath the papillary defect. Cyanoacrylate and additional dermal filler was injected as needed to achieve ideal papillary fill and sealing of the papillary margins. Post six months there was an improvement in patient's satisfaction with the papilla fill demonstrated by a mean increase in visual analog scale (VAS) measurements of 62.46%. Mean papilla fill was 1.75 mm.[15]

When HA is "merely" injected into deficient papillae, a randomised controlled trial demonstrated no significant changes in papilla fill as compared to control (saline) injections.Detaching the gingiva by tunnelling, as was done in our technique, imparts a subperiosteal space that provides for mobilisation of the papilla prior to the injection. Older studies have banked on the potential of HA to absorb water overtime with the use of up to five separate injections in order to procure a meaningful papilla expansion.[16],[17],[18]

I-PRF as Tissue Volumizer: I-PRF has shown to be a potent inducer of cell proliferation, migration and angiogenesis, inducer of higher fibroblast migration and expression of PDGF, TGF-β, and collagen, thereby playing a vital role in tissue regeneration.[19] In 2021, Chandramohan et al, conducted a pilot study to investigate the efficiency of i-PRF in achieving interdental papillary enhancement as development of a non-invasive papilla enhancement technique. Results at the first follow up (3 weeks after the injection) showed a 10-20% papillary enhancement with a mean of 13.38± 3.07%. In the second follow up (three months later) a 15-63% enhancement with a mean of 29.52± 18.72% was seen, and at the third follow up (6 months after the injection) a 33-69% enhancement with a mean of 47.33± 20.20% were noted.[20]

Prosthetic treatment as a non-invasive approach

Silicone gingival veneer: The gingival veneers are easily constructed, inexpensive, and practical devices to optimise the aesthetic and functional outcome and where patients do not need to undergo second surgical procedure for recession coverage of denuded roots and black triangles. As demonstrated in the case series conducted by Dr Priya Vijay Thakkar et al, acrylic gingival veneer has been used successfully and after repeated follow-up, the veneers did not produce any problems indicating that such prostheses can be made, can be used use of effectively whenever indicated.(21)

Another case report by El GhoulbzouriHouda et al (March, 2018) presents interest in gingival prosthesis especially in advanced periodontal disease among young patients with esthetic and functional requirements. Good esthetic results were achieved hereby, renewing the patient's self-confidence. Gingival veneers are easy to make, have light weight and are inexpensive. However, a good case selection with adequate oral hygiene is a key factor in the success of this conservative approach.[22]

Minimal Invasive Surgical Techniques

In recent development of surgical treatment, microsurgical techniques have been developed for a minimal invasive treatment approach.

Although many conservative surgical techniques were introduced in the late 90s like papilla preservation technique introduced long back in 1995 by Cortellini et al, and in 1996, Han and Takei described the application of a facial approach with the help of a semilunar incision to harness access towards papillary area for its augmentation in the last decade, more conservative treatments have been evolved especially to keep a check on the vascular supply.[23][24]

A case series of microsurgical techniques for interdental papilla augmentation described a microsurgical procedure for positioning donor tissue underneath a deficient interdental papilla. The surgery is devoid of releasing incisions hence, increasing the chances of donor tissue survival along with minimal tissue trauma, bleeding, scarring, and pain. This technique by Norland and Sandhu recently became popular.[25]

Procedure

To visualise the morphology of the entire interdental papilla area the surgical dissecting microscope is used. Using a microscalpel with blade width of 0.9 mm (Nordland Papillae N-6900 Micro-Scalpel, Sable Industries) a circumferential sulcular incision is made to the crest of the bone followed by a sulcular incision to the crestal bone, severing the marginal gingiva in the process. This incision extends around the adjacent teeth circumferentially.

The micro-scalpel blade modified to form a j-hook configuration to allow it to completely undermine the delicate papillary tissue. The minimal circumferential sulcular incision is given, followed by a split-thickness flap is raised. The customized blade allows any individual variations. Thus, another micro-scalpel is modified mimicking the precise buccal contours of the gingiva. As the incision extends past the mucogingival junction, mobility of the undermined tissue can be appreciated.

Three cases were discussed in Norland's paper. First, a patient who underwent orthodontic treatment pertaining to closure of embrasure space experienced incomplete movement of maxillary right central incisor due to ankyloses. Second, a patient who underwent four unsuccessful attempts at surgical repairs. Positive result was appreciated after 6 months of follow up. Third, a patient demonstrated with a papillary defect created by a surgical complication. There was a horizontal depression at that region. A surgical correction performed in one single stage was achieved. Subsequently, as normal tissue contours were appreciated, a new crown was placed. Uneventful healing was noted during the 3 years follow up.

In the same year, Francesco Cairo et al introduced fibre retention using papilla preservation technique using a microscope to treat infra-bony defects. The study aimed to describe microsurgical flap access for the treatment of periodontal pockets with infrabony defect conserving the aesthesis of the interdental papilla and preventing marginal gingiva loss. [26]

Tunnelling Technique

In 2018, Feuillet et al introduced tunnel approach to microsurgical technique reconstruction of interdental papilla, using a 4x magnifying loops and straight and curved microsurgical instruments (Deppeler) to create a mucoperiosteal tunnel on the buccal side without disrupting the papilla. The full thickness mucoperiosteal flap was extended laterally and apically around half of the adjacent teeth and beyond the mucogingival line to avoid any stress. On the palatal side, two vertical 7-10mm parallel release incisions were made halfway along the scalloped gingival margin, and a split-thickness dissection was performed through the incision. A 2 mm tunnelling instrument was then used to connect buccal and palatal created under the interdental papilla. Papillary mobility is essential for the formation of a recipient space under the papilla, the positioning of the CTG, and the coronal placement of papilla.[27]

In preparation of donor site, a distal wedge procedure is used to harvest a thick CTG. It is precisely contoured to the dimension of the expected papilla and partially split-lengthwise to create a T shape with two lateral wings and a main body.

Three stabilising sutures are then given to stabilise the custom made T shaped graft under the papilla. Out of the three patients, two patients achieved good results. The third patient was referred for intrabony defect with papilla loss. So the above treatment was done in the second phase to improve soft tissue profile. In this patient papilla regeneration was limited compared to the positive results of the first two patients.

Papilla Regeneration in Implant supported Units

Back in 1995 when several surgical techniques were being developed for regeneration of interdental papilla, Palacci et al had suggested elevation of a full-thickness flap from the buccal and palatal aspects of the ridge followed by rotating it to about 90-degrees filling the interproximal area adjacent to an implant.[28] Similar to Feuillet's tunnel technique, a surgical technique previously introduced by Stuart Froum et al was introduced in 2016, where they treated missing papilla in anterior maxilla, which were either between adjacent implants,or between an implant and an adjacent natural tooth, or between an implant and an adjacent pontic site. The treatment commenced as such: Any provisional restorations was removed followed by a full-thickness oblique incision made in the vestibule, apical to the deficient papilla. Followed by elevation of another full-thickness oblique incision on the palatal aspect.[29] The rationale behind oblique incisions was to preserve blood supply at the recipient site.[30] Then atranslingual curette is used to elevate the periosteum or flap, and to create a subperiosteal tunnel toward the crest of the alveolar ridge, coronal to the interproximal region. The same was then performed towards the palatal side, leading to formation of a tunnel between the buccal and lingual incisions. CTG was harvested from the palate, followed by closure using two 4/0 chromic gut sutures at the mesial and distal margins of the subepithelial connective tissue graft. So, ten consecutively treated cases from the implant connective tissue graft to ease the insertion and stabilisation of the graft over the defect.

Conclusion

The main objective of advancement of the known treatment is to reduce the invasiveness and develop a minimally invasive treatment approach which encourages the development of non-surgical modules. Hence, the extensive research on newer materials such as hyaluronic acid and iPRF. Similarly, the need to reduce the degree of invasiveness of surgical approach, brings about the development of conservative surgical techniques discussed in the article.

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CASE REPORT ARTICLE

Restoring the Lost Smile: A Case Report

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Abstract

When a deciduous tooth is lost early than its normal exfoliation time, the teeth next to the edentulous area tend to migrate into the space, leading to the loss of space needed for the normal alignment of the permanent erupting teeth in the arch, leading to overcrowding and other kinds of malocclusion.The most typical application of a space maintainer appliance is to preserve the area formed by the early loss of a primary molar while waiting for its successor permanent teeth to erupt.This paper will describe a case study using an interim fixed functional space maintainer appliance.

Keywords: - Space maintainer, Interim functional space maintainer, early tooth lost, full mouth rehabilitation.

Introduction

Primary teeth are essential for a child's growth and development. It also create spaces for the secondary successor teeth.[(1)] Primary teeth are also important for appearances, chewing, and pronunciation of speech, as well as promoting healthy development and maturation of jaw.[(2)] When a deciduous tooth is lost early than its normal exfoliation time, the teeth next to the edentulous area tend to migrate into the space, leading to the loss of space needed for the normal alignment of the permanent erupting teeth in the arch, leading to overcrowding and other kinds of malocclusion.[(3)] When an anterior primary tooth is exfoliated before its eruption timing, the teeth on both the side of the edentulous area seldom migrate into the gap. It also causes an unpleasant smile and difficulties and discomfort while biting, i.e. an impairment of function, resulting in a scenario that cannot be ignored.[(4)] The primary cause of early exfoliation of posterior teeth is dental caries.[(5)] Following the premature loss or extraction of a primary tooth or teeth, space maintainers appliances used to retain arch length. they may be fixed or removable appliance. Primary teeth that have been retained might function as space maintainer. The most typical application of a space maintainer appliance is to preserve the area formed by the early loss of a primary molar while waiting for its successor permanent teeth to erupt.[(6)] This paper will describe a case study using an interim fixed functional space maintainer appliance.

History

Fauchard was the first to utilise a horseshoe-shaped precious metal device called a "Bandeau" for arch expansion and tooth alignment.[(7)] Davenport et al., in 1880, highlighted the issue of space loss caused by early primary tooth exfoliation.[(6)] Angle, the founder of contemporary orthodontics, was credited with proposing the notion of artificially preserving the spaces created by the early loss of primary teeth in 1907.[(7)] Liu et al., in 1949, conducted the first known study that sought to estimate space were hampered by a lack of sequentially generated data and measuring method constraints.[(6)]

Purposes of Space Maintainer

The main purposes of space maintainer are as follows- It helps in maintaining the relative position of existing dentition to prevent loss of arch length, breadth, and perimeter. It is used to preserve the natural occlusal plane as well as anthropoid space. In certain circumstances, anterior space maintainers aid in phonetics, aesthetics, and posterior aids in mastication.[(7)]

A Case Study

A child 6 years old came to the department of Pediatric and Preventive dentistry with the chief complain of multiple carious teeth. The carious teeth were associated with pain in the maxillary left and right posterior region for the past 1 month. According to the history of present illness given by the patient, Pain started in the maxillary left and right posterior

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region.It was spontaneous, non-radiating which got aggravated while eating.Pain got relieved only after taking over the counter medication.

Intra oral examination revealed thatpatient was in mixed dentition stage with multiple grossly decayed teeth. **(Figure: 1)**

Figure1: Intra oral photograph (a) Frontal view (b) Right lateral view © Left lateral view

Multiple root stump was observed in the region of 54, 53,52, 61,62,63 and 64. Multiple grossly decayed teeth were found in the region of 55,65,74 and 84. **(Figure: 2)**

Figure2: Intra oral photograph (a) maxilla occlusal view (b) mandible occlusal view

Full mouth OPG was advised to the patient in order to evaluate the overall status of the erupting succedaneous teeth as well as the status of the primary teeth. **(Figure 3)**

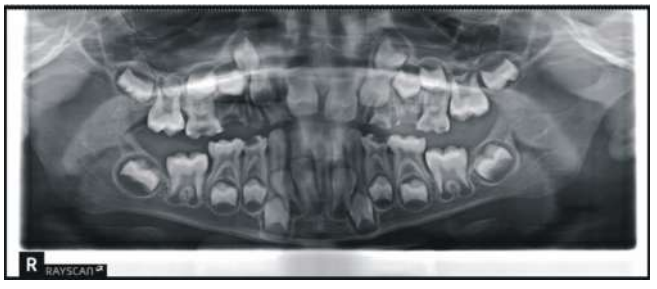

Figure3: Oral Pantomogram radiograph of the patient

According to the Oral Pantomogram radiograph revealed carious lesion involving pulp with periapical radiolucency in respect with 54,53,64,65. Internal root resorption was seen in 63 and 53. It was also observed that there were carious lesion approaching the pulp of 74,84.

According to the investigation, extraction of 53,54,61, 63,64,65 was planned. Pulpectomy was planned for 52,62 followed by crown build up in order to preserved the teeth as the natural space maintainer till the time of its natural exfoliation. Stainless steel crown was advised for 55,74 and 84 as shown in **(Figure 4)**.

Figure 4: Post op intra oral photograph (a) Maxillary occlusal view (b) Mandibular Occlusal view and (c) frontal view

As an interceptive treatment, a modified Nance palatal arch with incorporation of acrylic tooth in the posterior region was planned. Banding was done in 16 and 26 for interim functional Nance Palatal Arch **(Figure 5)**

Figure 5: (a) Modified wire banding design for incorporation of the acrylic teeth (b) Post insertion photograph of maxillary occlusal view

After 1 year follow up: Patient came with complain of swelling in the right anterior region tooth region. **(Figure 6)**

Figure 6: After 1 year follow up (a) Right lateral view (b) Left lateral view © Frontal View

Intra oral Periapical radiograph was taken for 52 and the radiograph revealed that there was external root resorption in 52 with erupting 12. **(Figure 7(a))**

Figure 7 : Intra Oral Peri apical radiograph of (a) 52 (b) 62

Intra oral palpation revealed that 52 had grade 2 mobility. Thus, 52 was extracted under LA without removing the appliance.

After 1year and 2 months follow up: Patient had grade II mobile 62 and 22 was erupting palatally. So, for investigation Intra oral Periapical radiograph was planned for 62. Where the radiograph revealed root resorption of 62 with erupting 22. **(Figure 7, (b))**

Extraction of 62 was planned with modification of the appliance as the appliance was hindering the path of eruption of 22. **(Figure 8)**

Figure 8 : Intra Oral Photograph showing palatally erupting 22 with retained 62

After extraction of 62, An OPG was advised to evaluate the status erupting succedaneous teeth as well as to further change the design of the appliance.

Figure 9: After 1 and 2 months follow up Ortho pantomogram

Discussion

One of the most common causes of malocclusion in permanent dentition is the early loss of a primary tooth. This is mostly due to the teeth next to the space produced by the loss of the deciduous tooth migrating into the space, resulting in a tooth material arch length discrepancy, predisposing the dentition to malocclusion. To address this issue, a number of space maintainers with varied modifications are being developed, which frequently restore the function of the oral cavity. Similarly in the above mention case report, we have tried to establish the normal occlusion as well as prevent further detrimental effect to the occlusion due to multiple carious lesions. In this case report, we had failure of pulpectomy done in 52 after 1 year follow up. The reason of failure of the pulpectomy done in 52 was in accordance with Siqueira et al in 2008[8] where they stated that primary anterior teeth with periapical lesions had a higher failure rate than teeth absent of periapical abnormalities. Through chemo-mechanical preparation, it is difficult to eliminate all pathogenic bacteria in the periapical tissue, and remaining bacteria might increase the likelihood of postoperative failure.Chen et al. in 2020 also found that pulpectomy had a poor outcome in deciduous teeth with periapical infections.[9] As the treatment of this patient is still going on, a change in the design of the space maintainer is being planned following a complete mixed dentition analysis.

Conclusion

It is challenging to manage space while improving masticatory performance and maintaining arch integrity in early primary tooth loss. The functional interim Nance palatal arch discussed in this article will be another ideal solution for young children who suffer early loss of multiple posterior teeth.

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REVIEW ARTICLE

Alleviation for Ankyloglossia - Review

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Introduction

A congenital condition, caused due to fusion between the tongue and floor of mouth is known as Ankyloglossia or tongue –tie. Wallace in 1960 defined tongue-tie as a condition in which tip of the tongue cannot be protruded beyond the lower incisor teeth because of a short frenulum linguae [1]. It can vary from a thin elastic membrane to a thickened, white nonelastic tissue. Ankyloglossia is a Greek term made by combination of two Greek words agkilos (curved) and glossa (tongue). It is characterised by a short lingual frenulum resulting in restriction of tongue movement which may have strong impact on function.

Prevalence

As reported in the literature, prevalence of ankyloglossia varies from 0.1% to 10.7%. According to studies prevalence is higher in studies concerning neonate i.e., about 1.72% to 10.7% than in studies investigating adults, adolescents or children i.e. 0.1% to 2.08%. Male to female ratio of tongue tie is 1:1.1 to 3:1. It is believed to be sporadic rather than genetic.

Anatomy of Lingual Frenum

Majorly, hyoid arch material results in formation of root of tongue. The lingual frenulum is a fibrodense conjunctive fold, occasionally made up of superior fibres of the genioglossus muscle, which are inserted in the ventral tongue, between the apex and the middle third, and in the floor of the mouth, which may be between the lingual carunculi or previously displaced to the lower alveolar ridge.

Aetiology

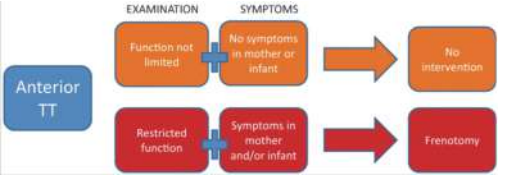
Ankyloglossia can be a genetically transmissible pathology. Genetic components that regulate the phenotype and penetrance in the patients are still unknown. Though it is found associated with various syndromes like:

- X linked cleft palate syndrome- caused due to gene mutation on TBX22
- Kindler syndrome
- Van der Woude syndrome
- Optizsyndrome
- Ehlers-Danlos syndrome (absence of labial and lingualfrenum).
- Infantile hypertrophic pyloric stenosis
- Holoprosencephaly
- Ellis-van Creveld syndrome
- Oro-facial-digital syndrome

Diagnosis

As per Carmela Baeza, there are two levels of identification

1. The Morphological Identification: A short frenulum can be identified on examining baby's mouth
2. The ClinicalIdentification: A short frenulum may or may not have an impact on the breastfeeding dyad.



Procedure

Tension is applied over the frenum to diagnose tongue tie. Movement of the papillary tip or the blanchis noticed which is produced due to ischemia in the region. The frenum is remarkably wide or once there's no apparent zone of the attached gingiva along the midline or the interdental papilla shifts when the frenum is extended; frenum is characterised as pathogenic.

Pathophysiology

Hazelbaker Assessment is used as assessment tool for Lingual Frenulum Function. This tool uses a scoring system using anatomy and function.

- **Anatomy:** Appearance of tongue when lifted, elasticity of frenulum, length of lingual frenulum when tongue lifted, attachment of lingual frenulum to tongue and attachment of lingual frenulum to inferior alveolar ridge
- **Function:** Lateralization, lift of tongue, extension of the tongue, spread, cupping of tongue, peristalsis, snap-back

It consists of ten points for frenulum look

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and fourteen points for tongue perform.[2]

Abnormalities

- **Breastfeeding difficulties:** Difficulty latching and irritability while feeding.
- **Speech disorders:** The difficulties in articulation are evident for consonants and sounds like "s, z, t, d, l, j, zh, ch, th, d" and it is especially difficult to roll an "r".
- Poor oral hygiene
- Difficulty consuming certain foods that include licking (ice cream)
- Difficulty playing certain wind instruments (examples include flutes, clarinets, tubas, trumpets)
- Bullying during childhood and adolescence.
- Gingival recession on the lingual surfaces.
- Orthodontic problems like open bite, mandibular prognathism and maxillary hypo development due to the low position and the forward and downward pressure applied[5]

Classification

* **Katlow's Classification**

The ankyloglossia can be classified into 4 classes based on Kotlow's assessment as follows:

- **Class I:** Mild ankyloglossia: 12 to 16 mm,
- **Class II:** Moderate ankyloglossia: 8 to 11 mm
- **Class III:** Severe ankyloglossia: 3 to 7 mm
- **Class IV:** Complete ankyloglossia: Less than 3 mm.[1]

* **Placek Et Al Classsification (1974)**

It is based on extent of attachment of fibres

- Mucosal attachment: The frenal fibres attachment is positioned at the mucogingival junction.
- Gingival attachment: The frenal attachment is positioned or inserted within the attached gingiva.
- Papillary attachment: The frenal attachment extends up to the interdental papilla.
- Papilla Penetrating attachment: The frenal attachment cross the alveolar process and extend up to the palatine papilla.[3]

Treatment techniques

Some milder varieties of this congenital disorder could resolve with growth. Though surgical interventions include:

Frenotomy

It is the most commonly used procedure. It includes incision and relocation of the frenal attachment. The procedure involves holding the tongue up to make the frenulum tight, then cutting through the fascia-like tissue along a line parallel with, and close to the tongue. The cut is made in a single motion as is done very quickly, less than a second. The infant is restrained by swaddling or in a Papoose board, with an assistant holding the child's head for better support. The initiation of treatment plan varies from half dozen to eighteen days.[9]

Frenectomy

It is the complete excision of the frenum along with its attachment to the underlying bone. It can be done in following ways.

Frenectomy with the use of one haemostat

The frenulum is held with a small curved haemostat with the convex curve facing the ventral surface of the tongue. The first incision is made with a #15c blade following the curvature of the haemostat, cutting through the upper aspect of the frenulum.[11]The second incision is made at the lower aspect of the frenulum, fairly close to the floor of the mouth. The frenulum is then excised, leaving a diamond-shaped wound. The wound margins are undermined with the tips of blunt-ended dissecting scissors.[12]

Frenectomy with the use of two haemostats.

After achieving good anaesthesia, two haemostats (one curved and the other straight) are placed against the tissues over the superior and inferior aspects of the frenulum, respectively, with their tips meeting in the deep aspect near the base of the tongue. Two incisions are made with a #15c blade following the haemostats, cutting through the upper and lower aspects of the frenulum, thus a triangular tissue held with the haemostats is completely removed. Fibre remnants were excised, blunt dissection is performed and 3-0 silk sutures are placed over the wound.[13]

Frenectomy with the use of a grooved director

After antisepsis and anaesthesia, the tongue is raised toward the palate with a grooved director and an incision is made with a #15c blade from the tip to the base of the tongue following the device. The grooved director is removed and a 3-0 silk suture is used for tongue traction. The frenulum remaining is excised and the wound edges are dissected and sutured with 3-0 silk suture.[14]

Frenectomy using electrocautery

It is advised in cases of patients with bleeding disorders, as the conventional scalpel technique carries a higher risk associated with problems in achieving a haemostasis and also in non-compliant patients.

Instruments used: Electrocautery unit with the loop electrode and a haemostat.

Procedure: Frenum is held with haemostat at the depth of the vestibule and two incisions are placed using needle electrode. Muscle fibres are then separated using loop electrode. Coagulation is achieved by using ball electrode.

Frenectomy using laser

Mechanism of action: The energy emitted by a CO_2 laser at the wavelength of 10.6 μm is efficiently absorbed into tissues with high moisture content, and this laser is commonly used for the resection and vaporization of soft tissues in the oral cavity [4]

Advantages

- When using a scalpel, sutures are required for intraoperative haemorrhage, whereas the electric scalpel offers strong haemostatic effects by means of thick coagulation and

deformation layers. However, the surrounding areas are affected by heat, and problems, such as enlarged wound, infection, delayed healing, and postoperative pain, are likely to occur, with many cases also requiring sutures. Meanwhile, although the CO_2 laser has a shallow resection surface depth, it causes relatively no wound surface opening due to heat effects being localized, and coagulation/deformation layers being of appropriate thickness, thus implying reliable haemostasis and early healing.

- Postoperative pain and discomfort during mastication and speech were statistically and significantly less common with the CO_2 laser than with a conventional scalpel.
- Reduce treatment time
- Simplification of overall surgical procedure
- Reducing the burden on patients
- Easier to gain patient's cooperation; thus is a highly useful inpaediatric patients.

Disadvantages

when using this laser to treat maxillary labial frenulum abnormalities, attention must be paid to the power during laser application. In contrast to lingual Frenectomy cases, excessive power can lead to damage of the bone surface, and constant care must be taken to protect the eyes because the laser is applied toward the upper lip.

Discussion

To alleviate the complications of Ankyloglossia it becomes necessary to treat tongue tie with time. The time of surgery depends on patient's history of speech, feeding, social/ mechanical difficulties. It can be done at any age. Various treatment procedures include using scalpel,electrocautery and lasers. Each procedure has their own benefits but lasers have come out to be advantageous.

Lasers for Frenectomy are considered minimally invasive and safe for paediatric patients. Some advantages include:

- Better patient perception.
- Quick heal of wounds as compared to other techniques.
- Well cellularized and well organised loose connective tissues, interspersed with isolate skeletal muscle fibres and some muscle bundles.
- Less scar tissue.
- Use of laser results in sterilisation of wound which intern reduces the need for postoperative antibiotics and care.

Despite of various advantages, proper care is needed to work with laser. For clinicians also; precautions like wearing of protective eye mask, high speed evacuation and a proper training are needed.

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A Journal of Advanced Dentistry
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CASE REPORT ARTICLE

Restoring the Candy Crushers – A Case Report on ECC

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Abstract

Early childhood caries is an irreversible and a polymicrobial disease commonly seen in very young children. Deciduous tooth are the one which is commonly affected in this. The various factors which cause early childhood caries includes diet (carbohydrate), microbes chiefly streptococcus mutans and lactobacillus, host, saliva and time. The clinical manifestations include decayed tooth in mostly posterior and anterior tooth with pain, sinus opening with pus discharges. These stages if left untreated would lead to poor nutrition intake and even cause various psychological effects. This paper presents 2 case reports, in which the patients were diagnosed with ECC and here we have discussed the treatment plan from its management of the existing lesions to prevention of such lesions in future

Keywords: ECC, Early Childhood Caries, Dental Caries in Primary dentition, Crown and loop space maintainer, Fixed Functional Space maintainer

Introduction

Early Childhood caries is one of the major public health problem in both developing and developed countriesIt is a rapidly occurring and burrowing type of caries most commonly seen in children younger than 6 years of age. The main etiological factor for the occurrence of dental caries is its multifactorial nature and its association with low socioeconomic status. According to MS Muthu et al in 2018 the highest prevalence of ECC in India was in Andhra Pradesh (63 %), whereas in the lowest prevelance was seen in Sikkim (41.92 %). It affects both the oral and general health status in children. ECC commonly occurs on tooth surfaces which are immune to decay i.e., labial surfaces of maxillary anteriors, lingual and buccal surfaces of maxillary and mandibular posteriorsIt is commonly associated with pain, orthodontic problems and enamel defects, which ultimately leads to problems with eating, speech and even may have psychological effects. It had shown to have a greater impact on the long term quality of the child and family. Primary dentition plays an important role in mastication, phonetics and esthetics. Dental caries in primary and permanent dentition is not a self-limiting like other infectious diseases, it requires professional treatment plan and management to remove the infectious part and to restore the tooth function

CASE DESCRIPTION

Case Report 1

A 4 year old male child reported to the OPD of the department of Pediatric and Preventive dentistry with the chief complaint of pain in upper front region of the jaw for past 2 days. The history of pain was sudden in onset, intermittent in nature, dull aching, nocturnal pain, which got aggravated on eating and relieved after taking over the counter medication. The child had a satisfactory general health status and past medical history.

On enquiring about the past dental history, it was known that the child had undergone restoration in maxillary primary incisors, a year ago. The parents were enquired about the personal history of the child which included diet chart and it was known that the child had a sweet score of 55 which was way beyond the "watch out zone".

During the initial visit the child exhibited the child was unco-operative and showed a score of 2 ((Frankel's behavior rating scale-1962).

On Clinical examination sinus opening with no pus discharge was seen in relation to 62, and multiple caries were noted as root stumps in relation to 52, 51, 61, 62, with pulp polyp in relation to 51, 61, multisurface caries in 54, smooth surface caries in 53, 63, Class 1 caries in 55, 65, 74, 75, 84, 85.**(Figure 1, 2, 3)**

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Figure 1:Frontal View: Root Stumps – 52, 51, 61, 62, With Sinus Opening - 62

Figure 2:Maxillary Arch With Multiple Caries – Class 1 -55, 65, Multisurface Caries- 54, 64, Smooth Surface Caries- 53, 63, Root Stumps: 52,51,61,62

Figure 3:Mandibular Arch Multiple Caries – Class 1- 75, 85, Class 2- 74, 84

In the radiographic examination none of the molars showed pulpal involvement, while the maxillary anteriors showed pulpal involvement with internal root resorption in 62 and widening of the pulp canal in relation to 51, 61. **(Figure 4)**

Figure 4:OPG – Multiple Caries With No Pulpal Involvement In 55, 54, 53, 63, 64, 65, 74, 75, 84, 85 & Pulpal Involvement in 51, 52, 61, 62, With Internal Root Resorption in 62 & Widening of The Pulp Canal in Relation to 51, 61.

Based on the clinical and radiographic finding, it was denoted that the child has Moderate ECC.

An extensive treatment planning was done, considering the age of the child. As the child was unco-operative we did the behavior modification of the child by tell show do technique, modelling and positive reinforcement. We started with minimal invasive procedure to invasive procedures, which involved restorations of 55, 53, 63, 64, 65, 74, 75, 84, 85, stainless steel crown in 54, pulpectomy with post and core build up in 52, 51, and 61 followed by extraction and fixed functional space maintainer in 62. **(Figure 5, 6, 7)**

Figure 5:Frontal View: Esthetically Restored 52, 51, 61 and 62

Figure 6:Fixed Functional Space Maintainer – 62, in Maxillary Arch With SS Crown- 54, Restored 55, 65, 64, 53 & 63

Figure 7: Restored Carious Tooth in Mandibular Arch – 74, 75, 84, 85

As a preventive measure, topical fluoride application was done and oral hygiene instructions with diet counselling was given to both the child and the parents. The parents were informed the appliance will be removed once the incisors starts erupting. The patient was recalled after 1 week to check the integrity of the fixed functional space maintainer. Later follow-up were planned for 3 months, 6 months

During the entire procedure the child showed a behavior rating of Score 3 (Frankel's behavior rating scale- 1962).

Case Report 2

A 5 year old female child reported to the OPD of the department of pediatric and preventive dentistry with the chief complaint of pain in lower left back region of the jaw for past 7 days. The history of pain reported was sharp shooting pain sudden in onset and intermittent in nature got aggravated on eating food and relieved on taking over the counter medication. The child showed a satisfactory general health status and past

medical history.

As the child was little apprehensive we did a behavior modification by Tell show do, Modelling.

On clinical examination a sinus opening with no pus discharge was seen in relation to 51, 62, with multiple caries as Class 1 dental caries in 55, 65: Class 2 (Proximal caries) in 74, 75, 84, 85; Class 3 Dental Caries in 53, 63, 73, 83; Class 4 Dental Caries in 52, 51, 61, 62; Multi-surface caries – 54 and root stumps in 64 with grate 1 calculus. **(Figure 8, 9, 10)**

Figure 8:Frontal View: Root stumps – Grossly Carious 52, 51, 61, 62, With Sinus Opening – 51, 62

Figure 9: Maxillary Arch- Multiple Caries – Class 1 -55, 65, Multisurface Caries - 54, Smooth Surface Caries- 53, 63, Grossly Carious – 52, 51, 61, 62, Root Stumps – 64

Figure 10:Mandibular Arch Multiple Caries –Class 2- 74, 75, 84, 85, Smooth Surface Caries – 73, 83

An OPG was advised and it was seen that no pulpal involvement in 55, 54, 53, 63, 73, 74, 83, 84, 85 while pulpal involvement was seen in relation to 52, 51, 61, 62, 65, 75 and root stumps in 64. **(Figure 11)**

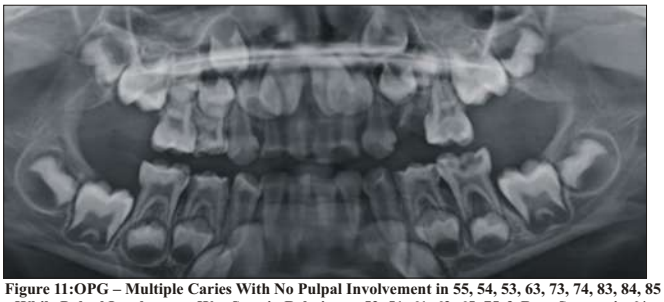

Figure 11:OPG – Multiple Caries With No Pulpal Involvement in 55, 54, 53, 63, 73, 74, 83, 84, 85 While Pulpal Involvement Was Seen in Relation to 52, 51, 61, 62, 65, 75 & Root Stumps in 64.

Based on the Clinical and Radiographic findings, a final diagnosis of Early Childhood Caries with Moderate and Severe form is noted.

The procedure followed as minimally invasive to invasive procedure i.e., restoration in 55, 54, 53, 63, 73, 74, 83, 84, 85 followed by pulpectomy and SS Crown in 52, 51, 61, 62, 65, 75, Extraction of 64 followed by Crown and lip space maintainer in 64 **(Figure 12, 13 , 14)**

Figure 12:Frontal View: Esthetically Restored 53, 52, 51, 61, 62 and 63

Figure 13:Fixed Non -Functional Space Maintainer (Crown & Loop) in Maxillary Arch

Figure 14: Restored Carious Tooth- 74, 73,83,84,85 & SS Crown- 75 in Mandibular Arch

As a preventive aspect Fluoride application with Oral hygiene measure were also advocated. The parents were informed that the space maintainer will be modified once the permanent successor erupts. As the child is under high caries risk group a follow up of 1 week, 1 month, 3 month and 6 months was planned.

The child showed a behavior rating score of 4 (Frankel's behavior rating scale- 1962) during the treatment procedures

Discussion

Early Childhood caries is a severe form of caries occurring in very young children due the imbalance between the risk and protective factors. It has a complex etiologies between the tooth, carbohydrate, microorganisms, time, Saliva and Social factors like socioeconomic status of the family. Thus ECC was found to be one of the most important factor which compromises the self – esteem in children's thus having a greater impact on the quality of life leading to nutritional and psychological problems. The main

culprit behind the occurrence of caries is the sugar component which causes severe damage to the tooth by the production of acids which demineralizes the tooth.

In both the cases reported it as seen that the children using of bottle containing milk with sugar, these are one of the risk factor which lead the child to develop ECC

Severely damaged anterior primary tooth ultimately results in Parafunctional habits which if left untreated leads to severe space loss and malocclusion. The main goal in prevention of early childhood mainly relies on the dentist, parents, child and the family of the child. The major two factors which determines the management of ECC in children is the dentist factor and the parents factor i.e. restoring a severely damaged tooth is a main challenging factor for the dentist while whether to give importance to the primary dentition is another challenging decision factor was seen among the parents

Clinical decision making regarding the management of children with ECC depends mainly on the age of the children, their risk levels and their oral health status. In the first case report, a fixed functional space maintainer was used inorder to restore the esthetics and to prevent any psychological disturbance in the child. Use of fixed prosthesis are usually limited due to the arch modifications which take place when the child moves from primary dentition to mixed dentition. The child's age in this case report was 4 years i.e., primary dentition stage. During which the sagittal and transverse dimensions of the dental arches are unaltered. This provides a stability where a fixed prosthesis could be given. Patil et al 2011 showed that fixed space maintainer which was used to replace a deciduous maxillary anterior teeth provided good esthetic results with better patient co-operation

In the second case report crown and loop space maintainer was given to prevent the space lost due to 64. In a case reported by Kayalvizhi Gurusamy et al 2010, where a crown a loop space maintainer was found to be effective in the prevention of space loss which occurred proximal to a cavitated tooth

In both the cases the parents as well as the child were satisfied with the final results. After a week follow- up the child was well adapted with the space maintainer and there was no difficulties with speech or mastication seen.

In addition to treating a carious tooth by rehabilitation of the tooth structure lost, an indirect management of the parafunctional habits was also done in these cases thus ultimately preventing the malocclusion

Conclusion

ECC, a severe form of disease could be prevented by anticipatory guidance, in the prenatal, natal and post natal periods. Once the disease has occurred proper management should be done to prevent it deleterious effects on both oral and general health status of the child. ECC can be managed in two ways. First, through non-operative using SDF and Fluoride application, in uncooperative patient. Second, through operative procedures which is mainly affected by various factors like child behavior during the procedure and the oral health status of the child. In this case report we had done the operative procedures like management of pulpally involved tooth. The complete success of the treatment relies on the hands of the dental practitioner and the child. Instilling a positive dental attitude in child through various behavior modifications is one of the main factor behind this success.

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REVIEW ARTICLE

Prosthodontic Practice in Covid-19 : A Review

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Abstract

Prosthodontists along with other dental professionals may encounter patients that could be COVID positive and will have to provide care to the patient but at the same time they also have prevent the spread of infection. Prosthodontists are at a high risk of exposure to patient's infected saliva and blood so it is of utmost importance to treat the patient in such a way that further transmission of the disease can be prevented. The aim of this article is to provide a brief overview of general and self-protective measures and the treatment that can be performed during this pandemic.

Keyword: COVID-19, Emergency Treatment Need, Pandemic, Prosthodontic Consideration

Introduction

Coronavirus disease is caused by the SARS-CoV-2 virus which is a single-stranded enveloped RNA virus of the Beta coronavirus family and enters the human cells through Angiotensin-Converting Enzyme 2 (ACE-2) receptors with the help of its S (spike) protein[1].The SARS-CoV-2 virus has a diameter in the range of 60-140 nm and the main route of spread is through person to person contact or by direct exposure to infected respiratory droplets[2]. It can also spread through asymptomatic carriers which is the reason why there is concern among dental practitioners.

Dentists are at very high risk of acquiring the infection because of the involvement of oral fluids, aerosol generation, and exposure to the blood. Hence Personal Protective Equipment (PPE) and other disinfection protocols need to be followed.

Prosthodontic procedures require some modifications during this Covid-era. Prosthodontists have to deal with saliva and blood-contaminated instruments and articles which can serve as a source of the disease transmission. Aerosol-generating instruments are also one of the main concerns as they amplify the spread of the virus particles many folds[3]. Prosthodontists require constant lab support so extra precaution needs to be taken to prevent the transmission of the virus because apart from the dentist there are multiple lab technicians involved performing various tasks. Prosthodontics provides treatment to patients of all age groups consisting of geriatric patients, patients requiring Maxillofacial prosthesis (MFP) following cancer or trauma or mucormycosis infection so involvement of such a variety of patients makes it crucial to form proper treatment protocol and guidelines. Geriatric patients are more Prone to acquire infection because of lower immunity and the presence of comorbidities like diabetes, various cardiovascular and respiratory illnesses, so it's of utmost importance to prevent the transmission of the infection[4].

India has the 2nd highest number of confirmed covid cases in the world and the 3rd highest number of covid deaths. As of now the new omicron variant of the virus has shown a rise in the spread and is expected to achieve the peak in February 2022. So an effort has been made to review old literature and protocols to suggest some modifications in the procedures performed and to ensure the safety of all the patients and the dentist.

Implications of Covid-19 in Prosthodontics

Prosthodontists are at high risk of exposure to the infection because of either direct or indirect contact with a possible covid infected individual in the following ways-

- Exposure to saliva during various procedures like impression making.
- Aerosols are produced due to the use of high-speed rotary instruments which facilitate the spread of infection.
- Contaminated acrylic debris from the patient's prosthesis can beasource of infection.
- Involvement of dental lab and technicians always runs a risk in the transmission of the virus as there is involvement of multiple people for a case.[5][6]

Saliva & SARS-CoV-2

The main targets of the SARS-CoV-2 are

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those cells that express angiotensin-converting enzyme 2 (ACE 2)[7]. ACE 2 acts as a receptor for the virus entry into the cell. Salivary gland epithelial cells express ACE 2 which is why the salivary gland gets infected with the virus and hence the saliva produced by it is a potential source of infection either directly or indirectly.[8]

Teledentistry

The first mode of interaction between the dentist and the patient should be over a video call. In this way, the dentist can evaluate the severity of the patient's illness and can categorize the procedure into an emergency or urgent one[9]. Questions should be asked to the patient whether he/she have had a fever, cough, sore throat, shortness of breath, close contact with people suspected to have a covid-19 infection In the last 14 days[10]. The dentist has the autonomy to reschedule the appointment when the patient gives a positive answer to any of the above questions. The patient is asked to come at least 14 days after the onset of the symptoms.

Prosthodontic Treatments to be Performed

All the elective treatment can be postponed only emergency and urgent procedures are performed, in situations like the following – [11]

- Need for surgical and interim obturators
- Caries or pain in abutment of fixed prosthesis
- Peri-implantitis
- Infection around the prosthesis
- Mobile/fixed faulty prosthesis
- Dislodged prosthesis
- Broken prosthesis
- Need for temporary or immediate dentures
- Ulceration due to prosthesis or sharp tooth.

Preventive Measures During Dental Care

Use of slow speed hand piece producing less aerosol, hand piece with anti-retraction valves, high volume saliva ejectors, high vacuum extra oral suctions, rubber dams where more amount of aerosols are generated, digital impression making, four-handed dentistry, Personal Protective Equipment are suggested[12]. Imaging procedures should use extraoral techniques including OPG and CBCT to avoid contact with saliva and to prevent gag reflex[10]. If intra oral imaging has to be done then double barrier should be used over the sensor to prevent cross-infection.

Patients should be asked to rinse the oral cavity with 1.5 % hydrogen peroxide or 0.2% povidone-iodine[7]. When rubber dam isolation is not possible then this measure is highly recommended. In the case of paediatric patients where rinsing cannot be done, cotton soaked with these solutions should be used[7]. Studies have shown that hydrogen peroxide (0.5%)andpovidone-iodine (0.2%) inactivates the virus after one minute of use[8].

Role of Personal Protective Equipment

Dentists who are exposed to aerosol must use N95-type mask, face shield, waterproof disposable gowns along with head cap and gloves[13]. N95 mask filters aerosol in a very effective way and is way better than the normal surgical mask. Viral particles from respiratory secretion can travel via aerosol (<5microns in diameter) or droplets (>5 microns in diameter)[14]. The N95 mask is capable of filtering 0.3 microns particles by 95% on the other hand surgical masks can filter particles of 5 microns or more[10]. N95 mask provides2-way protection, Masks with valves protect only the wearer while on the other hand triple-layered mask only protect people of surrounding not the wearer. Reuse of these N95 masks and respirators with valves should not be reused as it has no evidence-basedrecommendation[15].

Inactivation & Prevention of Contamination From Coronavirus

Aerosols are produced in large quantities while doing professional prophylaxis, using rotary instruments for tooth preparations or during trimming, finishing and polishing of prosthesis contaminated with saliva. Aerosol may contain both large and small particles (> 5 microns and <5 microns respectively). Large particles may settle down due to gravity but the smaller ones can travel in air up to 1.5 to 2 meters and it can remain viable for up to 3 hours suspended in air[7]. Viral load in aerosol is variable. During normal breathing, it is 0.34 copies /cm3 but it can reach up to 11.5 copies /cm3. While coughing it can go up to 366,000 copies /cm3[15]. Only the essential items should be kept in the open while all the other materials and instruments should be kept in closed cabinets.

In clinics where proper ventilation cannot be maintained use of air filters is recommended using high-efficiency particulate arrestor (HEPA) filters. HEPA filter can remove up to 99.97% of particles measuring 0.3 microns from the air[10]. HEPA 13 or 14 are generally recommended according to their filtration efficiency. Another way of purifying the air of coronavirus is by using negative ion generators, it fills the air with millions of negative ions which helps in breaking the lipid layer of the virus and reduces the viral load[6].

Fumigation and fogging are the other two methods for disinfecting clinics only where the circulation of clean air is possible post procedure[8]. For fumigation, formaldehyde solution is mixed with fixed proportion of potassium permanganate, this combination gives rise to fumes, which can kill bacteria, fungus along with their spores but it is not done commonly today because formaldehyde is a known carcinogen. On the other hand fogging can be done with mixture of hydrogen peroxide and silver ion solution or third-generation quaternary ammonium compounds. Fogging is comparatively rapid, effective and does not leave residue which makes it a preferred technique for the clinics and the labs. This method usually takes up to 45 min followed by a dwell time of an hour[8].

UV-C rays (wavelength 200-280nm) can also be used to disinfect clinics and labs[10]. It is safe, doesn't leave any residue, has a wide spectrum of germicidal activity and can be used in the presence of human beings.

Aerosol can deposit on inanimate surfaces in the office, so the

use of biocidal agents over these surfaces is necessary, there should be an adequate interval between two patients so that the clinical setup can be properly cleaned and disinfected. Among different biocidal agents, ethanol (78–95%), propan-2-ol (70-100%),45% propan-2-ol associated with 30% propan-1-ol, glutaraldehyde (0.5–2.5%), formaldehyde (0.7–1%),and povidone-iodine (0.23–7.5%) are shown to reduce infectivity of the coronavirus by about 10,000 times or more[13]. The minimum effective concentration of sodium hypochlorite is 0.21% and hydrogen peroxide is 0.5%[7].

Recommendations For Clinic Setup

The clinic should have dedicated areas for particular procedures including a separate sterilization room

- **Waiting Area-**

Basic information of the patient is taken, sanitization through contactless dispensers, noncontact temperature recording, patient is given face mask, shoe covers, head cap, gloves, glass barrier can be installed at the reception counter to prevent transmission of droplets. The patient is asked to fill the screening form and an informed consent in his/her preferred language. It is recommended to have a pulse oximeter, it measures arterial oxygen saturation very quickly[16]. If the oxygen saturation is below 93% then the patient should be referred to the physician for detailed screening[12].

- **Screening Area-**

Initial screening and diagnosis are done here. Pre-procedural mouth rinse is advised using povidone-iodine 0.5% for at least 15s can deactivate the virus completely. Other chemical based mouth rinses which can disrupt the viral lipid membrane include ethanol, chlorhexidine, cetylpyridinium chloride and hydrogenperoxide.

Orthopantomogram (OPG) and cone-beam computed tomography (CBCT) are recommended instead of intraoral radiographs to prevent contamination from saliva. But, OPG doesn't give good resolution and CBCT exposes the patient to higher radiation dose as compared to intraoralradiographs[16].

- **Non-Aerosol Generating Area-**

Here the procedures are performed with the use of hand instruments such as spoon excavator and chemical-based agents to remove caries, hand scalling etc. Donning and Doffing of PPE is done in specific area followed by sequential steps. Use of four-handed dentistry and digital workflow is suggested[16].

- **Aerosol Generating Area-**

This area involves the use of high-speed hand piece leading to production of aerosols in large quantities. This area involves a high risk of transmission therefore it's mandatory to follow universal precautions /OSHO guidelines[10]. Only the essential articles should be kept open while others should be kept in closed cabinets. Clinician should avoid the 8 o'clock chair position to avoid direct contact with the splatter[16].

Conclusion

The intent of this review was to discuss the effect of covid-19 on dental practice as prosthodontists are at high risk of acquiring covid infection due to production and exposure to a lot of aerosol and possibly contaminated surfaces and indirect contact with dental laboratories and dental technicians. Therefore it has become very important for dental practitioners to incorporate all precautionary measures in their routine practice and additional safety measures if treatment of patients with COVID-19 becomes necessary as the omicron cases are rising rapidly.

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REVIEW ARTICLE

Roadmap To Mercury Free Dentistry… Are We Prepared?

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Abstract

Dental amalgam has been phased-down throughout the world. 2020 is the year of eradication of use of amalgam in dentistry. Alternative restorative materials with improved properties are the need for future. Restorative dentistry must strongly promote the prevention of dental caries to reduce the need for restorative materials and emphasize the best management practices for all materials in use. Use of dental amalgam for restoration during the past 10 years or so, the awareness and recognition of the environmental implications of mercury have increased and dentistry has gained further attention as being a source of contamination of the environment. In addition, within the dental profession and the oral health research community the interest of serving patients through the use of alternative dental restoration materials has grown markedly.

Keywords: Amalgam alternatives, mercury free dentistry.

Introduction

As early as 160 years dentistry has used silver amalgam, which contains approximately 50% Hg metal, as the preferred material of choice for tooth restorations due to its ease of application, strength, and low cost. In recent years, the risk of mercury toxicity has been widely discussed and elaborated and the risk benefits of the use of amalgam are criticized. The dental amalgam has been seen as hazardous to society. World Health Organization (WHO) stated that even the small amount of mercury might be capable of causing severe health and environment problems which leads to the developmental defects of child in-utero and early stages of life. United Nations Environment Program (UNEP), global mercury Assessment 2013 revealed that dental amalgam uses 21%of global mercury consumption. The fact that mercury is highly toxic element, which is considered by WHO as one of the top ten chemical of major public health concern, because of its non-degradable nature; so, more amount of dental amalgam use results in more accumulation of mercury in environment.

Various Laboratories in early 1980's suggested that Vapor Mercury Exposure from Amalgam Fillings is continuously released from the tooth fillings and the rate of release into month air is increased immediately after chewing. A single amalgam restoration of size 0.4cm.sq. is estimated to release about 15ug Hg/day.

Effect of Amalgam Mercury on Organs

Various studies have shown that the mercury immediately after exposure is seen in significantly higher concentrations in the Brain, Kidneys and Lungs. The continuous release of mercury from amalgam restorations results in neurodegenerative diseases like Alzheimer's disease and can lead to impaired renal function. It has been seen that occupational exposure to mercury has led to infertility in female dental assistants because of the long-term exposure to mercury ions. So, it's very essential to restrict the use of dental amalgam.

Phase Down of Dental Amalgam

The complete ban on amalgam mercury was the need of the hour which leads to the Minamata Convention Treaty in 2013. The treaty that aimed to protect environment and the human health from the anthropogenic emission and release of mercury and mercury compounds.

The treaty proposed nine measures to phase down the use of dental amalgam:

1. Setting of national programs aiming at dental caries prevention and health promotion, thereby reducing the need for dental restorations.
2. Setting national objectives at minimizing use of mercury.
3. Promoting the use of cost-effective and clinically effective mercury free alternatives for dental restorations.
4. Promoting research and development of quality mercury –free materials for dental restorations.
5. Encouraging dental professional organizations and dental schools to educate

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and train dental professionals and students on the use of mercury free dental restorations alternatives and on promoting best management practice.
6. Discouraging insurance policies and programs that favor dental amalgam use over mercury –free dental restorations.
7. Encouraging the insurance policies and programs that favor the use of quality alternatives to dental amalgam restorations.
8. Restricting the use of dental amalgam to its encapsulating form.
9. Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and its compounds to water and land.

• Strategic intervention aligned with the nine measures of the Minamata Convention was the Implementation of strategies.
• Waste Management,
• Knowledge Management
• Health System Strengthening.

Waste Management

It includes best practice management, one that combines infection-control measures, chemicals management, environmentally sound lifecycle management of dental amalgam waste and quality mercury-free dental materials waste. Making the use of dental amalgam in encapsulated form and amalgam separators mandatory.

Knowledge Management

Raising public awareness and supporting country- level communication strategies and programs based on the results of the situations assessment and documentation of voluntary implementation.

Health System Strengthening

Integrating strategies to phase down the dental amalgam as part of the policy of prevention and control of non-communicable disease and addressing the social determination of health.

Improving the afford ability of mercury –free materials for dental restorations in the essential list of medicine products and medical devices and equipment managed by the national and regional authority.

Researching and developing qualities, affordable and safe alternatives to dental amalgam whose waste can be controlled in an efficient and effective manner in all health care settings.
Reorientation of the oral health work force; education agenda towards greater social accountability and of educational curricula to meet local community's needs; increasing national capacity of oral health professionals towards preventive and non-operative minimally invasive dental care by developing training materials and resources.

Encouraging and support insurance companies to examine policy and program options that favor a shift to quality mercury–free materials for dental restorations, including materials that re-mineralize tooth substance and inhibit dentine demineralization.

Technical Advantages of Mercury – free Dentistry

• Mercury –free fillings are more minimally invasive than amalgam: It is a fact that amalgam damages health tooth tissue weakens tooth structure as cavities has to be prepared more intensively for mechanical retention, due to its non- adhesive nature. So, mercury free materials like composite offer the more benefits of preserving the sound tooth tissues.
• Mercury – free fillings can last as long or longer than amalgam: With the recent advances in the dentine adhesive agent, the quality and longevity has improved. Composite have progressed so far over the past decade that it has reached at par with the strength of amalgam restoration.
• Mercury- free fillings can be placed as fast as amalgam: The ease of application for composite has improved and does not take any more time to place than it does with amalgam. Glass Inomer can be placed faster than amalgam.
• The factors effecting the time taken for restoration with composite and amalgam are: First, time may vary depending on whether the tooth structure has already been damaged by amalgam. Composite used to replace amalgam restoration may take more time than replacing a composite filling. The times vary depending on the training of the dentist. Dentist, who has more experience in using composite, can place composite as fast as amalgam. The range of time may vary ease of cavity preparation, as composite requires most of the time, conservative cavity preparation.
• Mercury–free fillings can help prevent caries, unlike amalgam: Materials like Glass Ionomer releases Fluoride over a period of time, which can help prevent dental caries. Flowable composite restorations are used in the pit and fissure sealing which again prevents caries.
• Mercury–free fillings can be repaired more easily than amalgam: Composite not only save tooth tissue during cavity preparation, but it permits us to do localized repairs instead of total restoration replacement, which in turn saves both tooth structure and costs.
• Mercury–free fillings are safer than amalgam: Seeing the public health implication of amalgam, composite restorations and GIC are safer. So, the Bis-gamma level in saliva returns to baseline within few hours, it's agreed with so many researches that composite are safer for humans and environment. World Health Organization & Food and Agriculture Organization of the United Nations Expert Meetings stated, "BPA (Bis–Glycidyl methacrylate) levels in saliva from dental materials were low. The Expert Meeting determined that there was no need to collect additional Data on BPA level from dental materials, as exposure is short term and unlikely to contribute substantially to Chronic exposure."
• Mercury-free fillings are safer for the environment: There is potentially no evidence of significant personal or environmental toxicity from the mercury-free restorative materials.

Human Safety of Current Dental Restorative Materials

Human safety evaluation must consider the release/exposure of substances from a dental material into the oral cavity of the

patient, to dental personnel, and into the environment.

It is generally accepted that mercury in different oxidation states is released from amalgam fillings. Uptake for metallic mercury (Hg0) occurs mainly through the lungs, with only minor parts as Hg2+ through the intestines. Ingested mercury in amalgam particles is virtually unabsorbed. Exposure is considered to be very hazardous to the life and indeed to the environment.

For Resin-Based Composites, many different substances have been identified to be released to the liquid interface (saliva, dentin/pulp) (Schmalz and Arenholt-Bindslev, 2009), to ambient air in the dental setting (Marquardt et al., 2009). Mainly, monomers like HEMA, TEGDMA, or UDMA are released, but also Bis-GMA and Bis-DMA. In this context, epoxy-intermediate 2, 3-epoxymethacrylic acid is formed, which is considered to be minimally releases in the saliva.

Available evidence shows that BPA is, under clinical conditions, not released from pure Bis-GMA. However, Bis-DMA is converted to BPA, e.g., by salivary esterase. Furthermore, BPA may be detected as residues/impurities in Bis-GMA because it may be used during the fabrication of Bis-GMA. After placement of Bis-DMA containing fissure sealants, BPA could be detected immediately or shortly after placement in saliva and urine, and salivary samples were estrogenic in vitro.) Calculations of exposure levels showed that even after exposure to Bis-DMA-containing materials (fissure sealants), the amounts of BPA were much below limit/reference values of classic toxicology. However, these levels are currently under discussion. The clinical relevance and the possible environmental impact are unknown.

Glass-ionomer cements release fluorides and aluminum ions. No systemic reactions and very few, if any, allergic reactions have been reported when these are used as dental filling materials. Biological properties of various combinations of glass ionomer cements and resin-based composites are determined mainly by their resin components.

A gross overview of data from the literature has been reported for the different endpoints and for the different material groups (SCENIHR, 2008) possible to generally rank them from the most to the least toxicmaterial. Fewer allergic reactions occur with glass-ionomercements, but their mechanical properties are insufficient formore than one surface cavity (Frencken et al., 2012).“Clinical risk evaluation” of dental materials is based on theconcept that 'safety' is freedom from unacceptable risks and 'risk'is the combination of probability (frequency) and severity of harm (in general). Epidemiological data on the frequency of adverse effects caused by dental materials are sparse, but estimated to be very low.

The EU report states: “All the materials are considered safe to use and they are all associated with very low rates of local adverse effects (… allergic reactions and an association with clinical features characteristic of lichen planus …) with no evidence of systemic disease”.

The longevity of a restoration is a relevant parameter as a benefit of dental restorative materials. In this respect, Modified Resin-based composites are replacements for the amalgam in the near future.

Environmental Safety of Current Restorative Materials

There are ever-increasing concerns for protecting the environment from effects of manufacture, use, and disposal of Amalgam. A strong emphasis in developed countries during the past decade has been the collection and recycling of amalgam waste materials.

The American Dental Association (ADA) has done considerable investigation and planning over the past two decades, not only for dental amalgam management but also for similar issues for other restorative materials. Technical issues regarding restorative materials affect much more than just simply those associated with restoration placement and service.

Waste management includes concern for residual materials from use, disposal of packaging, chair-side traps, vacuum pump filters, separators, plumbing, sewer systems, crematoria, and cemeteries, to mention just a few examples.

ADA's mission statement clearly emphasizes its roles as a trusted source for oral health information and for improving public health outcomes. During the past 10 years, the ADA has promoted the use of “best management practices” (BMPs) for all dental materials (ADA, 2003, 2007).Efforts to recapture Hg and derivatives within the dental office have included a range of chair-side filters and separators on waste water lines which reclaim greater than 99% of those materials.

Decreasing use of dental amalgam in most developed regions has been driven mostly by preferences for adhesive dentistry and aesthetic restorations. Thus far, those options do not provide the amalgam alternative that would also offer improved performance and longevity. That is why the current discussion of potential options is so important.

Alternatives For Dental Amalgam

Dental amalgam should be phased-down throughout the world. Alternative restorative materials with improved properties are needed for the future. A coordinated world-wide approach to research and funding for those materials is needed. Foremost, restorative dentistry must strongly promote the prevention of dental caries to reduce the need for restorative materials and emphasize the best management practices for all materials in use.

*** Recent Advances in Amalgam to Over Come Mercury Exposure**

Bonded Amalgam: The advantages of adhesive amalgam restoration over non-adhesive treatment alternatives are:
It is a treatment option for extensively carious posterior teeth, with a lower cost than either cast metal restoration or metal-ceramic crowns.

It allows use of amalgam in teeth with low gingivo-occlusal height which is not possible in conventional amalgam, amalgam with pins, inlays, onlays, complete cast crown restoration.

It permits more conservative cavity preparations, as it does not require additional retention in form of groove, pins etc.

Silver-based mercury-free restorative alloys: Mercury free metallic restorative materials proposed as substitute for mercury containing amalgam are gallium containing materials and pure silver and/or silver-based amalgam.

Advantages of Gallium Based Alloys

- Rapid solidification.
- Good marginal seal by expanding on solidification.
- Heat resistant.
- The compressive and tensile strength increases with time comparable with silver amalgam
- Creep value are as low as 0.09%
- It sets early so polishing can be carried out the same day
- They expand after setting therefore provides better marginal seal.

Nanocrystalline Melt spun Ag-Sn-Cu Alloy Ribbons

A new non-gamma-two dental powder has been developed from nanocrystalline melt-spun Ag-Sn-Cu alloy ribbons.The amalgam made from this powder exhibits excellent properties for dental filling. The nanocrystalline microstructure was found for the first time in as-spun and heat-treated Ag, Sn, Cu alloy ribbons, using X-ray diffraction, scanning electron microscopy and energy-dispersive spectroscopy.

Powder Coated Technology

A technology has been developed recently at the National Institute of Technology (Gaithersburg, Maryland, USA) that allows the formation of two types of condensable metallic composites.

One approach consists of cold-welding silver that is based on a powder technology and transforming it from an extremely plastic mixture to a solid within the prepared tooth at oral temperature.

The second approach is to condense a mixture of two inter-metallic compounds, Ag_4Sn (beta phase) and Ag_3Sn (gamma phase), or similar alloy particles that have been silver coated and which have undergone an appropriate treatment in a surface-activating solution

Advantages:

- Flexure strength as that of amalgam
- Smooth surface and hardening were obtained
- More resistant to wear because of work hardening

Glass Ionomer Cements

Glass ionomer is the generic name of a group of materials that use silicate glass powder and an aqueous solution of polyacrylic acid.

Though, glass-ionomer was originally aimed to be restorative material, soon it was modified as luting cement also. The early cement was a slow setting and highly technique sensitive. But since its introduction, it has undergone many changes.

Metal Modified Glass Ionomer Cement

Metal modified cements are two types:

Silver alloy admix - amalgam alloys are interpreted into the glass powder.

Cermet ionomer cement - precious metals like silver, gold, titanium, palladium etc. incorporate in glass powder. Silver is commonly used

Glass is generally brittle and addition of silver was expected to improve the toughness of the cement as silver acts as stress absorber and also improves the abrasive resistance of cement.

Glass Cermets

This was introduced by Mclean and Gasser in 1985. Glass and metal powders were sintered at high temperature. This was attempted to improve the wear resistance, flexural strength and at the same time maintains the aesthetics.The main disadvantages of conventional glass ionomers are brittleness, poor surface polish, porosity and surface wear. Improvements in these areas are essential if the clinical use of glass ionomer cements is extended to high stress bearing areas. Cermet's was introduced in 1984 under the trade name Ketac-silver. Due to its higher strength than conventional Glass Ionomer, it has replaced amalgam to some extent.

Silver-Alloy Powder & Glass Ionomer Cement (Miracle Mix)

Adding silver alloy powder to a type II restorative glass cement powder and mixing this powder admixture with polyacrylic acid liquid was intended to make this first metal reinforced glass ionomer cement radio opaque and harder. Addition of this spherical silver alloy powder to the pure hydrous restorative type II glass ionomer cement is termed "Miracle Mix". It was one of the materials which replaced amalgam.

Resin Modified Glass Ionomers

They were introduced to overcome the problems associated with the conventional glass ionomers and at the same time preserving the clinical advantages of the conventional materials. These combined the technologies of resin composites and conventional glass ionomers. In general, the resin modified glass ionomer materials are the hybrid of a glass ionomer and resin composites.

Advantages of resin modified glass ionomer cements

- Sufficiently long working time controlled in command to a snap set by photocuring.
- Improved setting characteristics.
- Protects the acid base reaction from problems of water balance.
- Rapid development of early strength.
- Can be finished and polished immediately after set.
- Repairs can be easily carried out, as the bond between old and new material is very strong.

Compomer (Polyacid Modified Composite Resins)

Compomers are the combination of composites ('comp') and glass ionomers ('omer'). Compomers contain dimethacrylate

monomer and two carboxylic groups along with ion leachable glass. There is no water in the composition of these materials and the glass particles are partially silanated to ensure some bonding with the matrix.

Advantages

- Superior working characteristics to resin modified glass ionomer cement
- Ease of use
- Easily adapts to the tooth
- Good esthetics
- Good fluoride release

Giomer (pre-reacted glass-ionomer)

Giomers are a relatively new type of restorative material. The name 'giomer' is a hybrid of the words 'glass ionomers' and 'composite'. They have the properties of both glass ionomers (fluoride release, fluoride recharge) and resin composites with excellent esthetics, easy polishability, and biocompatibility.

Ketac™ N100 Light Curing Nano-Ionomer Restorative

A nano-ionomer is an aesthetic, fluoride-releasing restorative solution. Easy to create a high initial gloss and achieve a smooth final surface. Saving time in difficult to polish situations such as Class V's. Reduces waste, quick delivery of the material and the right mix every time.

NVP modified glass-ionomer cements

Modification of conventional glass-ionomer cements with N-vinylpyrrolidone containing polyacids, nano-hydroxy and fluorapatite to improve mechanical properties. After 24h setting, the NVP modified glass-ionomer cements exhibited higher compressive strength (163–167MPa), higher diametral tensile strength (DTS) (13–17MPa) and much higher biaxial

More Recent Advances in GIC

- Zirconia–Glass Ionomer Cement—A Potential Substitute for Miracle Mix
- Reactive fibre reinforced glass ionomer cements
- Chlorhexidine containing GICs
- Bioactive glass containing GIC

Composites

Bowen resin, was made up from the combination of bisphenol –A and glycidyl methacrylate. Developed by Bowen, a polymer based on dimethacry late chemistry. This polymer was generally known as Bis-Glycidyl Methacrylate. Composite are finely ground amorphous silica or quartz with wide distribution in particle size Average size 8-12 microns; up to100microns can also be present. Problems of surface roughening and low translucency associated with traditional and small particle composites is overcome by the use of micro filled composites.

A modification of Small Particle Filler and hybrid composites results in flowable composites Adapts intimately to a cavity. Used as a cavity base or liner; where access is difficult. There are condensable composites, to enable clinicians to apply techniques similar to those used for amalgam restorations. Have higher strength.

Micro filled composite is greater than that of unfilled acrylics because of transfer of stress from matrix to filler particles. Tensile strength and elastic modulus and hardness is also increased. Increase in hardness is due to filler reinforcement and cross-linked resin structure

Ceromers

Ceramic Optimized Polymer was introduced by Ivoclar Composition: It is Composed of specially developed & conditioned fine particle ceramic fillers of submicron size (0.04 & 1.0 μm), which are closely packed (75 – 85 weight %) & embedded in an advanced temperable organic polymer matrix.

Properties of ceromers = composites & they exhibit fluoride release lower than conventional glass-ionomers or compomers.

Ormocers:

Dr. Herbert Wolters from Fraunhofer Institute for Silicate Research introduced this class of material in 1994.Ceromers combine the advantages of ceramics and composites. These are Durable estheticswith High abrasion resistance and stability. Have Excellent polishing abilityand are Effective bond with luting composite. Acronym of Organically Modified Ceramic Represents a novel inorganic-organic copolymer in the formulation -allows for modification of its mechanical parameters.

E.g.; Definite Inorganic condensing molecule segment is used to build inorganic network. An inorganic Si-O-Si network is developed through targeted hydrolysis and inorganic polycondensation in a sol-gel process. ORMOCER has a biocompatible polysiloxane net with low shrinkage

Composite Inserts

Preformed shapes & sizes of glass ceramic whose surfaces have been silane treated. Available in different shapes: L, T, round, conical, cylindrical size 0.5-2mm (mega fillers).

Application: Used to minimize the marginal contraction gaps in composite fillings.

Properties: they have Low coefficient of thermal expansion and Wear resistant.

Fiber reinforced composites

First described in 1960s by Smith, when glass fibers were used to reinforce polymethyl methacrylate. Contain fibers aimed at enhancing the physical properties. This group of materials is very heterogeneous; depending on the nature of the fibergeometrical arrangement of fibers overlying resin used. Fibers within the composite matrix are bonded to the resin via an adhesive interface. Fibers increase the structural properties by acting as crack stoppers. The resin matrix acts to protect the fibers and fix their geometrical arrangement, holding them at predetermined positions to provide optimal reinforcement

Nanocomposites

Nanotechnology refers to the deliberate placement, manipulation and measurement of sub-100 nanometer scale

matter. The first nanocomposite introduced was Filtek Supreme (3M ESPE). With its nanosized particles and another few technologies called "clustering"; it provided more polishibility without sacrificing strengthClustering is a process by which numerous nanoparticles are combined to form larger particles. They are available in 30 different shades in 4 opacities (dentin, body, enamel and translucent).

Advantages

- Superior translucency and esthetic appeal, excellent color, high polish and polish retention.
- Superior hardness, flexural strength and modulus of elasticity.
- About fifty percent reduction in polymerization shrinkage.
- Excellent handling properties.

Smart Composites

Introduced as the product Ariston in 1998.Smart Composites are active dental polymers that contain bioactive amorphous calcium phosphate (ACP) filler capable of responding to environmental pH changes by releasing calcium and phosphate ions and thus become adaptable to the surroundings. These are also called as intelligent composites.

It is the Barium, Aluminum Fluoride, silicate glass filler (1m) with Ytterbium trifluoride, silicon dioxide and alkaline glass (1.6 m) in dimethacrylate monomers.

This phenomenon is based on a newly developed alkaline glass filler and is expected to reduce the formation of secondary caries at the margins of the restorations due to an inhibition of bacterial growth, a reduced demineralization and a buffering of acids produced by cariogenic micro-organisms It releases functional ions- fluoride, hydroxyl, and calcium ions as the pH drops in the area immediately adjacent to the restorative materials, as a result of active plaque.

Conclusions

Dental amalgam should be phased-down throughout the world. Alternative restorative materials with improved properties are need for the future. A coordinated world-wide approach to research and funding for those materials is needed. Foremost, restorative dentistry must strongly promote the prevention of dental caries to reduce the need for restorative materials and emphasize the best management practices for all materials in use.

The need of the hour is to completely ban the use of Amalgam to prevent the exposure of mercury on the human health and the environment. Until we achieve the complete success in eliminating the use of amalgam, it is necessary that knowledge regarding the detrimental effect of amalgam to the environment and human health should be spread to the dental professionals and to the dental schools. With, the more emphasis put on the use of mercury –free dentistry.

The recent advancements which have introduced a true revolution in the field of restorative dentistry have enabled the dental clinicians to perform better and to present high quality service for their patients.

"The world hates change, yet it is the only thing that has brought progress." --Charles Kettering

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CASE REPORT ARTICLE

Management of Severely Resorbed Mandibular Ridge Using Neutral Zone Technique :A Case Report

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Abstract

Residual ridge resorption leads to a compromise in denture stability and retention. A neutral zone approach can be used to enhance denture retention and stability using all the oral muscular forces in balance to enhance the quality of life in such patients. This case report describes the use of the cocktail impression technique for resorbed ridges along with the neutral zone approach to increase denture stability and retention.

Keywords: Cocktail impression technique, Denture stability, Neutral zone, Resorbed ridges.

Introduction

The surrounding neuromuscular system in the oral cavity affects the stability of complete dentures. The cornerstone of successful, stable dentures is the synchronization of the complete dentures with neuromuscular function.[1]

The neutral-zone technique for the fabrication of a complete denture is not a new or unique approach but is the synthesis of many men's beliefs and ideas into a feasible and effective technique.[2] Loss of the natural teeth in the oral cavity leads to the potential denture space. A neutral zone, also known as a zone of minimal conflict, is the potential space where the inward forces of the lips, cheeks are balanced by the outward forces of the tongue.[3]

This case report entails the use of the neutral zone technique along with the cocktail impression technique for the management of severely resorbed ridges.

Case Report

A 60- year old male patient reported to the Department of Prosthodontics with the chief complaint of inability to eat food due to the missing teeth in the upper and lower arch from the past 10 years. The patient also had a history of the previous loose lower denture. Intraoral examination revealed a low- well rounded mandibular ridge making it difficult for the fabrication of a stable denture. The tongue was enlarged due to the long span of edentulism.

Treatment Plan

The various treatment alternatives were addressed after a comprehensive examination of the patient's history and current clinical circumstances. Pre-prosthetic procedures followed by conventional complete denture prosthesis, implant-supported prosthesis, and conventional complete denture prosthesis were the various treatment choices. The patient chose the conventional complete denture as the treatment option.

On the first clinical visit, the primary impression of the maxillary and the mandibular ridge was made **(Figure 1A)**. Impressions were poured using dental plaster to obtain the primary casts. Custom trays were fabricated using the auto polymerising resin. The mandibular custom tray was fabricated with cylindrical rests placed on the molar region using the auto polymerising resin.

On the second clinical visit, border molding and the definitive impression was made using green stick and the zinc oxide eugenol impression paste respectively for maxillary arch**(Figure 1B)** whereas that of the mandibular ridge was made using the cocktail impression technique. Wax spacer was removed and the impression was made using McCord and Tyson's technique [4] by loading tray with 3:7 parts of impression compound and green stick. Various functional movements like sucking cheeks, licking the lips, and swallowing were performed to record the impression in the functional state **(Figure 1C)**. Reheating the impression or adding to deficient areas is not done to avoid differential tissue loading. Wash impression **(Figure 1D)** was then made using light body consistency addition silicone and poured using dental stone to obtain the master casts **(Figure 1E)**.

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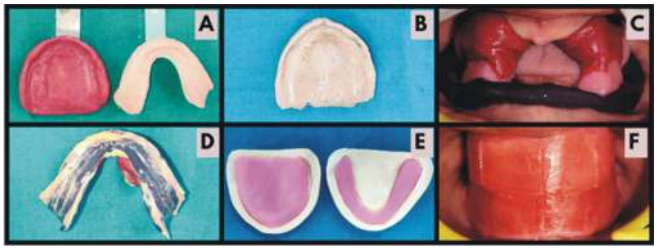

Figure 1: A) Primary impression of the maxillary and mandibular arch, B)Final impression of the maxillary arch, C) Single-step cocktail impression technique with the admixed material, D) Final impression of the mandibular arch, E) Temporary denture bases adapted on the maxillary and the mandibular arch, F) Recording of jaw relations.

On the third clinical visit, maxillo mandibular relationships were recorded **(Figure 1F)** and mounted on the mean value articulator **(Figure 2A)**. The mandibular occlusal rim was then removed from the denture base and spurs or fins made of a stainless steel wire corresponding to the occlusal rim height were adapted to the denture base posteriorly using the auto polymerizing resin. Green stick wax was placed anteriorly on the mandibular denture base corresponding to the anterior height of the mandibular occlusal rim **(Figure 2B).**

On the fourth clinical visit, the admixed material (3:7 parts of impression compound and green stick) was then placed on the mandibular base plate and the patient was then asked to perform various functional movements like talking, swallowing, drinking water, licking the lips, sucking the cheeks, etc **(Figure 2C)**. The set impression was removed from the mouth after 5-10 minutes and examined. The neutral zone was then recorded and the putty index was made **(Figure 2D)**. The admixed material and spurs were removed followed by the addition of modelling wax for the teeth arrangement **(Figure 2E)**. Teeth arrangement was done according to the putty index**(Figure 2F)**.

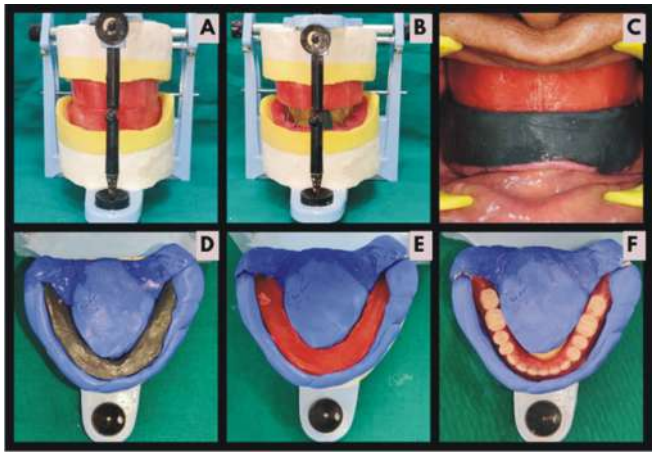

Figure 2: A) Mounting of occlusal rims on the mean value articulator, B) Spurs made of a stainless steel wire were adapted to the denture base, C) Recording the neutral zone, D)Putty index corresponding to the neutral zone, E) Wax was melted and added in the space provided by the admixed material, F) Teeth arrangement according to the putty index.

On the fifth clinical visit, the try-in of the denture was done to check the fit, function, and esthetics **(Figure 3A)**.

On the next clinical visit, the patient was delivered the final complete denture, finished and polished**(Figure 3B)**. The patient was kept on a regular 3 monthly follow-up. The patient found the denture satisfactory.

Figure 3: A) Try-in of the complete denture, B) Insertion of the complete denture, C) Pre-rehabilitative frontal view of the patient, D) Post-rehabilitative frontal view of the patient.

Discussion

The ultimate goal of prosthodontics is to restore form, function, and aesthetics. Anatomic, metabolic, functional, and prosthetic aspects all have a role in the rate of residual ridge resorption. [5] Although our understanding of these causes is limited, we are aware that resorption can occur despite our best attempts to prevent it.

One of the main functional concerns in the atrophic mandible, aside from instability, is the inability of the remaining residual ridge and its overlying tissues to sustain masticatory stresses. Furthermore, because the muscle attachments are at the crest of the ridge, the muscles have a higher dislocating impact. As a result, the impression must precisely capture the range of muscle motion as well as the areas into which the denture may extend without dislocating.[4]

The impression material advised by McCord and Tyson for atrophic mandibular ridges was utilized to capture the functional position of the muscles. This homogeneous material allows for the creation of a definitive impression in a single step by moulding it in a suitable viscosity. Further, the mandibular rests that fit on the maxillary alveolar ridge have the benefit of stabilizing the custom tray during the final impression by avoiding horizontal movement.[6]

The neutral zone has been recorded using a number of materials throughout the years, including impression plaster, waxes, impression compound, tissue conditioners, and polyether. The patient may ingest bits of impression plaster while performing functional motions because impression plaster is chaotic. The impression compound has a high viscosity, making

it difficult to perform oral tasks including blowing, sucking, and pursing the lips. The uniform softening of all wax rims is crucial for capturing full functional motions, and if done incorrectly, might result in an erroneous neutral zone recording. Tissue conditioners lack adequate substance, making them difficult to use even when held by wire loops. Polyether impression material sets by an irreversible chemical process, making any changes to the set material and reuse impossible. Admixed material is a low viscosity substance, allowing easier manipulation of the musculature of the mouth. It improved flow and provided a more accurate impression. It also provides good results in patients with poor neuromuscular coordination.[7]

The neutral zone approach for the fabrication of denture makes advantage of their stabilizing capabilities instead of being displaced by surrounding soft tissues. The laboratory component of this procedure is a drawback. It is important to increase laboratory time and expense, and the laboratory worker must be educated to support this clinical practice.[1]

Conclusion

Modifications to treatment plans and techniques should be explored to meet the functional and aesthetic needs of the patient. The cocktail impression technique provides a relatively simple and effective method for the rehabilitation of patients with severe atrophic ridges. The neutral zone is another simple alternative method for the fabrication of complete dentures in patients with severely atrophic ridges which aims to provide a denture that is stabilized by the oral musculature.

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REVIEW ARTICLE

Nanodentistry : Dream of Today, Reality of Tomorrow

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Introduction

Nanotechnology is the manipulation of matter in the molecular and atomic levels. Its concept was first elaborated in 1955 by the late Nobel Prize winning physicist, Richard P. Feynman. Nanotechnology in dentistry is a research on a new approach towards dentistry, using nanosized restorative materials, nanodimensio -nal drugs and newer technologies with nanomachines.

Nanodentistry includes-

- Nanomaterials
- Nanorobots

Nanomaterials

Recent advances in nanomaterials have brought nanocomposites, nanoimpression materials and nanoceramic into the domain of clinical dentistry. Nanofillers have better mechanical strength and polishing qualities, and nanozirconia ceramics are used in the manufacture of dental crowns.

Nanorobots:

Nanorobots have a diameter of 0.5-3 microns and made of components sized from 1-100 nanometres. These nanorobots which are carbon based molecules, are largely in the research and development phase. They are computer controlled microscopic devices enabling clinicians to execute accurate procedures at the cellular and molecular level.

Uses of Nanotechnology in Various Fields of Dentistry

1. Nanotechnology in Local Anaesthesia

Colloidal suspension with millions of active analgesic nanorobots will be applied in the gingiva of required tooth. These nanorobots will then reach the pulp within minutes, and shut down pain in the specific tooth. After finishing of the procedure, clinician can make the nanorobots restore all the sensations.

2. Nanotechnology in Orthodontics

Recent advancement in orthodontic treatment to reduce undesirable friction is nano-coated arch wires and brackets. Nanoparticles of tungsten-disulfide and nickel-phosphorus nano particles have been recently used to coat Nickel-Titanium(NiTi) and stainless steel wires.

Dr. Sims proposed the use of nanorobots instead of brackets, programmed to control bone and periodontal ligament response to achieve painless tooth movement in less duration of time.

3. Nanotechnology In Site Specific Drug Delivery

Targeted drug and gene delivery system have been developed by Osaka University in Japan. Controlled drug delivery using nanoparticles reduces drug dosage related side-effects. It will be a boon in cancer treatment where tremendous side-effects of the drug are seen. Recently, new drug delivery systems have been developed using nanoparticles with triclosan, which will halt the advancement of periodontal disease.

4. Nanotechnology in Caries Control

To control caries, use of genetically modified bacteria BCS3-L1[4](NANOROBOT). But how will they work?

· Identify the pathogenic microorganisms S. mutans, and replace it

· No production of acid from sugar.

Tschoppe et al. stated that caries can be prevented with toothpaste containing nanohydroxyapatite which would help to enhance remineralisation of enamel and dentin.

5. Nanotechnology in Hypersensitivity Cure

Hypersensitive teeth have dentinal tubules with twice the normal diameter. Nanorobots will reach the pulp chamber in just 100 seconds. They can occlude the dentinal tubules in more target specific and precise manner, resulting in quick and permanent recovery with precise and selective occlusion of dentinal tubules.

6. Nanotechnology in Correction of Bone Defects

Nanophase materials have a potential to be used in correction of maxillofacial defects. Two main types of nanophase materials used

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are nanophase hydroxyapatite(HA) and nanophase carbon. Nanophase HA(eg. Nan OSSTM HA, Ostim HA) has superior osteoblastic adhesion compared to traditional HA. Nanophase Carbon has superior biomechanical properties.

7. Nanotechnology in Dental Cosmetics

Nanocomposite material comprises of nano filler particles of size 1-100nm. diffused in the matrix of composite, which increases the durability and resistance to abrasion. The resulting superior colour and translucency increases the overall esthetics of the restoration.

8. Nanotechnology in Oral Cancer

' Quantum dots', which are tiny nanoparticles of size <10nm, show a very bright luminance when viewed under UV light. If coated with a material showing affection to cancerous cells, they can help in locating and detecting cancer cells at an early stage. Nanorobots can be applied to precisely deliver exact amount of chemotherapeutic agents directly to the target cells, sparing the normal cells, which will reduce the side effects. Such drug delivery nanorobots were termed 'Pharmacytes' by R.A. Freitas in 2000.

9. Nanotechnology in Periodontal Disease

Programmed nanorobots could identify and destroy pathogenic, disease specific bacteria harbouring the plaque, leaving aside the beneficial oral microflora, thus playing a key role in treatment of gingival and periodontal diseases.

10. Nanotechnology in Dental Implants

Nanoscale topographic modification increases the implant osseointegration. It includes immobilization of specific, active biomolecules known for their central role in osteogenesis on the surface of implants. Eg. Alkaline phosphatise, calcium phosphate coating and bone morphogenic protein.

11. Nanotechnology in Prosthodontics

Nanofillers, presently added to polyvinylsiloxane impression material, results in better flow, improved hydrophilic properties, detailed precision and less voids at the margin. Nanozirconia ceramic, used in the manufacture of dental crowns and dentures show excellent corrosion resistance, high fracture toughness and translucency.

Challenges faced by nanodentistry :

- Ø Biocompatibility
- Ø Economical nanorobot production technique
- Ø Precise positioning of nanomolecules
- Ø Co-ordination of activities of large numbers of independent nanorobots
- Ø Public acceptance and human safety

Problems for research in India :

- Ø Painfully slow strategic decisions
- Ø Sub-optimal finding
- Ø Lack of engagement of private enterprises
- Ø Problem of retention of trained manpower

Conclusion

It sounds like a science fiction, but as said by the late Noble Prize winner P. Feynman, “THIS IS A DEVELOPMENT WHICH I THINK CANNOT BE AVOIDED.” However, with developments it may also pose a risk for misuse. If used properly, it will revolutionize the diagnosis and treatment planning in the near future, alongwith tissue regenerative materials for improving esthetics in dental field.

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CASE REPORT ARTICLE

Aesthetic Management of Idiopathic Gingival Enlargement: A Case Report

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Abstract

Gingival enlargement is a common clinical condition caused by a number of reasons that includes inflammation, medications, systemic diseases and conditions etc. The balance between gingiva and clinical portion of teeth is lost resulting in poor aesthetics. Idiopathic gingival enlargement is a rare condition of undetermined cause characterized by progressive fibrous overgrowth of the gingival tissues. Gingivectomy is the treatment of choice which can be done by surgical excision using scalpels, electrocautery & electrosurgery, soft tissue lasers etc. This case report presents "aesthetic management of idiopathic gingival enlargement in a 17 year old male patient."

Keywords: Aesthetic, External bevel gingivectomy, Gingival enlargement, Gingival fibromatosis, Idiopathic

Introduction

Aesthetics is one of the major factors which influence the treatment planning in the field of clinical dentistry. For a harmonious smile, it is important to maintain a balance between gingival and coronal portion of teeth. In cases of gingival enlargement this balance is lost resulting in poor aesthetics. Patients with gingival enlargement usually presents clinically due to functional and aesthetic problems. Gingival enlargement can be caused by multiple reasons e.g. inflammation, medications, systemic diseases and conditions etc.

Idiopathic gingival enlargement is a rare condition of undetermined cause characterized by progressive fibrous overgrowth of the gingival tissues. The enlargement affects the attached gingiva, the gingival margin, and the inter dental papillae. The facial and lingual surfaces of the mandible and maxilla usually are affected, but the involvement may be limited to either jaw. The enlarged gingiva is pink, firm, and almost leathery in consistency, and it has a characteristic minutely pebbled surface. In severe cases, the teeth are almost completely covered, and the enlargement projects into the oral vestibule. The jaws appear distorted because of the bulbous enlargement of the gingiva. Secondary inflammatory changes are common at the gingival margin.[1]

Excessive gingival tissue may obstruct the exfoliation of deciduous teeth and eruption of permanent teeth. After removing the obstruction eruption of permanent teeth can be expected. The enlarged tissue may cause diastema, pathological migration and may delay or impede tooth eruption. In severe cases, mastication, phonetics and aesthetics may be affected. The beginning of the enlargement usually coincides with the eruption of permanent teeth; however, cases have been reported to occur even in deciduous dentition and rarely at birth.[2,3] This case report addresses the diagnosis and aesthetic management of idiopathic gingival enlargement in a17 year old male patient."

Case Report

A 17 year old male accompanied by his mother reported to the Department of Periodontics, Maulana Azad Institute of Dental Sciences, New Delhi with the chief complaint of swollen gums in upper and lower jaws preventing proper speech, articulation, and mastication, causing inadequate lip apposition and poor esthetics. The enlargement was gradually increasing in size and causing discomfort to the patient aesthetically and functionally. There was no associated history of drug intake, neither any physical or mental disorder was reported. Family history was also non-contributory. On general physical examination, gait of the patient was found normal. Patient was conscious to the time, place and person with little difficulty in phonetics.

On intra-oral examination, a generalized diffuse fibrotic enlargement of gingiva was found involving both buccal & linual/palatal sides. Gingival enlargement score of grade III was given, however it was not superimposed

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by any secondary inflammatory changes.**(Figure 1)**

Fig 1 Pre operative view

Retained deciduous canine was present in left maxillary arch with impacted permanent canine. Remnants of roots of left mandibular first molar were present. Probing revealed pseudo pockets with no loss of attachment and no mobility.

Panoramic radiograph revealed resorbed root of deciduous canine in left maxillary arch with permanent canine present periapically. Root formation of all the wisdom teeth was evident. No periodontal bone loss was noted.**(Figure 2)**

Fig 2 Panoramic view

All the lab investigations were with in the normal physiological range including complete haemogram, thyroid levels (T3, T4 & TSH), calcium and alkaline phosphatase level estimation.

A provisional diagnosis of idiopathic gingival enlargement was made on the basis of all the findings. A detailed treatment plan was made after establishing the diagnosis.

Treatment

Potential risks and benefits were explained to the patient's guardian and an informed consent was obtained.

Initially, phase 1 therapy was carried out for the patient which included oral prophylaxis, extraction of deciduous canine in left maxillary arch and left mandibular first molar followed by oral hygiene instructions.

After performing phase 1 therapy, patient was kept under review for 4 weeks and then surgical treatment was carried out quadrant wise using external bevel gingivectomy.

Surgical site was disinfected with 2% povidone-iodine solution and local anesthesia was given i.e. lignocaine HCl 2% with 1:200000 epinephrine.

Pocket depths were marked using crane-kaplan pocket markers. External bevel incision was given using Kirkland knife. Gingival tissue was removed using curettes and collected in 10% formalin for histopathological examination. Orban knife and tissue nippers were then used to contour the interdental papillae and remaining portion of excess gingival tissue. Hemostasis was achieved and periodontal dressing was placed. **(Figure 3)**

Fig 3 Surgical Management

Postoperative instructions were given to the patient along with the antibiotics and anti-inflammatory agents. Uneventful healing was observed by secondary intention.

H & E staining showed parakeratinized stratified squamous epithelium overlying a cellular fibroblastic tissue and extensive interlacing bundles of collagen fibers. The connective tissue stroma was vascular with plump fibroblasts. There was scattered inflammatory cell infiltrate which was mainly plasmalymphocytic in nature. Few mast cells were seen. Melanin incontinence was seen. **(Figure 4)**

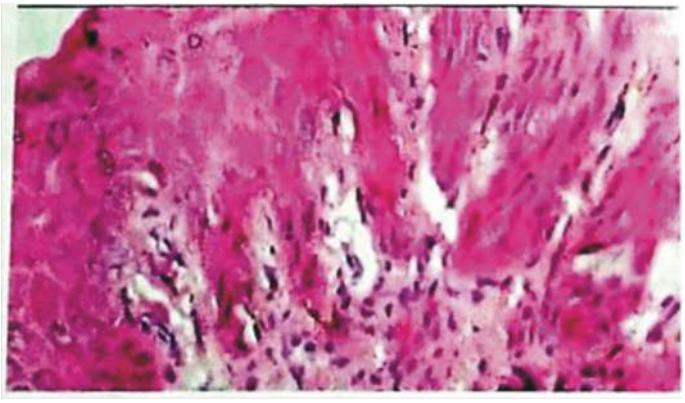

Fig 4 Histopathologic analysis

Frequent follow ups were carried out and no recurrence was noted. The impacted left maxillary canine was found to be continuously erupting in coronal direction.**(Figure 5 & 6)**

Fig 5Post operative view (2 months)

Fig 6 Follow up after 18 months

Discussion

Gingival fibromatosis is one of the types of gingival enlargement and it is further classified into hereditary and idiopathic forms. Idiopathic forms of gingival fibromatosis have not been linked to specific genes or any other etiology, and the condition is designated as idiopathic. While hereditary gingival fibromatosis has been linked to several genetic loci and it can develop as an isolated disorder or a feature of a syndrome.[4,5,6,7] A distinction can be made between the two forms by asking the family history and postnatal history.

Various known syndromes associated with gingival enlargement includes Rutherford's syndrome (corneal dystrophy), jones syndrome (progressive deafness), Murray-PureticDrescher syndrome (multiple hyaline fibromas), Laband syndrome, cross syndrome[8], Cornelia De Lange syndrome, Ramon's syndrome, Hypothyroidism, chondrodystrophia, and diffuse osteofibromatosis[9] (GF with osteofibrosis), Wynne and colleagues[10] have reported a syndrome which is associated with hearing deficiencies, hypertelorism, and presence of supernumery teeth.

Various treatment modalities have been advocated including surgical excision using scalpels, electrocautery & electro surgery, soft tissue lasers etc. While selecting the mode of treatment, the operator should be aware of the advantages and disadvantages of each technique. Surgical excision using scalpels is relatively fast but it becomes difficult to manage bleeding at times. Soft tissue laser provides excellent hemostasis but it is relatively time consuming, hence not indicated in excessive enlargement case. Electrocautery & Electrosurgery also provide excellent hemostasis but relatively uncontrolled and can cause bone necrosis if comes in contact. Recurrence is not rare in such cases so regular follow up should be systematically planned. A gradual repositioning of the pathologically migrated teeth is also reported after surgical therapy.[11] This could be explained by the removal of the etiological factors such as pressure produced from enlarged gingiva and disturbance in the force of oro-facial musculature.[12,13] Orthodontic and prosthetic management should also be considered if needed.

Conclusion

Once the correct diagnosis is made, prognosis can be determined. In case of idiopathic gingival enlargement, prognosis is usually good. Of all the treatment modalities available, the operator should choose the best option. External bevel gingivectomy is still considered the gold standard. Biopsy should be performed to confirm the diagnosis and to rule out any other pathology. Recurrence is common, which can be prevented by regular follow up including patient motivation regarding oral hygiene maintenance.

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