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JIDAK Apr.- Jun. 2020, Volume 2 , Issue 2

JOURNAL OF INDIAN DENTAL ASSOCIATION - KOCHI

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Greetings from the editorial board of JIDAK

As the world witnesses an unprecedented pandemic of COVID 19 outbreak, we see our world turn upside down around us! The social activities, continuing dental education programmes, hands on programmes and even the activities of dental education institutions are affected! We also see that the utilisation of the online platforms are on the rise for imparting education in every field! In this context the pioneer online journal of IDA Kochi - JIDAK is a well sought after one! We thank all the contributors and our technical team who help us to bring out the journal with all its glory even in this testing times!

Thanking you

Dr. Meera Gopalakrishnan
Chief Editor- JIDAK
IDA Kochi

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ORIGINAL RESEARCH ARTICLE

EFFECT OF IN-OFFICE BLEACHING ON SHEAR BOND STRENGTH OF NEWER UNIVERSAL BONDING AGENTS

ABSTRACT

Objective: To evaluate the effect of in office bleaching on the shear bond strength of a new universal bonding agent to enamel

Materials and methods: 30 human maxillary premolar teeth extracted for orthodontic purposes were selected. Roots of all teeth were embedded in acrylic resin block with only 3-4mm of the crown exposed. Specimens were randomly divided into two groups (n=15).Group I- positive control group, intact enamel, no bleaching done. Group II - experimental group-enamel surfaces were bleached with Pola office (35% Hydrogen Peroxide Gel, SDI). Each specimens of Group I and Group II were etched with 37% phosphoric acid (Scotchbond etchant gel, 3M ESPE) and bonded with Universal Bonding agent (3M™ Single Bond Universal Adhesive). This was followed by composite (Filtek Z350 XT, 3MESPE, Dental Products) build-up in incremental technique in 3 increments of 1mm each to a height of 3mm. All specimens were then stored in distilled water for 24 hours. Shear bond strength was tested using universal testing machine and vertically loaded at a crosshead speed of 1 mm/min in shear mode until fracture occurred and data were analysed using ANOVA.

Results: Results showed that there was a statistically significant difference in the bond strength between unbleached and bleached teeth (P<0.005). The mean bond strength of control group was seen to be significantly higher (25.01 ± 1.76) as compared to the experimental group (6.82 ± 0.53).

Conclusion: The bleaching significantly affects bond strength of universal bonding agent to enamel

Key words – universal bonding agent, in office bleaching, shear bond strength

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J Ind Dent Assoc Kochi 2020;2(2):2-6.

INTRODUCTION

Dental aesthetics has pronounced impact in our beauty-conscious society.[1] The appearance of the teeth is determined by socio-cultural values and individual preferences.[2]

As esthetics is attaining more attention, tooth discoloration is becoming a greater concern and its management is dependent on the diagnosis. Treatment choices include micro abrasion, Bleaching, Composite Resin Restorations, and Porcelain Veneers etc. Now a days people desire for more conservative methods of treatment. A safe, popular, conservative, well-accepted treatment modality for discolored teeth is vital bleaching.[3] In spite of excellent esthetic outcomes, the clinicians should be aware of the outcome of the bleaching treatment and the interactions with other dental treatments.[4]

On application of bleaching agent, hydrogen peroxide on tooth surface it undergoes ionic dissociation and gives rise to the formation of free radicals such as hydroxyl radical, per-hydroxyl, nascent oxygen, and superoxide anions, which are the most potent free radicals. These extremely reactive free radicals will react with the electron-rich regions of pigment within the tooth leading to dissociation of the larger pigmented molecules into smaller and less pigmented molecules.[5]

In some cases bleaching may be indicated prior to an aesthetic composite resin restoration to obtain a more pleasing final shade.[6] Bleaching procedures can result in chemical and morphological changes in enamel,[7] which has shown to result in reduction of shear bond strength values in composite resin restorations. This could be due to the release of residual oxygen from the bleaching agent, which interferes with resin infiltration into etched enamel and inhibits resin polymerization.[8]

Several studies have shown that bleaching enamel significantly compromises the composite-enamel bond strength achieved with total etch bonding systems[6] and with self-etching primers.[7]

The multi-step dental adhesives have been promoted since the early 1990s and can still today be considered as 'gold-standard' adhesives.[9]

The market-induced demand for simplified adhesive procedures has rapidly led to the development of the self-etch adhesives which follow a trend towards simplification.

A new class of bonding agent has been introduced in which manufacturer claim that it can be used in Total etch and self-etch and selective etch mode (Adper single Bond Universal).

Single Bond Universal adhesive utilizes the MDP (methacryloxydecyl phosphate) monomer, as well as incorporates silane into the chemistry. 10-MDP (10-methacryloyloxydecyl dihydrogen phosphate) has been identified as being capable of establishing a very intensive and stable chemical interaction with hydroxyapatite. The MDP-Ca water-insoluble salts contribute to the protection of the collagen fibers.[10] Literature have shown that Universal Dentin Bonding agent significantly improves the shear bond strength to enamel.[11] Chemical bonding in Single Bond Universal between 10-MDP and enamel may play an important role in forming stable and durable interfaces by providing acidity for its self-etch capability.[12] Although the literature revealed many studies comparing this new class of bonding agents, but the effect of in office bleaching on shear bond strength of universal bonding agent is not been investigated and it is crucial to evaluate the bonding ability of adhesive to bleached enamel as bleaching procedures have become popular. Hence, the aim of the present study is to evaluate and compare the effect of in-office bleaching on shear bond strength of newer universal bonding agent to enamel.

MATERIALS AND METHOD

Specimen Preparation: Thirty intact, non-carious human maxillary premolars extracted for orthodontic purposes were collected. The teeth with severe attrition, erosion, fractures, cracks were excluded. The roots of all teeth were embedded in acrylic resin block with only 3-4mm of the crown exposed and the specimens were randomly divided into two groups, each group containing 15 samples.

Group I- positive control group, intact enamel, no bleaching done.

Group II -experimental group -enamel surfaces

were bleached with 35% Hydrogen Peroxide Gel (Pola office, SDI)

Each specimens of Group I and Group II were etched with 37% phosphoric acid, Scotchbond etchant gel (3M ESPE, USA) and bonded with Universal Bonding agent, Single Bond Universal Adhesive (3M ESPE, USA). This was followed by composite build up using Filtek Z350 XT (3M ESPE,USA) in incremental technique in 3 increments of 1mm each to a height of 3mm.[13] All specimens were then stored in distilled water for 24 hours as it appeared to restore bond strength but not to a point that was statistically significant.[7]

Shear Bond Strength testing: The SBS was tested using universal testing machine (Instron, UK) and vertically loaded at a crosshead speed of 1mm/min in shear mode until fracture occurred.

RESULTS

The values obtained were statistically analyzed using computer software Statistical Package for Social Sciences (SPSS) version 16.0. One-way analysis of variance (ANOVA) was used to analyze the data. Significance was established at $p< 0.05$ level.

As shown in **table 1**, there was a statistically significant difference between the control and the experimental group ($P <0.005$). The mean bond strength of control group was seen to be significantly higher (25.01 ± 1.76) as compared to the experimental group (6.82 ± 0.53).

Table 1. Comparison of mean SBS values of different groups (MPa).

GROUP	N	MEAN	STANDARD DEVIATION	ANOVA
CONTROL	15	25.0130	1.76806	F= 355.62
BLEACHED TOOTH	15	6.8252	0.53461	P< 0.005

DISCUSSION

Tooth whitening is a well tolerated, completely safe, and well accepted procedure for the removal of extrinsic stains of the teeth. Vital tooth bleaching proposed by Haywood and Heymann in 1989 is the most commonly used method.[14] In-office bleaching technique is faster and more effective treatment which involves using high concentrations of carbamide or hydrogen peroxide.[15]

In most cases, tooth bleaching is done before esthetic restorative procedures.[16] Bleaching procedure is an oxidation reaction that releases free radicals.[17] A decrease in bond strength immediately after bleaching of teeth is a concern and is of great clinical significance.[15] In addition, bonding process immediately after tooth bleaching affects the marginal seal of composite resin restorations as it causes deleterious effects on organic and inorganic components of enamel causing micro to nano morphological changes leading to cracks and craters[17], also the residual peroxide radicals interfere with the polymerization of composite resin reducing the penetrating ability of resin adhesives into enamel.[18] This results in microleakage, which can lead to marginal discoloration, recurrent caries and pulp inflammation after composite resin restorations.[19,20] It has been postulated that a delay in bonding procedure from 24 hours to 2 weeks after the bleaching procedure restores the bond strength.[15]

The present study showed that the means of shear bond strength values with the adhesive system in both the study groups were significantly different. It also found that the unbleached enamel exhibited a higher bond strength when compared to bleached enamel.

A decrease in bond strength subsequent to bleaching might be attributed to the presence of oxygen in enamel, which is an inhibitory factor for polymerization reactions of free radicals. Oxygen reacts with the free radicals and oxidizes them and has a low affinity to react with monomers.[21] Whereas Perdigao et al reported that this decrease in bond strength after bleaching might not be attributed to the

presence of oxygen in enamel; rather, dentin might function as a reservoir and pooling of oxygen in dentin might be a factor for a decrease in bond strength.[22]

Moreover, some researchers have studied on the morphological and organic alternations in enamel structures, the loss of calcium, and decrease in micro hardness as important factors resulting in reduced enamel bond strength. In another study where SEM observations has shown that the interfaces between resin and bleached enamel has large areas of enamel surface which were free of resin or the present tags were fragmented, poorly defined, and penetrated to a lesser depth than in the unbleached controls.[21]

Potocniket al. studied the effect of carbamide peroxide bleaching gel and it showed that bleached enamel had eroded prism cores and striae of Retzius which were similar to structural changes seen in caries. Also the concentrations of calcium and phosphorous were lowered in bleached enamel due to the demineralizing effect of the bleaching gel, which thereby reduced the surface energy and bond strength. Furthermore, for the bonding procedure, when the bleached enamel was etched, the usual keyhole appearance was not seen, rather an over etched appearance with loss of prismatic structure was observed. Numerous voids and bubble like structures were seen inside the adhesive layer which suggested that the oxygen released by the decomposition of hydrogen peroxide was trapped within the adhesive during light activation.[14] These findings might be the reason for the reduced bond strength of composite to bleached enamel obtained in this study.

Previous studies suggested the subsurface enamel organic matrix was altered by the oxidizing effect of hydrogen peroxide.[23,24] These are not permanent structural alterations, but reversible changes in redox potential of the organic components.[25] The antioxidant can restores the altered redox potential of the oxidized bonding substrate. Thus the compromised bonding of composite resin to acid etched-bleached enamel can be reversed by sodium ascorbate, an antioxidant.[21]

The data from the present study and previous experiments suggest that immediate bonding of composite may result in less compromised composite bond strength when restorative work is to be completed immediately after bleaching. If elective dental treatment may be postponed for several days, the choice of the bonding agent becomes less critical. Further studies are required to evaluate longevity of bond strength between universal adhesives and bleached surface over time.

CONCLUSION

Within the limitations of this study, it was concluded that bonding of composite to unbleached enamel was found to be better when universal adhesive agent was used.

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COVID-19 THE NEW HAVOC AMONG PEDIATRIC DENTISTS : A REVIEW

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ABSTRACT

The novel virus severe acute respiratory syndrome coronavirus 2(SARS - Cov -2) causing coronavirus disease has become one of the global pandemics. This has become one of the most significant challenges to the health care profession. Dental practices are focal points of cross-infection. This is because the work environment of a dentist involves close patient contact and aerosol production. Children are also more prone to this infection. As the number of COVID - 19 cases may increase in the future, the pediatric dentist should be well informed about the signs and symptoms as well as the strict infection control measures to be followed in these cases. Also, parents should be reassured that pediatric dentists use all the necessary precautions needed to avoid the spread of the disease. The pediatric dentist should also try to reduce the stress in parents and children and create a relaxed and anxiety-free environment. The aim of this paper is to highlight the clinical recommendations to be followed by pediatric dentists providing care for children during this pandemic. Special attention should be given to medically compromised children. Minimization of aerosol-generating procedures and case-based selection of minimally invasive methods are recommended.

Keywords: COVID-19, Pandemic, Pediatric dentistry, Aerosol generating procedure, Atraumatic Restorative Technique, Interim Therapeutic Restoration, Filtering Facepiece, Personal Protection Equipment, Silver Diamine Flouride.

J Ind Dent Assoc Kochi 2020;2(2):7-12.

INTRODUCTION

At the beginning of 2020, a novel virus, the Severe Acute Respiratory Syndrome Coronavirus (SARS - Cov - 2) resulted in Coronavirus disease (COVID - 19), a global pandemic. It was declared as Public Health Emergency of International Concern (PHEIC)[1] by the World Health Organization (WHO) Director-General based on the recommendations of the International Health Regulations Emergency committee (2005).[2] In December 2019 "COVID - 19" Originated in China. The virus exposed about 7 billion humans on our planet to one of the worst pandemic known to the global population since the Spanish flu Pandemic in 1918 -19 (Synder and Ravi 2018).[3] This has even infected the pediatric population (Dong et al. 2020).[4] Pediatric COVID - 19 infections are reported to be relatively mild in symptoms when compared to adults. Children and adolescents are also reported to have a better prognosis (Shen et al 2020).[5] Mortality in children is also found to very rare (Sinha et al 2020).[6] Clinical features of COVID - 19 in children include fever and cough, but many children can remain asymptomatic and may contribute significantly to the transmission of disease. (Quietal 2020).[7]

The American Academy of Pediatric Dentistry (AAPD) issued a re-emergence practice checklist to help prepare the pediatric dentist to start their practice (American Academy of Pediatric Dentistry 2020).[8] Although the literature concerning the impact of COVID - 19 on pediatric dentistry is quite limited, this critical review aimed to provide a summary of the guidelines issued by different authorities regarding the management of pediatric patients during the COVID 19 pandemic.

Risk factors associated with Pediatric Dental Treatment

Because of the long incubation period (2-14 days approximately)[9], children can be asymptomatic or present with mild, non-specific symptoms. Hence all child patients should be considered as potential carriers of the virus as COVID 19 can be transmitted through direct and indirect contact mainly via respiratory droplets and splatter from saliva and blood.[10] The reason why COVID 19 cases in children are less severe than in adults is still confusing. It may be due to the active innate immune response, healthier respiratory tracts because they have not been exposed to cigarette smoke and air pollution as adults, and less underlying illness. Due to these specific features, the true rate of COVID 19 infection in children is underestimated.

As the possible COVID19 transmission routes include inhalation of airborne microorganisms, direct contact with blood; contact of conjunctival nasal and oral mucosa with droplets; aerosols containing microorganisms generated from an infected individual and propelled by coughing and squeezing and indirect contact with contaminated surfaces[11], pediatric patients present an additional risk of transmission. The use of a removable orthodontic appliance increases the risk of contamination if handling is not carried out with proper precautions. Another problem is related to the difficulty for the child to use personal protective equipment during dental visits. The presence of care givers with whom the pediatric dentist must unavoidably interact will increase the risk of infection. Following measures can reduce the transmission of virus from and to, to the child patients.

Tele Screening

The scheduling of patients should be performed via telephone contact. Caregivers must inform in advance if the child has been unwell in the last 24 hrs. If so, the appointment should be rescheduled. Parents are asked to arrive on time, avoid more than one bystander, and use a face mask. Brief medical history must be taken as certain chronic diseases like asthma, diabetes and immunodeficiencies are responsible for increasing the severity of COVID 19.[12] If a child who is COVID positive needs dental assistance, it should be scheduled at the end of the day. Extraoral radiography is preferred as a diagnostic aid because intraoral radiography induces salivation and favors cross-contamination.

Preoperative period

Care should be taken to prevent the transmission of the virus from infected children to professionals and other patients. Visual alerts like signs and posters should be placed at the office

entrance as well as in strategic locations like waiting areas and elevators. The waiting room should have spacing between the chairs. Magazines and toys should be removed to avoid surfaces exposed to contamination. There should be easy access to hand sanitizer in a different office setting.[13]

Environments should be well ventilated with an open window to renew the circulating air to reduce contamination by droplets suspended in the environment and deposited on surfaces for long period.[14] It is suggested to follow strict protocols of periodic clearing of the air conditioning system and installation of high-performance air filters. Upon arrival at the office, the body temperature of the patient and accompanying person should be checked using an infrared thermometer. Personal protective equipment such as a shoe protector, mask and cap for the child and companion should be provided. The patient should be instructed to wash hands before entering the clinical room. Filtering facepiece class 2 (FFP 2, equivalent to N 95) mask is recommended for both non-COVID 19 and COVID 19 confirmed cases irrespective of the use of aerosol-generating procedures(AGP)[15] (Clarkson et al 2020). 1% Hydrogen peroxide mouth rinse has been recommended due to its oxidative potential thereby reducing the viral load. In children, the use of 1% hydrogen peroxide with the addition of flavoring agents has been recomended[16].

Operative Period

The professional must remove all accessories like earrings, rings, bracelets, and watches. Men should avoid beard for the better sealing effectiveness of the face mask. The pediatric dentist should be friendly, casual, positive, and motivating to the patient. Avoid prolonged conversations during the pandemic period[17].A printed format of post procedural instructions for each procedure would be handy. Behavior modification of uncooperative children might pose a big challenge and use of pharmacological means of behavior modification should be considered as and when necessary. Regarding PPE, the dentist must wear PFF 2 respirator (without valve) waterproof and disposable grown, cap, protective goggles, disposable gloves, and face shield. The correct sequence of PPE donning involves wearing the mask, the protective goggles, the cap, the face shield, the disposable gown, and the protective gloves. The doffing of PPE must follow the reverse order.[18]

A pediatric dentist should be familiar with treatment options that eliminate aerosol-generating procedures as much as possible. This can be achieved by the use of sealants, Atraumatic restorative technique (ART), Interim therapeutic restorations (ITR), the Hall technique for stainless steel crowns, and Silver Diamine Fluoride(SDF) for arresting caries. Anticipatory Guidance and delivery of prevention information and preventive measures on a regular basis will reduce the need of aerosol generating procedures and should be practiced diligently, The importance of tooth brushing with fluoridated toothpaste to prevent tooth decay should be emphasized. Telephone and video consultations with parents to promote positive oral health behavior should be conducted.

Sealants

To arrest or reverse a non cavitated carious lesion on the occlusal surfaces of both primary and permanent teeth sealants along with 5% Sodium Fluoride varnish is recommended by ADA (Slayton et al 2018).[19] For the approximal surface, ADA suggests the use of 5% Sodium Fluoride varnish (application every 3-6 months) or resin infiltration alone or along with 5% Sodium Fluoride(Slayton et al).

Atraumatic Restorative Technique (ART)

The use of ART for both primary and permanent teeth in children presents a valid option to manage caries successfully during the pandemic. ART along with sealants presented a high caries preventive effect (De Amarim et al 2018).[20]

Interim Therapeutic Restorations

ITR is used to restore and prevent further decalcification and caries in young patients, uncooperative patients, and patients with special health care needs. The ITR procedure involves removal of caries using hand or slow speed rotary instruments followed by restoration with an adhesive material like RM-GIC (Breg 2002).[21]

The Hall technique

This is a non-surgical/non-invasive method used to restore a carious but asymptomatic primary molar. It relies on sealing non - pulpally involved carious lessons on primary molars using a preformed metal crown (PMC) and GIC (Welbury 2017).[22] No local anesthesia is used and no attempt to surgically remove the carious tissue is made (Innes et al 2015).[23]

Silver diamine fluoride (SDF)

SDF is a clear odorless liquid indicated for the desensitization of non-carious tooth lesions and molar incisor hypoplasia. The ADA recommends using SDF to arrest advanced caries lesions on any coronal surface of primary and permanent teeth (Slayton et al 2018).[24]

Postoperative period

Waste management should be performed in a safe and environmentally correct manner. Residues must be packed in impermeable bags made of material resistant to rupture and leakage. It should be placed in closed containers until disposal.

Appropriate measures for cleaning and disinfecting the dental operatory must be carried out. This should be done after a period of 1 to 2 hrs. This is because aerosols settle on the surfaces after this period.[25] Cleaning surfaces with neutral detergent are recommended followed by disinfection with 70% alcohol and 1% sodium hypochlorite.[26]

Patient recalls must take into consideration the risks and benefits of a dental appointment during the COVID-19 pandemic. Preventive measures should be reinforced for the patient. Oral hygiene measures should be reinforced.

Medically compromised Children

Children with medical conditions are at a significantly increased risk from COVID 19. This is because these children will have long term respiratory conditions like chronic lung disease, cystic fibrosis, asthma, etc. These children should not attend the hospital or dental clinic unless the dental condition is considered life-threatening (RCSENG 2018).[26] The AAPD recommended that the dental office should be prepared with the hospital office should be prepared with hospital protocols before treating children with special needs.

CONCLUSION

COVID - 19 will continue to have a major impact on the practice of pediatric dentistry. Dentists who treat children during this pandemic should use high standards of infection control procedures. Minimally invasive procedures that minimize or eliminate aerosol generation should be employed throughout the pandemic. The end of the pandemic will mark the beginning of new methods of approach and management in the field of pediatric dentistry. Since the COVID - 19 situation continues to evolve day by day, the pediatric dentist should keep a high level of awareness to help patients, minimize risk, and prevent viral spread.

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SUCCESSFUL MANAGEMENT OF GINGIVAL RECESSION ASSOCIATED WITH ROOT CARIES AND NON CARIOUS CERVICAL LESION USING SUB EPITHELIAL CONNECTIVE TISSUE GRAFT : A CASE REPORT

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ABSTRACT

Gingival recession is one of the most common manifestations of periodontal disease. The exposed cementum may be affected with carious and non-carious cervical lesions. Only restorative approach to treat these lesions to establish esthetics and function may not be sufficient. This paper presents gingival recession associated with carious and NCCL, successfully managed by soft tissue grafting (sub-epithelial connective tissue graft), resin-modified glass ionomer cement and composite restoration with stable results for a follow up period of 6 months.

Key words: Sub epithelial connective tissue graft, caries, non carious cervical lesion, periodontics-restorative interrelationship.

J Ind Dent Assoc Kochi 2020;2(2):13-7.

INTRODUCTION

Denuded root surfaces as a result of gingival recession are one of the most common manifestations of periodontal disease.[1] The causes of gingival recession are multifactorial, with poor oral hygiene, faulty tooth brushing, thin labial bone/ bony dehiscence, labially proclined teeth, orthodontic tooth movement being some of its etiologic and/or predisposing factors. The exposed cementum as a result of gingival recession most commonly leads to hypersensitivity, cervical abrasion, root caries and impaired esthetics.

Carious and non-carious cervical lesions (NCCL) are commonly associated with gingival recession and/or inadequate width of keratinised gingiva. The conventional treatment of following only restorative approach to treat these lesions may not be sufficient.[2] Therapy should also be aimed to increase the dimension of keratinised tissue to prevent or halt recession, which improves patient's ability to maintain plaque control.

Various techniques to treat gingival recession are free gingival grafts, sub epithelial connective tissue grafts, lateral pedicle grafts, use of soft tissue replacements such a cellualar dermal matrix, collagen membrane and amniotic membrane.[3,4,5] Sub epithelial connective tissue graft, till date remains one of the most predictable procedures to increase the width of keratinised gingiva as well as treat gingival recession, with superior esthetic results.[6]

This case report presents the successful management of gingival recession associated with root caries and cervical abrasion using sub epithelial connective tissue graft, along with resin modified glass ionomer cement and composite restoration.

CASE REPORT

A 28 year old systemically healthy, male patient reported to the outpatient department of SCB dental college and hospital, Cuttack, Odisha, with a chief complaint of sensitivity with respect to lower left back tooth region. The patient had no history of tobacco chewing or smoking. The oral hygiene status was fair.

On clinical examination tooth #33 and #34 were associated with Miller's class 1 gingival recession (fig 1). In addition, #33 was affected with cervical abrasion, while #34 was presented with cervical caries extending beyond cement-enamel junction. Both the teeth showed signs of dentinal hypersensitivity. Clinical probing measurements were as reported in table 1. Also, there was bleeding on probing with respect to the affected quadrant. Pulp vitality using electric pulp tester revealed that both teeth were vital.

Treatment goals for patient were to restore the lost soft tissue as well as the tooth architecture using root coverage surgery and cervical restoration respectively. Written informed consent was obtained from patient. Phase I therapy included scaling, root planning, patient education and motivation to maintain his oral hygiene. Two weeks after phase I therapy, when the area was free of gingival inflammation, the surgical and simultaneous restorative phases were planned.

Surgical procedure

The recipient site was anaesthetised for the soft tissue grafting procedure and tooth #33 and #34 were outlined to receive sub epithelial connective tissue graft. Two vertical incisions on either side of the involved teeth including whole of the adjacent papilla were given and

	#33		#34	
Clinical parameter	Preoperative	Postoperative	Preoperative	Postoperative
Probing depth	2mm	1mm	1mm	1mm
Recession depth	2mm	0	2.5 mm	0
Recession width	3.5 mm	0	3 mm	0
Keratinised gingiva width	2mm	3mm	1mm	3mm
Keratinised gingiva thickness	1 mm	2mm	1 mm	2mm

extended apically beyond the mucogingival junction. The two vertical incisions were joined by a sulcular incision involving the papillae. Full thickness flap to expose the apical extent of caries, followed by a partial thickness flap beyond the mucogingval junction was reflected (fig 2). The carious lesion was excavated using a slow rotating round bur. The area was well irrigated, acid etched and restored using resin modified glass ionomer cement (Gc Gold Label 2 Lc). The surface was polished using carbide burs to smoothen and make it non plaque retentive (fig 3).

The donor site was prepared for harvesting connective tissue graft, i.e. premolar region of the palate. The graft was harvested using the double incision, trap door method of harvesting connective tissue graft.[7] Under local anaesthesia, using 15C BP blade, two vertical incisions were given perpendicular to the gingival margin at premolar region which were joined by a horizontal incision. The partial thickness flap was reflected and the graft was harvested with the epithelial collar (fig 4). The palatal flap was sutured back using 5-0 black silk and the site was covered using a custom made acrylic stent.

The graft was trimmed, adapted and sutured on to the recipient site using 5-0 vicryl sutures (fig 5). The partial thickness flap at the recipient site was sutured using 5-0 black silk (fig 6). The recipient site was covered by periodontal pack.

Figure 1:
Preoperative view showing carious and non carious cervical lesion in relation to #34 and #33 respectively

Figure 2:
Flap reflected to expose the lesions

Figure 3:
Restoration done with Resin modified GIC

Figure 4:
Connective tissue graft harvested

Figure 5: Graft sutured on donor site

Figure 6: Graft covered with flap

For post surgical care patient was prescribed systemic antibiotics and analgesics for seven days and 0.2% Chlorhexidine rinse twice daily. Sutures were removed after fourteen days (fig 7). Normal oral hygiene measures were resumed after four weeks. Patient was recalled every week for first two months and once in a month till one year of postoperative period. At the end of eight weeks, when the soft tissue healing was almost complete (fig 8), the coronal aspect of resin modified GIC was removed and replaced with tooth colour matching composite (3m EspeFiltek Z350 Xt Restorative Syringe) (fig 9). Figure 10 shows stable clinical results at 6 month post operative follow up visit. There was complete root coverage as well as 3mm increase in the width of keratinised gingiva.

DISCUSSION

Gingival recession is a lesion with multi factorial etiology. The denuded root surface is a major cause of concern as it may result in dentinal hypersensitivity, pain, root caries and cervical abrasion[1]. The exposed cementum is vulnerable to caries and NCCL. In the present case report the recession associated with cervical caries and cervical abrasion were successfully managed using a periodontics-restorative approach.

Sub epithelial connective tissue grafting, remains the gold standard for periodontal plastic and esthetic surgeries. The graft survives and integrates into the donor site on the principle of dual blood supply, i.e., blood supply derived from underlying connective tissue bed as well as the overlying partial thickness flap.[8] As a result, it makes this procedure the most predictable for improving the soft tissue parameters as well as esthetically acceptable.

In the present case report, the choice of graft was sub epithelial connective tissue graft, as it not only covered the denuded root but also resulted in increasing the width and thickness of keratinised tissue (table-1). Adequate width and thickness of keratinised tissue, acts as a mechanical barrier as well as halts further progression of recession. Resin modified GIC was the restorative material of choice, as it is highly biocompatible with the subgingival environment.[9] Coronal portion of the GIC was removed and replaced with composite restoration for its better tooth matching ability. The final outcome was complete restoration of form, func-

Figure 7:
Two weeks post operative

Figure 8:
Two month post operative

Figure 9:
Composite restoration done

Figure 10:
Six months post operative

tion and esthetics of the hard tissue, as well as soft tissue. Establishment of adequate zone of keratinised gingiva enabled the patient to maintain good oral hygiene during the entire six months follow up period.

CONCLUSION

A multidisciplinary approach can provide better clinical results and emergence profile in gingival recession. Considering root exposure co-existing with factors like carious and non carious cervical lesions, a periodontics-restorative interdisciplinary approach helped in successfully managing the teeth involved with gingival recession, showing stable clinical results at the end of six months period.

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CASE REPORT

MANAGEMENT OF MANDIBULAR SECOND MOLAR WITH C-SHAPED CANAL- A CASE REPORT

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ABSTRACT

The variability of root canal system morphology presents a continuous challenge to endodontic diagnosis and therapeutics. C-shaped canal configuration is a variation that has a racial preference and is commonly seen in mandibular second molars. In this configuration, the canals are connected by slit or web. The presence of fin, slit and web makes through debridement difficulty for the clinician. This case report deals with the management of case of C-shaped canal in mandibular second molar. Clinical examination revealed a Mandibular second Molar restored with temporary restorative material, tender on percussion and tooth showed no response to electric and thermal tests. Therefore, endodontic treatment was done and the patient reported complete relief of pain and found to be asymptomatic on review.

Key words: C-shaped canal, Mandibular second Molar, Root canal Anatomy.

J Ind Dent Assoc Kochi 2020;2(2):18-22.

INTRODUCTION

The C-shaped canal, which was first documented in endodontic literature by Cooke and Cox in 1979, is so named for the cross-sectional morphology of the root and root canal[1]. C-shaped canal configuration results from the failure of the Hertwig's epithelial sheath to fuse or its inadequate development during the root embryologic stage. The prevalence of C-shaped canal is between 2.7 and 9.0% in non-Asian population and is as high as 41.27% among the Asian population such as Chinese, Korean, and Hong Kong Chinese .[2]

CLASSIFICATION

Melton et al in 1991 proposed the following classification of C-shaped canals based on their cross-sectional shape [3]. (Figure 1)

Category I: Continuous C-shaped canal running from the pulp chamber to the apex defines a C-shaped outline without any separation.

Category II: The semicolon-shaped orifice in which dentine separates a main C-shaped canal from one mesial distinct canal.

Category III: Refers to those with two or more discrete and separate canals:

- Subdivision I: C-shaped orifice in the coronal third that divides into two or more discrete and separate canals that join apically.
- Subdivision II: C-shaped orifice in the coronal third that divides into two or more discrete and separate canals in the midroot to the apex.
- Subdivision III: C-shaped orifice that divides into two or more discrete and separate canals in the coronal third to the apex.

Fan et al4 classified C-shaped roots according to their radio-graphic appearance into three types. (Figure 2)

Type I, II, III - Conical or square root with a vague, radiolucent longitudinal line separating the root into distal and mesial parts.

1. Type I: There was a mesial and a distal canal that merged into one before exiting at the apical foramen.
2. Type II: There was a mesial and a distal canal, and the two canals appeared to continue on their own pathway to the apex.
3. Type III: There was a mesial and a distal canal, one canal curved to and superimposed on this radiolucent line.

The complexity of C-shaped canals makes them difficulty to clean, shape, and obturates efficiently[5]. Failures can also be caused by procedural errors such as root perforation, separated instruments, or missed canals. The thin dentinal wall of the buccal or lingual groove may lead to strip perforation, which poses a considerable risk to tooth prognosis.

The purpose of this paper is to report the management of a mandibular second molar with C-shaped canal.

CASE REPORT

A 16 year old female patient reported to our Department of Conservative Dentistry and Endodontics, Malabar Dental College & Research Centre with a chief complaint of pain of her lower left back tooth. The medical history was noncontributory. Intra oral examination revealed temporary restoration on tooth 37. Tooth was tender on percussion and pulp sensitivity tests cold and EPT revealed no response .Radiographically the tooth was classified as Type II (Fan et al)[4]. External apical root resorption was also noted in the radiograph. The tooth was diagnosed as symptomatic apical periodontitis. Root canal treatment (RCT) was planned and explained to the patient.

The access cavity was prepared under local anesthesia (LA) and a single semicircle shape orifice was found and classified as category 1(Melton et al). Working Length (WL) was established with radiograph and apex locator (J MORITA ROOT ZX II, Tokyo, Japan). Cleaning and shaping of the canal was done with hand K files and ProTaper rotary files (Dentsply Maillefer Ballaigues, Switzerland) up to F3. The anti curvature filing method was performed to avoid the strip perforation.

Irrigation was performed using 2ml of 5.25 % sodium hypochlorite after and 2ml of 17% Ethylenediamine tetraacetic acidafter each

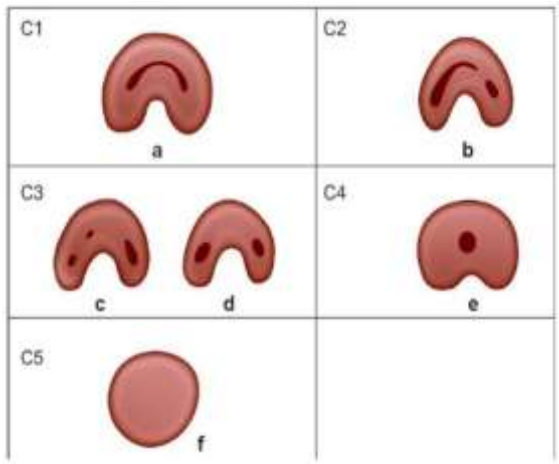


Figure 1-Melton DC (Department of Endodontics, University of Iowa College of Dentistry, Iowa City), Krell KV, Fuller MW. Anatomical and histological features of C-shaped canals in mandibular second molars. J Endod. 1991 Aug;17(8):384-388.

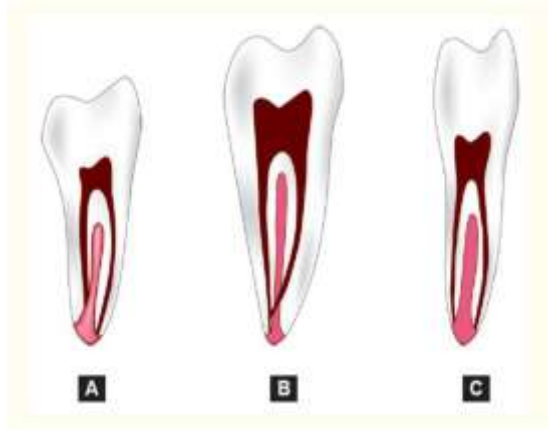
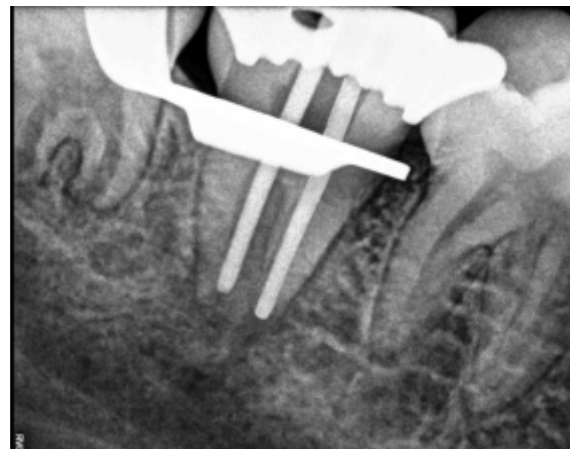


Figure 2- Fan B, Cheung GS, Fan M, Gutmann JL, Fan W. C-shaped canal system in mandibular second molars: Part II–Radiographic features. J Endod. 2004 Dec;30(12):904–908

Preoperative radiograph

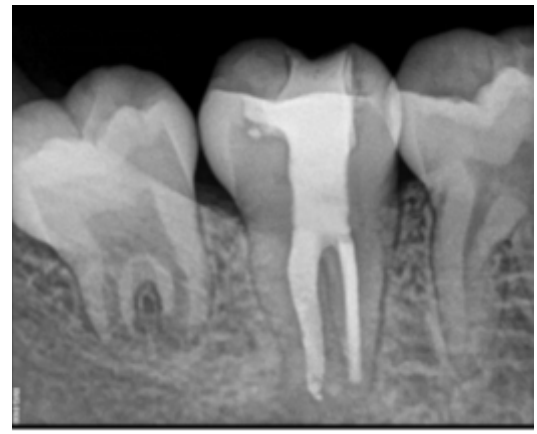
'C' shaped orifice

Working length determined



Master cone selected

Obturation Done



Post endodontic restoration

instrument. As a final irrigation, 10 mL 17% , 10 Ethylenediamine tetraacetic acidmL 1% sodium hypochlorite, and 2ml saline solution were used using a 5ml syringe with a 30-gauge needle placed 1mm away from the working length[6]. Resorption was managed by giving Calcium hydroxide (Merck India Ltd) intracanal medicament for 2 weeks. Tooth was sealed with temporary restoration. (Zitemp India)

The patient was recalled after 2 weeks and was asymptomatic. Calcium hydroxide was retrieved with 1ml of 17% Ethylenediamine tetraacetic acid combined with ultrasonic agitation (Sonofile endodontic tips Endostar Poland) for 1min and a final rinse with 1ml of distilled water[7]. Radiograph was taken to confirm fit of the master cone. The obturation was performed using cold lateral condensation technique 8 using AH plus sealer (Dentsply, Konstanz, Germany). Post endodontic restoration was done using Filtek™ Z350 XT (3M ESPE, USA) (shade A2) Universal Restorative Composite.

DISCUSSION

One of the most complicated situations with which the dentist is challenged during root canal treatment is with the management of a C shaped canal[2]. The teeth that entitled as having a Cshaped canal system should essentially exhibit all the following three features: Fused roots, a longitudinal groove on the lingual or buccal surfaces of the root, and at least one crosssection of the canal belongs to the C1, C2, or C3 configuration [2]

Pulp sensitivity tests assess the integrity of the AΔ nerve fibers in the dentine pulp complex. A Negative response indicates that the AΔ fibers cease to function.[8] The use of angulated radiographs, from a 20-degree mesial or distal projection increases the probability of revealing unusual root canal morphology[9].

Access cavity should be redefined for adequate debridement. Orifice portion of the slit can be widened using Gates Glidden drills or size 25 instrument or smaller. During cleaning and shaping Abou-Rass et al.'s anti-curvature filing technique has been recommended to avoid root perforation indanger zones[5].

A three-dimensional filling of a C-shaped canal may prove to be a problem due to the various intricacies present within the root canal system. Various Novel obturation techniques such as Ultrasonic compaction (UC), single cone with injectable Thermoplasticized gutta-percha (IT) core-carrier[2], Walid's technique, ZAP and TAP technique, Maggiore's modified MicroSeal technique have given successful results[10]. However literature showed lateral condensation technique is also an excellent method for obturating aberrant canals [8].

CONCLUSION

"C" configuration, which is an important anatomic variation, presents a thin fin connecting the root canals. Recognition of unusual variations in the canal configuration is critical. The early recognition of these configurations facilitates cleaning, shaping, and obturation of the root canal system.

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PERMANENT MAXILLARY CANINE WITH TWO ROOT CANALS : AN ABBREVIATED CASE REPORT

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ABSTRACT

For successful endodontic treatment, the clinician should have thorough knowledge about the variations in the root canal morphology. The science of extra canal is important in endodontics as failure to locate and treat an extra canal is the prime cause for failure of root canal treatments. This case narrates about the treatment of a maxillary canine with two root canals with deep class III dental caries. Clinical examination revealed a maxillary canine with carious lesion and tooth showed no response to electric and thermal tests. Radiographic examination revealed a distal carious lesion (close proximity to pulp) and also appeared to have an additional canal in this tooth. Therefore, endodontic treatment was done and the patient reported complete relief of pain and found to be asymptomatic on review.

Key words: Maxillary permanent canine, endodontic treatment, root canal anatomy, two root canals.

J Ind Dent Assoc Kochi 2020;2(2):23-26.

INTRODUCTION

Two root canals in a permanent Maxillary canine is a rare condition as these teeth are usually single-rooted and single-canaled[1]. The pulp canal system in any tooth has the probability of being very complex with a network of branches throughout the length of the root[2]. The proper knowledge about the root canal anatomy can directly affect the prognosis of the treatment[3]. The prime reason for the failure of root canal therapy is insufficient knowledge of pulp space anatomy and inability to negotiate and properly obturate the canal[2]. The clinician should be aware of the anatomy of the tooth before starting the procedure to prevent this failures[4]. Radiographs from different angles are a prerequisite to study morphological aberrations of root canal system[5]. Additional root canals if not identified are a major cause for unsuccessful root canal therapy[1]. Vertucci et al. classified the root canal configurations of human permanent teeth into several types extending from single to three separate canals[2]. Teeth having multiple canals and multiple roots in the maxillary anterior teeth region with or without any developmental anomalies have been reported[3]. In maxillary canine, the prevalence of double canal is seen to be as low as 2.8% in Indian population with slight female predilection[2]. In this case report, we describe a case of two canals in a single-rooted maxillary canine.

CASE REPORT

A 32-year-old female patient was reported to the department of conservative dentistry and endodontics of Malabar Dental College and Research Center, with a chief complaint of decayed left upper front teeth for 2 months. There was a history of sensitivity on taking cold foods associated with the same tooth which was noticed 1 week before. On clinical examination, extensive class III dental caries concerning maxillary left canine (tooth number 23). A positive response to the percussion test was revealed. Tooth showed no response to electric and thermal tests. The pre-operative radiograph shows coronal radiolucency involving enamel and dentine extending to the pulp in the mesial surface. Radiograph also revealed two separate radiolucent lines running till the middle third of the root suggestive of two canals and associated with a slight widening of PDL space. (Figure 1).

Local anesthesia was administered and a medium thickness rubber dam (GDC, India) was placed to isolate tooth #23. Access to the pulp canal space was achieved using a round diamond bur (SS White, New Jersey). Further modification and exploration in the access cavity demonstrated the presence of an additional canal orifice, lying palatal to the main canal [Figure 2]. Working Length was determined using radiograph and apex locator (J MORITA ROOT

Fig.1 : Pre op. 23

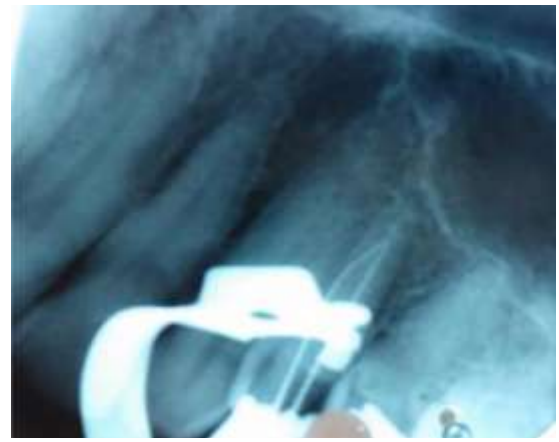

Fig.2 : Working length 23

ZX II, USA) and it was found that the palatal canal joined the buccal canal at the apical third of the root (type II configuration of Vertucci classification of root canal configurations). The canals were cleaned and shaped using hand instruments (k files –Mani, Japan) by step-back preparation. Apical preparation was done to size 40 k file in both canals (Mani, Japan). Irrigation performed using 5 ml 3% sodium hypochlorite (TRU LON Jayna industries, Uttar Pradesh, India) and 5ml 17% ethylene diamine tetra acetic acid (Anabond Stedman, India) between each instrument[6]. As a final irrigation 10ml, 3% sodium hypochlorite was used using a 5ml syringe with a 30-gauge needle placed 1mm away from the working length[4]. The canals were dried with paper points and obturation was done by cold lateral condensation technique using Zinc oxide Eugenol sealer (Tubli-Seal, Kerr, USA), followed by post endodontic restoration (FiltekTM Z350 XT Universal Restorative Composite, USA.).[4] [Figure 3 & 4). The patient was recalled after one week and found to be asymptomatic.

Fig.3 : Master cone 23

DISCUSSION

Morphological features of the tooth may adversely affect endodontic procedures. Thorough knowledge of both the external and internal anatomy of teeth is an important aspect of root canal treatment[5]. The predominant factor in the failure of nonsurgical endodontic therapy is the failure to locate and fill a canal[6,7]. It is of crucial importance that all canals be located and managed during endodontic therapy.

In the present case report, Vertucci's classification (Vertucci's type II) was used for the classification of the canal morphology. It is considered a standardized method for categorizing root canal anatomical variations[7]. Bolla et al,[8] and Mohammed et al,[9] have reported Type II canal configuration in maxillary canines. The present cases had similar characteristics to that reported by Bolla et al, and Mohammed et al. Two distinct canal orifices were located.

A thorough and careful radiographic evaluation and endodontic exploration may show the way to identify additional canals[4]. Radiographs taken from different angles, some with a file in place may help find and locate extra canals[1]. It is important to identify periodontal ligament space that often projects on the tooth and may resemble a canal. In this case, the examination of the pulpal floor and radiographs were taken with a file confirmed the existence of the extra canal[4].

The advanced diagnostic radiographic tools such as cone-beam computed tomography (CBCT) are very helpful to diagnose morphological variations if conventional radiographic

Fig.4 : Obturation 23

techniques provide less information. Besides, the use of magnification tools, sodium hypochlorite NaOCl bubble technique might help to locate any additional root canals[10].

CONCLUSION

Adequate knowledge of the basic root canal anatomy and its variations from normal is required for the success of the non-surgical root canal treatment. This case report shows the presence of two root canals in maxillary canine. Though such anatomic findings have been cited earlier, our case report highlights the importance of having detailed knowledge of all possible root canal irregularities practitioners should look for and never assume that all canal systems are simple. Angulated radiographs and magnification devices are important tools in diagnosing and treating such cases.

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MICROABRASION - A MINIMALLY INVASIVE APPROACH TO MANAGE MILD TO MODERATE FLUOROSIS CASES : A CASE REPORT

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ABSTRACT

Aesthetics is a primary concern for most people when they smile and being minimally invasive while treating enamel surface irregularities and stains is the primary concern for the operating dentist. Bleaching, resin based restorations and Porcelain laminate veneers are also treatment modalities[1] that can be used for correction of enamel surface lesions in specific clinical scenarios. This case report describes enamel microabrasion as a minimally invasive treatment modality for mild to Moderate fluorosis cases where the lesion is in superficial enamel layers.

Keywords: Microabrasion, Mild Fluorosis, Moderate Fluorosis.

J Ind Dent Assoc Kochi 2020;2(2):27-31.

INTRODUCTION

Dental Fluorosis is a condition of the teeth characterised by cosmetic defects like white or brown stains, minor surface irregularities or even marked pitting on the surface of the teeth. It usually occurs due to over exposure to fluoride during the formative years of the dentition. Discolourations in enamel are commonly seen in general population[2].

The Dean's Classification System for Dental Fluorosis (1942)[3] helps in classifying the prevailing clinical situations in the following way :

Normal

The enamel represents the usual translucent semivitriform type of structure. The surface is smooth, glossy and usually of pale creamy white colour.

Questionable

The enamel discloses slight aberrations from the translucency of normal enamel, ranging from a few white flecks to occasional white spots. This classification is used in those instances where a definite diagnosis is not warranted and a classification of 'normal' not justified.

Very Mild (10-25% of surface)

Small, opaque, paper white areas scattered irregularly over the tooth but not involving as much as approximately 25% of the tooth surface. Frequently included in this classification are teeth showing 1-2mm of white opacity at the tip of the summit of the cusps, of the bicuspids or second molars.

Mild (25-50% of surface)

The white opaque areas in the enamel of the teeth are more extensive but involve as much as 50 percent of the tooth.

Moderate (100% of surface)

All enamel surfaces of the teeth are affected and surfaces subject to attrition show wear. Brown stain is frequently a disfiguring feature.

Severe (100% of surface)

All enamel surfaces are affected and hypoplasia is so marked that the general form of the tooth may be affected. The major diagnostic sign of this classification is discrete or confluent pitting. Brown stains are widespread and teeth often present a corroded appearance.

The aim of this case report is to show the decision making and planning involved while treating a case of mild to moderate enamel fluorosis.

Summary of Case and Diagnosis :

A 40yr old female patient came to the clinic complaining of unattractive appearance of her smile. She had routine prophylaxis done and had a lot of post-op sensitivity.

On examination: (Fig 1, 2, 3)

We noted brown stains on the two central inci-

Fig.1 : Pre op smile

Fig.2 : Pre op.

Fig.3 : Pre op.

sors. There were crack lines in both central incisors in the axes. The other anterior teeth showed mild brown stains. Posterior teeth showed white stains as well. Oral hygiene was good. There was a composite restoration on the left lateral incisor. Lower anterior teeth had more value than the upper teeth. The Dean's classification for the case was mild to moderate fluorosis without any pitting on the enamel surface.

Treatment Objectives:

The main objective was to give the patient an aesthetic smile considering minimally invasive techniques, time of treatment and budget of the patient.

Treatment Options:

1) Porcelain Laminate Veneers would be colour stable and a long term solution to our patient's problem. It would mean preparing the teeth by 0.5-1mm to remove the stained, fluorosed enamel and additional lab costs. There could be post operative sensitivity. The time taken for the treatment would also be a factor. If the patient's aesthetic expectations were extremely high, this would be our 1st line of treatment.

2) Composite Veneers to replace the stained enamel with a brighter shade would also yield good aesthetic results in the short term with lower costs to the patient. Long term colour stability, maintenance, repeated repair and/or polishing would be needed.

3) Bleaching the teeth to increase the value of the teeth could be a part of the pre-treatment regimen if the patient chose the above restorative options. Many times brown stains change to chalky white stains post bleaching. Post operative sensitivity was to be expected and the change in shade would not be permanent. Usually a relapse of shade is seen within 2 yrs. Home bleaching could also be done by the patient after microabrasion for improved aesthetic results[4]. Maintenance would be needed every year for the same.

4) Microabrasion using an acidic solution would help in removing the surface stains on the enamel in a minimally invasive way[5]. The results would depend on the depth of the stain in the tooth. Stain removal would be permanent and not recur. There is usually no post operative sensitivity. Treatment can be completed in one sitting if the aesthetic results are acceptable to the patient. Post treatment home bleaching can be done for better aesthetic results.

Final Treatment Plan:

Microabrasion was the final treatment agreed upon by the patient and the team.

Treatment Protocol:

The commercially available Antivet Solution by MDC Dental was used for enamel microabrasion in this case. The upper anterior teeth were isolated using a heavy body rubber dam sheet (Fig 4). Inverting the dam and securing it with floss ties on the teeth is important to make sure the acidic solution does not leak and burn the soft tissues. Oral prophylaxis using a pumice paste and a brush was done to remove the biofilm (Fig 5). The 1st solution, a stabilised solution of 21% hydrochloric acid, was rubbed on the stains using a cotton pellet till the cotton pellet changed colour. The combination of mechanical rubbing and the chemical action of the acid causes penetration of the agent into the fluorotic enamel prisms, leaches out the fluoride ions and reduces the stains. A total of 3

Fig.4 : Isolation

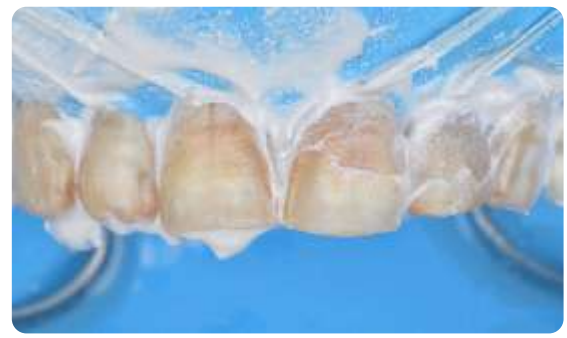

Fig.5 : Prophylaxis

applications for 5 min each was done to get the desired results (Fig 6,7,8) . The 2nd solution in the kit (helps to neutralise any remaining acid on the teeth) was applied on the teeth for 2 min and washed off (Fig 9). The rubber dam was removed and the teeth were polished using a composite polishing kit. The final result made the patient very happy (Fig 11). Though it was suggested, she did not want to use a home bleach kit post operatively to get brighter teeth. The patient was given an over the counter whitening toothpaste for 2 weeks for maintenance. The case follow-up has been for 8 months post treatment at the time of writing this article, there has been no sensitivity or any relapse in the stains.

Fig.6 : Microabrading solution-1st application

Fig.7 : After 2nd application

Fig.8 : After 3rd application

Fig.9 : Application of Neutralising solution

Fig.10 : Immediate post op

Fig.11 : Polishing

Fig.12 : Post op

Fig.13 : Pre op smile

Fig.14 : Final smile

DISCUSSION

The correct diagnosis of intrinsic enamel stains can be challenging. If an individual consumes too much fluoride in his/her formative years, it could result in brown or white discolourations in the superficial enamel layer[6]. Microabrasion, Bleaching, Composite resin restoration and Porcelain laminate veneers can be used to treat the appearance of the fluorosed teeth depending on the clinical situation, in some cases in combination as well[7]. Enamel microabrasion using acidic and or abrasive agents gives immediate and permanent aesthetic results, with minimal loss of enamel and post op sensitivity[8].

CONCLUSION

Microabrasion is a minimally invasive technique to permanently reduce mild fluorosis stains without causing sensitivity to the patient. The key to acceptable treatment outcome is proper case selection and effective rubber dam isolation.

Disclaimer

Some of the photographs have been tilt-corrected and cropped. No other digital editing has been done to any of the photographs. The author has no commercial interests in any of the companies making the materials used for the case.

Acknowledgements

I would like to thank Dr. Gunjan Gawai (Your Smile Multispeciality Dental Centre, Navi Mumbai) for entrusting me with this case.

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