

AUTISTIC CHILDREN ARE SPECIAL

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ABSTRACT :

Autism is a developmental disorder characterized by severe deficits in social interaction and communication. A wide spectrum of medical and behavioral symptoms is exhibited by children with autism, which makes routine dental care very difficult in them. Bruxism or forceful grinding of teeth is one of the sleep problems commonly observed in children with autism. There was history of excessive grinding and clenching of teeth. Limited oral examination revealed severe attrition of all primary teeth. Although the communication and behavioral problems in children with autism pose challenges for the dentist, treatment with proper planning and a lot of patience can definitely make a difference.

KEY WORDS: COMMUNICATIVE DISORDER, MENTAL RETARDATION, SLEEP DISORDER, BRUXISM

Introduction

Mental disability is a term which is used when an individual's intellectual development is significantly lower than average, limiting his or her ability to adapt to the environment.¹ Autism is a neurobehavioral and cognitive disorder characterized by impaired development of interpersonal and communication skills, limited interests, and repetitive behaviors. The incidence of autism is about 0.2%.² This complex mental disability is about four times more prevalent in males but is more severe in females. It manifests during the first three years of life.^{1,3} There are enormous variations in the behavioral patterns and the severity of illness among individuals with autism. Mental retardation is evident in approximately 70% of individuals with autism. The behavioral symptoms in children include temper tantrums, hyperactivity, short attention span, impulsivity, agitation, anger, and a tendency for aggressive and self-injurious behaviors.³ Disorders of language and social communication, poor response to external stimulation, tendency to isolate themselves, and poor eye-to-eye contact are well-recognized symptoms. Children with autism also commonly have damaging oral habits such as bruxism, tongue thrusting, pricking at the gingiva, lip biting.

Sleep disorders in children with autism are frequently reported by their parents. Parasomnias such as sleepwalking and nightmares were among the least frequently reported sleep problems, however, bruxism was reported by Williams *et al.* to be a relatively common disorder, occurring in approximately one-fifth of the surveyed children.⁴ Bruxism, by definition, is a nonfunctional, involuntary, forceful grinding or gnashing

of teeth that affects 10-20% of the population.⁵ Bruxism has a higher than normal prevalence in children with special needs and can result in excessive dental wear, temporomandibular joint pain, avulsion of teeth, and other problems.⁶ The treatment options for bruxism (eg, the use of splints or behavioral modification techniques) are limited in children with autism due to their poor mental capacity and difficulties in communication. Obsessive routines, repetitive behaviors, unpredictable body movements, and self-injurious behavior are symptoms that can interfere with routine dental care in a child with autism. Hering *et al.* has observed that parents of autistic children often report difficulties in coping with sleep problems.⁷ Schreck and Mulick noted an increased incidence of nightmares, sleepwalking, and bruxism in children with autism.⁸ A case report by Monroy *et al.* describes the use of botulinum toxin A injections into the masseter muscle for treatment of bruxism.⁶ Providing oral care to children with autism requires patience and a thorough understanding of the patient's degree of mental disability. Chew *et al.* state that better understanding of the effects of autism on the behavior of an affected individual helps the dental practitioner to deliver oral healthcare in an empathetic and appropriate manner.⁹ we present our experience in delivering, under general anesthesia, comprehensive dental management in a child with autism

DISCUSSION

Autism is an incapacitating disturbance of mental and emotional development characterized by severe deficits in social interaction and communication and the presence of

repetitive, ritualistic behaviors.⁴ There are no specific genetic, medical, or laboratory tests available to confirm the diagnosis of autism and the comprehensive management of autism includes parental counseling, special education in a highly structured environment, speech therapy, and social skills training, with the ultimate goal of facilitating independence in activities of daily living and self-care. Children with autism have multiple medical and behavioral problems, which make their dental treatment extremely difficult. Communication problems and poor mental capabilities are central concerns when treating children with autism; these children exhibit wide variations in their ability to cooperate during dental treatment.⁶

Children with autism who have mild to moderate mental retardation and an absence of severe behavioral problems can be treated successfully in the general practice setting. Nevertheless, behavioral problems like hyperactivity and quick frustration can hamper the provision oral health care in patients with autism. Also, the invasive nature of oral care may trigger violent and self-injurious behavior such as temper tantrums or head banging.¹⁰ General anesthesia gives the dental surgeon an opportunity to perform better.

In general, children with autism prefer soft and sweetened foods and they tend to pouch food inside the mouth instead of swallowing it due to poor tongue coordination, thereby increasing the susceptibility to caries.¹¹ Moreover, the risk for dental caries can be expected to be higher in these patients due to difficulties in brushing and flossing in them. Noninstitutionalized children with autism had caries rates that were similar to the rates in functionally independent peers in a study conducted by Shapira *et al.*¹² Rajic *et al.* reported that a combined treatment, provided by a dental team and a pedopsychiatric team working together, resulted in a decreased prevalence of caries in a group of children with autism

CONCLUSION

We emphasize the need for routine dental check-ups and regular practice of oral hygiene measures to the parents. This might be attributed to the reduction in sensitivity to thermal stimuli following placement of the stainless steel crowns. Long-term care includes increasing the frequency and efficiency of oral hygiene measures with the help of the parents, application of fluoride gel or rinse, intake of healthy noncariogenic foods, and frequent recall appointments needed for autistic children.

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BIOFILM IN ENDODONTICS

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ABSTRACT :

Changes in the way plaque and its microorganisms are viewed affect the strategies used to prevent and control it. In recent years, dental researchers have begun to view plaque as a biofilm. This shifting view of plaque has important implications for future efforts in its prevention and treatment. The main goal in endodontic infection is to recognize and removal of etiological factors. Debridement of the root canal by instrumentation, irrigation and removal of biofilm is considered important factor to prevent and treat endodontic disease. The root canal morphology provides excellent conditions for a biofilm formation which is one of the main causes for endodontic reinfection. The following review article explores the biofilm formation which commences from adhesion of planktonic microorganisms to a surface followed by colonization, coadhesion, growth and maturation and finally detachment of some microorganisms. Bacteria's present in biofilm display a wide range of characteristics that provide a number of advantages over planktonic bacteria.

KEYWORDS : BIOFILM, ENTEROCOCCUS FAECALIS, MICROORGANISMS.

INTRODUCTION:

Microbial infection is the most common reason for root canal therapy. The success of root canal treatment mainly depends on effective instrumentation, efficient cleaning and shaping of the root canals with total removal of biofilm and 3-dimensional obturation of the entire root canal system.¹

Control of oral biofilms is fundamental to the maintenance of oral health and prevention of dental caries, gingivitis and periodontitis. The biofilm mode of growth seems to be advantageous for microorganisms as they form three dimensional structured communities with fluid channels for transport of substrate, waste products.

BIOFILM- Biofilm is defined as a surface associated community of one or more microbial species that are firmly attached to each other and the solid surface and are encased in an extracellular polymeric matrix that holds the biofilm together. Microbes in biofilm are more resistant to antibiotics and host defenses, perhaps as a result of the dense extracellular matrix that protects the microbes secluded in the interior of the community². When a bacterial cell switches modes from free floating (Planktonic) organisms to biofilm, it undergoes phenotypic shift in behavior in which large groups of genes are regulated².

FORMATION OF BIOFILM:

It's a step-wise procedure and its formation occurs in the presence of microorganisms, fluids and solid surface. Step 1:

It involves adsorption of inorganic and organic molecules to the solid surface which leads to the formation of conditioning film.

It is composed of glycoproteins and proteins derived from saliva and gingival crevicular fluid.³ Step 2: It involves adhesion and colonization of planktonic microorganisms and its attachment is strengthened by polymer production and unfolding of cell surface structures. Pioneer organisms which are involved in the formation of biofilm on tooth surface are streptococcus followed by subsequent attachment of gram positive and gram negative bacteria. Factors affecting bacterial attachment include P^H, temperature variations, bacterial cell surface charge, surface energy of substrate, bacterial content, and nutrient supply.

Factors that helps for transportation of the microorganisms and its attachment to substrate includes, pili, fimbriae, flagella. Between the microbes and substrate bridges are formed. These are formed in a combination of electrostatic attraction, covalent and hydrogen bonding, dipole and hydrophobic interaction. Initially the bond between the bacteria and substrate tends to be weak but over a period of time they gain strength with polysaccharide adhesion.⁴ Step 3: Involves bacterial growth and expansion. Monolayer of microorganisms attracts secondary colonizers to form microcolonies which are similar to towers with vertical and lateral growth of microorganisms.⁵ Two types of microbial interaction are seen at cellular level during biofilm formation, co-adhesion, and co-aggregation.^{6,7}

Co-adhesion is a process of recognition between a suspended cell and cell already attached to substratum. Co-aggregation is a process where genetically distinct cells in suspension recognize each other and results in a clump formation. At the end of this stage biofilm is seen as corn-cob structure. Step 4: Involves the deattachment of biofilm microorganisms into their surroundings which are of two types – seeding dispersal and clumping dispersal.⁸ Seeding dispersal is detachment of planktonic bacterial cells caused by local hydrolysis of the extracellular polysaccharide matrix which causes persistent infection. Clumping dispersal is a process in which fragment of microcolony detaches from the biofilm and is carried by the bulk until it lodges in a new location and initiates a new sessile population. It is of two types: continuous deattachment of biofilm or erosion and rapid deattachment of biofilm or sloughing.

BASIC PROPERTIES OF BIOFILM⁹

1. Cooperating community of various types of microorganisms.
2. Microorganisms are arranged in microcolonies.
3. Microcolonies are surrounded by protective matrix.
4. Within the microcolonies are differing environments.
5. Microorganisms have primitive communication system.
6. Microorganisms in biofilm are resistant to antibiotics, antimicrobials, & host response.

Electron microscopically, bacteria in a biofilm are not distributed evenly. They are grouped in micro colonies surrounded by an enveloping intermicrobial matrix. Appears as tower or mushroom shaped micro colonies with interspersed channels. The matrix is penetrated by fluid channels that conduct the flow of nutrients, waste products, enzymes, metabolites, and oxygen. These microcolonies have micro environments with differing pH's, nutrient availability, and oxygen concentrations. The bacteria in a biofilm communicate with each other by sending out chemical signals. These chemical signals trigger the bacteria to produce potentially harmful proteins and enzymes.¹⁰ Biofilm has a complex architecture with niches and also it possess different array of lytic, proteolytic enzymes. Mature biofilm with increased nutrient, pH, metabolic products, signaling molecules possesses antimicrobial resistance. Oral biofilm is dominated by anaerobic because of redox gradient formed within the internal compartmentalization of biofilm.¹¹

Communications in biofilm are of two types¹²: Interspecies and Intra species communication.

Auto inducer system 2 (AI-2) helps in interspecies communication. This signal is released by many gram positive

and gram negative microorganisms. Close proximity of microorganisms facilitates gene transfer between them.¹²

Quorum sensing is intraspecies communication which is mediated by low molecular weight molecules, which can alter the metabolic activity of neighbouring cells and coordinate the functions of resident bacterial cells within the biofilm.¹³

Increased understanding of biofilms have demonstrated that there are great differences between bacterial behavior in laboratory culture and in their natural ecosystems. For example, bacteria in biofilm produce compounds in biofilm that they do not produce when in culture. Also, the matrix surrounding the microcolonies serves as a protective barrier. This helps explain why systemic and locally delivered antimicrobials have not always proven successful, even when they were targeted at specific microorganisms. It also helps explain why mechanical plaque control and personal oral hygiene have continued to be an integral part of periodontal therapy. Biofilms can be removed by mechanical means. However, they immediately begin to reform.¹⁴

ROLE OF ENTEROCOCCUS FAECALIS BACTERIA IN BIOFILM:

Enterococcus faecalis are Gram positive cocci, facultative anaerobes. They are associated with root canal infections and also seen in chronic periapical pathology and more importantly in failed root canal cases. They have many survival and virulence factors: they are capable of causing mono-infection, opportunistic microorganisms which can withstand nutritional deprivation, they utilize serum as nutritional source, binds to dentinal tubules, produces collagen-binding protein and serine protease alter host responses, suppresses the action of lymphocytes, possesses lytic enzymes, cytolysin, aggregation substance and lipoteichoic acid, maintains pH homeostasis due to proton pump mechanism and they resist the activity of antimicrobial agents due to biofilm formation.¹⁵ Among all the survival and virulence factors enterococcus faecalis the unique property of this organisms is biofilm formation and the physiochemical properties of organisms help them to modify according to the prevailing environmental and nutrient conditions. Biofilm are found to be resistant to amoxicillin, doxycycline and metronidazole. Biofilms formed by enterococcus faecalis are able to resist destruction by enabling the bacteria to become 1000 times more resistant to phagocytosis, antibodies and antimicrobials than nonbiofilm producing bacteria.¹⁶

ERADICATION OF BIOFILM:

2% Chlorhexidine gel or liquid can be effectively used as an intra canal irrigant during the process of cleaning and shaping

of the root canal system and also can be used as an intra canal medicament when mixed with calcium hydroxide powder for the elimination of enterococcus faecalis bacteria from the superficial layers of dentinal tubules up to 100micrometer. 5.25% Sodium hypochlorite is also highly effective against all forms of enterococcus faecalis including its biofilm form, when used as an intra canal irrigant during the process of cleaning and shaping of the root canal system.¹

Newer techniques for the eradication of biofilm includes: use of Ultrasonic irrigation, Plasma dental probe, Photoactivated disinfection with low-energy laser for biofilm removal.

1. One minute use of ultrasonically activated irrigation, followed by root canal cleaning and shaping has been shown to improve canal and isthmus cleanliness in terms of necrotic debris and biofilm removal.

2. Plasma dental probe is effective for tooth disinfection. Scanning electron microscopy shows complete destruction of endodontic biofilms for a depth of 1 mm inside a root canal after plasma treatment for 5 min.

3. The Er:YAG laser have produced excellent results due to its capacity for ablating hard tissue with very less thermal effects. They are considered to be effective tool for the removal of apical biofilm.

Photodynamic therapy is the latest method used to destruct endodontic biofilm. It involves the killing of microorganisms when a photo sensitizer selectively accumulated in the target is activated by a visible light of appropriate wavelength.

4. PAD is a unique combination of a photosensitizer solution and low-power laser light. The photosensitizer, which is mostly colored, adheres to or gets absorbed by microbial cells. The low-power laser will destruct the target area and inactivate the microbial invaders. The photosensitizer then binds to microbial cell walls or even enters the cells. Further, the Laser light activates the photosensitizer and creates a cascade of energy transfer and variable chemical reactions in which singlet oxygen and free radicals play an important role.

CONCLUSION:

Adaptation of microorganisms under different disease conditions as well as how biofilms are organized in root canals are important issues to be addressed, so that to obtain a total bacterial free environment inside the root canal space.

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PREVALENCE OF ORAL MANIFESTATIONS ASSOCIATED WITH HIV INFECTED PATIENTS IN COSTAL ANDHRA PRADESH.

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ABSTRACT :

Objective: To determine the pattern and prevalence of oral lesions in HIV infected patients of costal Andhra Pradesh. Patients and methods: The study population comprised 1000 consecutive HIV seropositive patients presented to regional ART centre at Vijayawada, Andhra Pradesh. The oral lesions were diagnosed based on clinical appearance and were recorded to the database for analysis. Results: 30-39 yrs age group was most commonly affected and 87% of the patients had acquired infection via heterosexual contact. Oral lesions were seen in 66% of the patients. Gingivitis (36.7% males & 33.9% females) was the most common lesion followed by candidiasis (21% males & 26.4% females), periodontitis (6.8% males & 7.5% females), pigmentation (36.7% males & 33.9% females), ulcers (2.7% males & 0% females) and leukoplakia (1.3% males & 0% females). Conclusion: The pattern of oral lesions associated with HIV infection was not markedly different from those reported in the literature, the prevalence of each type of lesion differ slightly.

KEYWORDS : HIV, ORAL LESIONS, INCIDENCE

Introduction

Human immunodeficiency virus (HIV) infection is a major global health problem. It is estimated that number of people living with HIV infection in India, by the end of 2007 was 2.31million. The prevalence rate of HIV infection in the country has stabilized over the last few years with estimated adult prevalence of 0.34%. Andhra Pradesh showed the higher prevalence rate (>1%) when compared with all other states (<1%) in India¹.

Systemic and oral lesions in HIV infection reflect the immune status of the patients. These lesions, not only important for the morbidity they cause but also for their diagnostic value in monitoring the immune status of the patient. Some oral lesions have been observed to be more rampant in HIV infected patients than healthy individuals and sometimes may be the first indication of the disease². Furthermore, the appearance of some of these lesions in a HIV infected patient may signal the deterioration of the disease³. The aim of this study is to determine the pattern and frequency of oral lesions associated with HIV infection in our environment in order to contribute to the existing data on oral HIV lesions in India.

Patients and Methods

One thousand consecutive Patients attending the ART centre (Government regional centre for counseling and treatment of HIV/AIDS infection, Nellore) over a period of one year (from December 2009 to November 2010) were the subjects of this study. A trained counselor confirmed the sources of infection. Confirmation of HIV seropositive status for all the patients was done by ELISA and western immunoblot. Examination of the orofacial tissues for each patient was

performed by a trained oral physician in oral manifestations of HIV/AIDS. Data was captured on an adopted WHO record form for oral HIV/AIDS and subjected to statistical analysis.

Results

Of the 1000 HIV seropositive patients, 735 (73.5%) were males and 265 (26.5%) were females (Table 1), giving male to female ratio of 2.8:1. The age of the youngest patient was 2 years and the age of the oldest patient was 58yrs. The maximum number of cases was in the age group of 30-39yrs for either genders (38.0% males and 43.3% females, respectively). Laborers' (33.3%) in male and housewives (39.6%) in female were more infected than other occupations.

The main source of infection for both 88% of males and 83% of females (Table 2) was through the heterosexual route. The maximum number of male patients showed CD4+ count <200 (37.9%) whereas the female patients showed CD4+ count 200-500 (35.8%). Of the 1000 patients, 560 patients (420 males and 140 females) showed oral lesions. The most common lesion seen in both male and female patients was gingivitis (270 males and 90 females) followed by candidiasis (Pseudomembranous, Erythematous and Angular cheilitis) (155 males and 70 females). Oral pigmentation was seen in 60 male patients and 10 female patients and all the pigmentations were seen on buccal mucosa. Among the male patients, 20 showed oral ulcers and 10 had leukoplakia which were not seen in female patients. Number of lesions seen in each patient was varying from 0 to 3. 315 male patients and 125 female patients showed no lesions, 260 males and 85 females showed one lesion, 155 males and 50 females showed two lesions and 5 patients of either genders showed three lesions (Table 4).

Discussion

Oral lesions of the HIV infected patients have been widely studied and were found to have diagnostic and prognostic value⁴. This study determined the prevalence of oral lesions in HIV infection in the costal Andhra Pradesh. It has been consistently shown that HIV infection affects young and active age groups (3rd and 4th decades). The age of patients in this study is similar with the previous Indian study⁵. Regarding the occupation, Labourers and housewives were most commonly affected in the present study agrees with the study done by Singh H et al.,⁶. The source of infection in the present study showed heterosexual transmission and is in par with previous studies^{5,6}. The maximum number of male patients showed CD4+ count <200 (37.9%) and the maximum number of female patients showed CD4+ count 200-500 (35.8%) and is in par with the previous studies^{6,7}.

HIV infection is associated with gingival disease which accounted for 36.7% in males and 33.9% in females in the present study. This is comparable to the previous study⁸.

Candidiasis has been consistently found to be the first recognized oral manifestation and sometimes the only initial clinical sign of the HIV infection⁹. The prevalence rate of candidiasis in the present study is 21% in males and 26.4% in females which is similar with the previous study¹⁰. Intraoral pigmentation was seen in 8.1% male and 3.7% female patients. The presence of intra oral pigmentation in the HIV patients has not been reported in the previous study⁵. We had ten patients with leukoplakia and all the patients had tobacco chewing habit.

Conclusion

The pattern of oral lesions associated with HIV infection was not markedly different from those reported in the literature, the prevalence of each type of lesion differ slightly. The present study emphasizes the usefulness of orofacial examination of the patients by dental surgeon which increases their index of suspicion of the infection with the appearance of these HIV associated oral lesions.

Table 1. Demographics of 1000 HIV seropositive Patients

Age Group (y)	Male(n=735)	Female(n=265)
	No. (%)	No. (%)
<9	20(2.7)	15(5.6)
10-19	65(8.8)	25(9.4)
20-29	135(18.3)	45(16.9)
30-39	280(38.0)	115(43.3)
40-49	155(21.0)	40(15.0)
>50	80(10.8)	25(9.4)
Occupation		
Farmer	85(11.5)	0(0.0)
Business	35(4.7)	0(0.0)
Driver	70(9.5)	0(0.0)
Employed	85(11.5)	10(3.7)
Housewife	0(0.0)	110(41.5)
Labourer	245(33.3)	105(39.6)
Others	215(29.2)	40(15.0)

Table.2 Distribution of HIV-positive patients by source of infection

Source of infection	Male(n=735)	Female(n=265)
	No. (%)	No. (%)
Heterosexual	650(88.0)	220(83.0)
Mother to child	80(10.8)	45(16.9)
Blood transfusion	5(0.6)	0(0.0)

Table.3 Distribution of HIV-positive patients by CD4+ counts

CD4 Count	Male(n=735)	Female(n=265)
	No. (%)	No. (%)
<200	275(37.9)	80(30.1)
200-500	260(35.8)	95(35.8)
>500	190(26.2)	90(33.9)

Table.4 prevalence of HIV-related oral lesions by gender

Oral lesions	Male(n=735)	Female(n=265)
	No. (%)	No. (%)
Candidiasis	155(21.0)	70(26.4)
Gingivitis	270(36.7)	90(33.9)
Periodontitis	50(6.8)	20(7.5)
Ulcers	20(2.7)	0(0.0)
Pigmentation	60(8.1)	10(3.7)
Leukoplakia	10(1.3)	0(0.0)
Others	20(2.7)	10(3.7)
Number of lesions		
0	315(42.8)	125(47.1)
1	260(35.3)	85(32.0)
2	155(21.0)	50(18.8)
3	5(0.6)	5(1.8)

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IMPLANT SUPPORTED OVER DENTURES

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ABSTRACT :

Retention of the lower complete denture is always a question for the dentist and the patient because of the alveolar ridge resorption and many muscle attachments to the mandible. The treatment of edentulous patients using oral implants does not always permit the placement of adequate number implants for fixed prosthesis construction; the reasons are sufficient anatomical bone height of the alveolar ridge, health restrictions and financial limitations. Placement of two dental implants in the canine region will improve the retention and stability of complete dentures in edentulous patients. Implant supported overdentures with Dalla Bona attachments are more successful, provides good retention, stability for the denture and improves comfort and confidence for the edentulous patients while speaking and mastication.

KEY WORDS: IMPLANTS, OVER DENTURES, RETENTION, ALVEOLAR RIDGE, EDENTULOUS.

INTRODUCTION

The loss of the natural teeth is an emotional experience and depressing factor for many younger as well as older patients. The indications for implant-supported overdentures are the edentulous maxilla, the edentulous mandible, and the compromised situation. These indications for overdentures are related to young patients with loss of all teeth due to some pathology, older patients who are suffering with poor retention and stability of the complete dentures and patients with congenital anomalies. In the dental practice for the treatment of edentulous patients the remaining natural teeth have been retained in the mouth for the better retention and stability of overdentures and to preserve the alveolar bone. Preserving natural teeth or their roots should be considered as often as possible because of the preservation of the edentulous ridges and tactile discrimination. In a similar manner, root form implants have also been successfully used to enhance the support, retention and stability of overdentures.

Implant supported dentures are a type of full over denture that is secured in place by dental implants instead of simply resting on the gums as conventional dentures. Dalla Bona male and female attachments that are fixed to the implants and denture, provide locking mechanism and thus significantly improves the retention of the denture.

ADVANTAGES OF THE IMPLANT SUPPORTED OVER DENTURES⁸:

1. Only two implants may be used for support.
2. Good stability.
3. Good Retention.
4. Improved function.
5. Improved esthetics.
6. Reduced residual ridge resorption.

7. Simplest Implant supported prosthesis.

8. Possible incorporation of existing denture into the new prosthesis.

MATERIALS AND METHODS

Alveolar ridge resorption is a major issue regarding the treatment choice of edentulous patients. Sufficient alveolar bone height, width, length and angulations are considerable factors for placement of dental implants in the edentulous arches. The height of the bone for placement of implants is measured from the bone crest to the closest anatomical landmark. As a general rule, 2 mm is maintained between the implant and any adjacent landmark. Distal aspect of the maxilla maxillary sinus is the landmark to check the height of the bone, whereas in the mandible mandibular canal is the landmark. Due to severe resorption in the distal aspect of the dental arches sometimes it is difficult to place the implants or not possible at all. Usually mastication is done with the help of molars in the natural dentition where at times not possible to place the implants. By not placing dental implants in this area, the choice of the treatment for the edentulous patients is overdenture instead of fixed implant prosthesis. The width of the bone is measured between the facial and lingual crests at the site where the implant will be placed.

Location of the Implants

Overdenture implants should be placed in the center of the ridge anterior to mental foramina, at the canine region beneath the canine in the denture base. Hence the ball end of the Dolla Bona male implant component comes and joins with the female Dolla Bona component or 'o' ring which lies beneath the canine in the denture. For the placement of female Dolla Bona component in the denture base at least 8mm of occlusocervical height of the denture is required.

The height and the width of the edentulous ridge in the canine region should be measured before placement of the

implants to select the appropriate size of the implants. While placing the implants duplicate denture should be used as a template for correct positioning of the implant. When the implants are placed anterior to the canines, the denture base width has to increase to compensate the implant position, which will affect the denture stability and the esthetics. Implant parallelism to each other is very important which facilitates the easy fabrication of prosthodontic phase of treatment by allowing the use of standardized implant components. Malaligned implants can cause damage to the implant attachments during the placement and removal of the denture by the patient, also at times results in implant failure because of undesired forces applied on the implant every time. Always osseointegrated dental implants have been proven successful in the treatment of edentulous patients. Usually implants should be left in the bone without loading for a period of minimum three months for better osseointegration. Three months later Dolla Bona male and female components can be fixed to the implants and denture. Some techniques also advise immediate loading implants.

DISCUSSION

The classical treatment plan for the edentulous patient is the complete removable maxillary and mandibular denture. This treatment is relatively inexpensive in comparison with fixed implant-supported prostheses, but it has several drawbacks like less retention, difficulty while chewing and speaking. Like all dental restorative procedures, a complete removable denture requires extensive attention to detail if an excellent clinical result is to be achieved. Depending on the shape of the alveolar ridge, the denture may be unstable or inadequately retained, leaving the patient dissatisfied with the functional result. Even if it is possible to insert an adequate number of implants ensuring a permanent construction, its teeth will have to be long enough to compensate for the bone loss at some places⁷.

Clinical studies have compared individual implants with implants connected by a bar. A study of photoelastic stress patterns indicated that individual implants with ball and o-ring attachments transferred less stress to the implants than the design that used two implants connected by a bar. There were no biologic differences between the two designs but greater prosthesis retention was attained when the implants were connected by a bar⁶.

Implant placement surgery is relatively simple to perform and, in experienced hands, may take less than an hour. Many options are available for retention of the prosthesis, including magnets, clips, bars and balls. The resultant implant-supported denture has good stability and retention, and patients who have received them have reported improved function and satisfaction⁹. Other studies have measured the rate of residual ridge resorption in the five years after implant placement. The rate of resorption is decreased significantly from the rates seen with conventional dentures, and recent research has shown that the height of the posterior ridge increases with continued use of implant-supported prostheses¹⁰.

CONCLUSION

In edentulous Patients even though patient is affordable, fixed prosthesis construction with implants may not be the choice of treatment because sometimes placement of implants in the distal region of the edentulous arches are not possible due to severe alveolar ridge resorption and anatomical structures in the maxilla and mandible. Hence in such cases implant supported over dentures should be considered for better support and stability of the dentures which gives excellent comfort for the patients while speaking and chewing. Last but not least come the financial factor; the implant supported overdentures are priced very less compared to fixed full arch implant prosthesis. The literature indicates that implant-supported overdentures in the mandible provide predictable results with improved stability, retention, function and patient satisfaction compared with conventional dentures⁸.

Implant supported overdenture



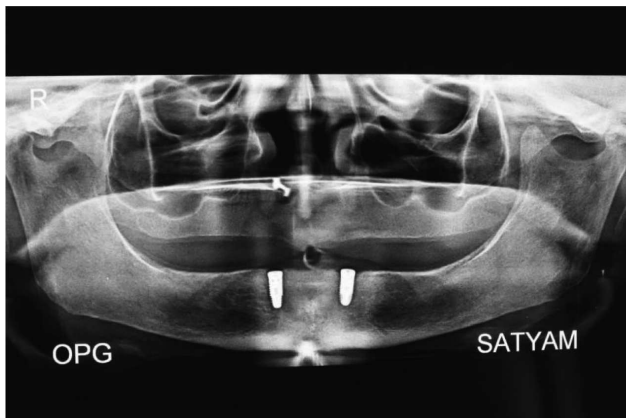
After placing the implants and ball end attachments



Lower denture with retentive component



OPG showing overdenture implants in the mandible



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PATHOLOGICAL FRACTURE OF MANDIBLE – A REVIEW

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ABSTRACT :

Introduction - Pathological fractures of the mandible are defined as fractures caused by the underlying pathology. **Material and method** - A review study has been carried out in which articles regarding pathological fracture of mandible from different literatures are studied to analyze the incidence, etiology, site and treatment protocols for pathological fractures of the mandible. **Results** - Etiology for pathological fractures are inflammatory, severe atrophy of edentulous mandible, benign tumors, cysts and malignancies. Majority of the fractures occurred in the angle of the mandible. It can be treated by eliminating the cause of the underlying condition and immobilization of the fragments is achieved either by osteo-synthesis, arch bars or intermaxillary fixation. **Conclusion** - Increased rate of pathological mandibular fractures is found in males, following removal of a difficult lower wisdom tooth with a high retention grade that necessitated bone removal. Most of the pathological fractures reported in the literature are iatrogenic. It is recommended to inform the patients for the anticipated possible risks and in selective cases, a soft diet for up to 4 weeks post surgically.

KEY WORDS : - PATHOLOGICAL FRACTURE OF MANDIBLE, TREATMENT PROTOCOL FOR PATHOLOGICAL FRACTURE OF MANDIBLE.

Introduction: Mandibular fractures are one of the most frequently occurring injuries in the maxillofacial region. Studies on facial fractures have revealed that motor vehicle accidents and interpersonal violence are the leading causes. Pathological fractures of the mandible are defined as a fracture caused by the underlying pathology and their incidence is less than 2% of all fractures¹. The exact definition of a pathological fracture is controversial. One suggestion is a fracture that 'results from normal function or minimal trauma in a bone weakened by pathology. Other authors have contended that it is impossible to define inadequate or minimal trauma, and that the definition should be a fracture which occurs through a preexisting lesion or in a diseased part of the bone². Even this definition may not cover the entire spectrum of pathological fractures as an atrophic mandible in an elderly person may not be regarded as being diseased in any one part.

Material and method: A review of articles regarding pathological fracture of mandible from different literatures were studied on the basis of incidence, age, sex predilection, ratio, type of bony lesion, site of fracture, event leading to fracture, treatment protocol for pathological fractures of the mandible.

Different conditions showing pathological fracture of mandible

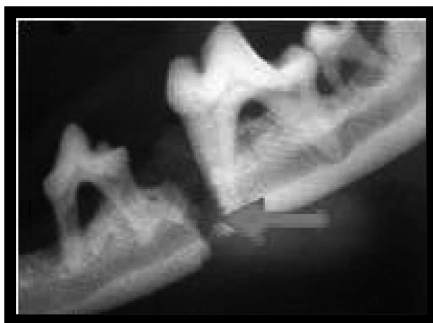


Fig.1 Iatrogenic



Fig.2 Pathological Mandibular Fracture due to Osteoradionecrosis after treatment of Nasopharyngeal Carcinoma



Fig.3 Fracture through an Infected Residual cyst

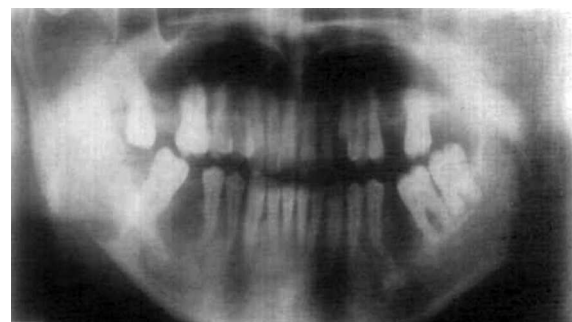


Fig.4 Fracture through a cystic

Familial dysautonomia is an autosomal recessive genetically inherited disorder which is rare in the general population³. The disease involves the peripheral nervous system and is characterized by progressive sensory, autonomic, and motor dysfunction, dysphagia, and regurgitation with frequent aspiration, esophageal dysmotility, significantly decreased or absent fungiform lingual papillae. Pathological fracture of mandibular condyle due to primary adenocarcinoma of the rectum is very rare⁴. Adenocarcinoma is the most common of all metastatic tumors in the jaws. The most frequent sites of the primary lesion are the breast and thyroid. However, secondary metastasis can also occur in and around the oral cavity. About 30% of oral metastasis has been found to be the first sign of an undetected malignancy at a distant site.⁵ Angiosarcoma is a rare malignant tumor of vascular endothelium representing less than 1% of all soft tissue sarcomas. Pathologic mandibular fracture may be the first sign of disseminated angiosarcoma.

The predominant site - posterior molar/angle region followed by body and symphysis



Fig. 5 Dissaminated Angiosarcoma

Results and observations

Table 1: shows etiology for mandibular fracture in pathological conditions⁹

Etiology	Pathological Condition
➤ Hereditary	Osteogenesis imperfect, Osteopetrosis ¹⁰ , Familial dysautonomia ¹¹
➤ Infectious	Actinomycosis ¹² , Acute Osteomyelitis ¹³ , ¹⁴ Chronic Osteomyelitis ¹⁵ , Sclerosing OsteomyelitisTuberculous Osteomyelitis, Osteoradionecrosis ¹⁶ , Bisphosphonate osteonecrosis ¹⁷
➤ Iatrogenic	Cryotherapy, extraction or surgical removal of wisdom teeth ¹⁸ Injudicious use of instruments, Implants, malposition of bicuspid ¹⁹
➤ Benign pathology	Cysts like KCOT /tumors like Amelobalstoma ²⁰
➤ Malignant pathology	Early invasive carcinoma ²¹
➤ Metastatic disease	Oesophageal squamous cell carcinoma ²² ,Disseminated angiosarcoma ²³ , Carcinoma of rectum ²⁴
➤ Hemopoietic	Leukemia, Lymphoma, Multiple Myeloma
➤ Metabolic	Osteomalacia, Osteoporosis
➤ Idiopathic	Gorham's disease

Table 2 : shows generalised non-malignant diseases in which pathological fractures may occur ²⁵.

Pathological Condition	Non-malignant diseases
➤ Resorption of bone mass	Osteoporosis
➤ Reduction of bone quality	Osteomalacia, Osteoradionecrosis
➤ Insufficient bone production	Osteogenesis imperfecta, Fibrous dysplasia
➤ Increased bone resorption	Hyperparathyroidism, Giant cell granulomas
➤ Pathological remodelling of the bone	Paget's disease, Albers-Schonberg's disease

Table 3 :shows incidence of the each pathological conditions:

Pathological Condition	Incidence
➤ Bisphosphonate Osteonecrosis	4.66
➤ Osteoradionecrosis	21.33
➤ Osteomyelitis	14.66
➤ Osteopetrosis	2.66
➤ Metastasis	8.0
➤ Tumor	3.33
➤ Cyst	08.00
➤ Surgical Removal Of 3 rd Molar	30.66
➤ Osteoporosis	02.66
➤ Actinomycosis	01.33
➤ Hereditary	01.33

Table 4 : shows the percentage of mandibular fractures based on sex

Sex	Percentage
Male	59.00
Female	41.00

Table 5: shows the percentage of mandibular fractures based on site

Site	Percentage
➤ Angle	53.00
➤ Body	30.00
➤ Other	17.00

Discussion: It is very essential to rule out the bone diseases first by using the diagnostic aids such as orthopantomogram or CT Scan helps to confirm the pathological fracture of bone.

The treatment of pathological fractures is difficult to diagnose and are controversial⁶. Primary or directly bone invading tumors require elimination of the underlying cause. Secondary deposits require enucleation to resection with fixation depending on the nature of the tumors and the general

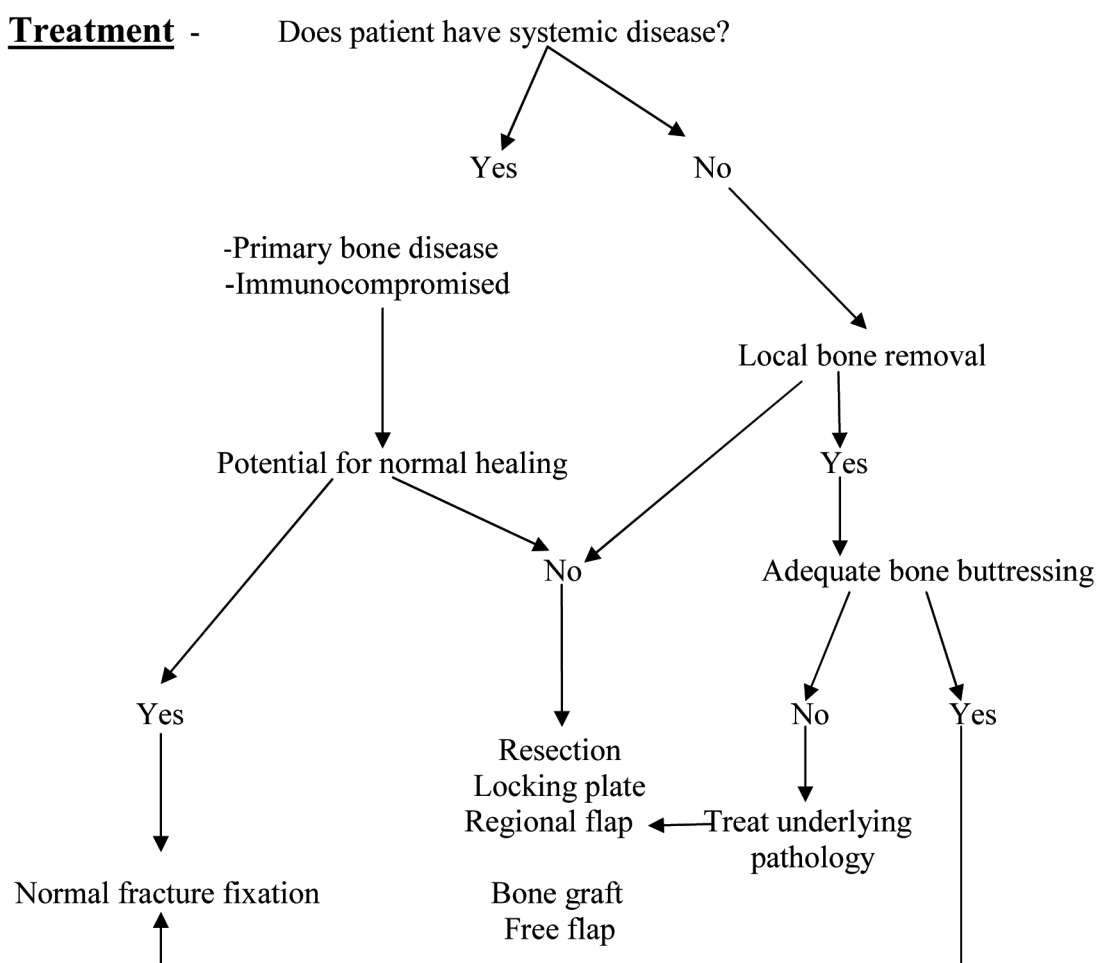
condition and life expectancy of the patient. Non-malignant underlying lesions require removal of the lesion and provision of stable fixation. The nature of the pathology means, fracture healing can be expected to be prolonged. Its consequences and inconvenience to the patient must not be overlooked. In the treatment it is mandatory to know the presence of systemic diseases. If patient is having primary bone disease or immunocompromised condition, it is necessary to know the potential for normal healing. If there is a potential for normal healing, then normal fracture fixation has to be done. If there

is no potential for normal healing, than resection/locking reconstruction plate followed by regional flap or bone graft has to be taken. If patient is not suffering from systemic diseases and local bone is normal then bone buttressing followed by fracture fixation has to be done. The treatment of pathologic fracture of the atrophic mandible has generally consisted of various methods of closed reduction, which result in a ridge that is unchanged in height and contour hence prone to repeated fracture⁷. The technique of inferior border grafting for preprosthetic augmentation of the atrophic mandible is superior than other procedure. Skeletal fixation can also be done in pathologic fractures of the mandible with extensive loss of substance.⁸

Summary & Conclusion: Increased rate of pathologic

mandibular fractures in males, following removal of a difficult lower wisdom tooth with a high retention grade that necessitated bone removal. Most of the pathological fractures reported in the literature are Iatrogenic followed by osteroradionecrosis. Hyperbaric oxygen therapy is helpful when either conservative or surgical exploration is necessary.²⁶

It is recommended to inform the patients for the anticipated possible risks and in selective cases, a soft diet for up to 4 weeks post surgically. A cracking noise reported by the patient is the most important indication of a pathologic fracture. If the fracture is undetected on clinical examination, the use of radiological aid is very handy.



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REVASCULARISATION OF PULP: A NEW TREATMENT PROTOCOL FOR IMMATURE PERMANENT TOOTH WITH APICAL PERIODONTITIS.

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ABSTRACT :

A new technique is presented to revascularize immature permanent teeth with apical periodontitis. The canal is disinfected with copious irrigation and a combination of three antibiotics. After the disinfection protocol is complete, the apex is mechanically irritated to initiate bleeding into the canal to produce a blood clot to the level of the cemento-enamel junction. An immature tooth with early irreversible pulp involvement presents with thin divergent or parallel dentinal walls. This situation creates clinical challenges in cleaning and shaping, & obturation of blunderbuss canal. Such a tooth receives traditional apexification with calcium hydroxide or one step apexification with MTA which induces further development of an apex, but does not promote thickness of entire canal wall. So even if successful, it will leave a short root with thin dentinal walls with a high risk of root fracture. Recently the concept of revascularization of necrotic pulp regained interest and became alternative treatment option for young permanent teeth with immature roots. It re-establishes the vitality in a nonvital, infected, immature tooth by stimulating regeneration of apical tissue & inducing apexogenesis to form entirely matured & strong root.

KEY WORDS: APEXIFICATION, APEXOGENESIS, IMMATURE TEETH, OPEN APICES, REGENERATIVE ENDODONTICS

Introduction:

A new technique is presented to revascularize immature permanent teeth with apical periodontitis. An immature tooth with early irreversible pulp involvement presents with thin divergent or parallel dentinal walls. This situation creates clinical challenges in cleaning and shaping, & obturation of blunderbuss canal. Such a tooth receives traditional apexification with calcium hydroxide or one step apexification with MTA which induces further development of an apex, but does not promote thickness of entire canal wall. So even if successful, it will leave a short root with thin dentinal walls with a high risk of root fracture. Recently the concept of revascularization of necrotic pulp regained interest and became alternative treatment option for young permanent teeth with immature roots. It re-establishes the vitality in a nonvital, infected, immature tooth by stimulating regeneration of apical tissue & inducing apexogenesis to form entirely matured & strong root.

The concept of revascularization introduced by Ostby in 1961¹. Later Rule and Winter² documented root development and apical barrier formation in cases of pulpal necrosis; also studies were aimed at determining how periodontal tissue would react, if the entire pulp was removed from the main canal and the apical part subsequently allowed to be filled with blood.³⁻⁴ K. Yanpiset & Trope⁵ Showed that the absence of bacteria is critical for successful revascularization because the new tissue will stop at the level it meets bacteria in the canal space.⁶ Iwaya et al showed that in revascularisation the apical portion of pulp may remain vital & proliferate coronally,

replacing the necrotized coronal portion of pulp⁷. Windley et al stated that revascularisation of immature teeth with apical periodontitis depends on (a) disinfection of the canal (b) placement of matrix in the canal for tissue ingrowth (c) a bacterial tight seal of the access opening⁸. Thibodeau et al demonstrated that the revascularisation potential of necrotic pulp & blood clot is essential as a scaffold for revascularisation⁹.

Clinical Procedure:

Under local anaesthesia and rubber dam isolation, access opening is carried out. The working length is estimated radiographically using a size 15 K-file. The selection of file is made to avoid any damage to the canal walls. The irrigation protocol included a slow and careful irrigation of 20 ml of 5.25% sodium hypochlorite, 2 mm back from working length because of the increased danger of pushing sodium hypochlorite through the apex of immature teeth. This is followed by a 5 ml rinse of saline and then a final irrigation of 10 ml of 2.0% chlorhexidine gluconate. An irrigation needle that can passively reach close to the apical length is useful for disinfecting the canals of these immature teeth. When the irrigant leaving the canal appears 'clean' of debris, the canal is dried with paper points & the tri-antibiotic paste is prepared immediately by mixing 200 mg of Ciprofloxacin, 500 mg of Metronidazole and 100mg of Minocycline with sterile water or with propylene glycol and macrogol ointment as carrier.¹⁰

Composition and mixing instructions for the tri-antibiotic paste:

- Antibiotics (3Mix)
 - Ciprofloxacin 200 mg
 - Metronidazole 500 mg
 - Minocycline 100 mg

- Carrier (MP)
 - Macrogol ointment
 - Propylene glycol

Protocol for preparation:

- Antibiotics (3Mix) – be sure not to cross-contaminate
 - Remove sugar coating from tablets with surgical blade, crush individually in separate mortars
 - Open capsules, crush individually in separate mortars
 - Grind each antibiotic to a fine powder
 - Combine equal amounts of antibiotics (1:1:1) on mixing pad

- Carrier (MP)
 - Equal amounts of macrogol ointment and propylene glycol (1:1)
 - Using clean spatula, mix together on pad
 - Result should be opaque
 - Separate out small portions of 3Mix and incorporate into MP using the following:
 - 1:5 (MP:3 Mix)'!creamy consistency
 - 1:7 (standard mix)'!smears easily but does not crumble
 - If result is flaky or crumbly, then too much 3Mix has been incorporated

Storage

- Antibiotics must be kept separately in moisture-tight porcelain containers
- Macrogol ointment and propylene glycol must be stored separately
- Discard if mixture is transparent (evidence of moisture contamination)

A 20G needle is set 2 mm short of working length and is used to introduce the medication into the canal using a backfill approach up to the level of the cemento-enamel junction. The tooth is then temporarily sealed with a cotton pellet & patient is called after one month.

Follow up after 1 month

One month later, under local anaesthesia and rubber dam, the tooth was re-accessed. The triantibiotic paste is removed with 6% sodium hypochlorite. With the root canal infection controlled, the regenerative process is initiated. A sterile size 20 K-File is introduced 2 mm past the working length to stimulate bleeding and create a biological scaffold for pulpal regeneration. The intra canal haemorrhage is controlled below the CEJ by applying pressure with a sterile saline-soaked cotton pellet. Until a clot is established MTA is mixed with sterile water and carefully placed above the blood clot up to the level of CEJ. Access is redefined, cleaned and restored

with resin-bonded composite.

Follow up after the 18-months, During this follow-up period, the tooth remains asymptomatic & responds normally to vitality tests. After 18 month, the canal is reopened & formation of dentine bridge is found at the level of orifice (adjacent to filling material) using an explorer. There will be positive response to electric pulp testing on the surface of Dentine Bridge. The access is again restored.

Follow up after 30 month

Thirty month after initial treatment the radiographs demonstrate evidence of periradicular bone healing and significant root development with maturation of the dentine as compared with the preoperative radiographs.

Discussion:

Pulp tissue in immature teeth with open apices has a rich blood supply and the potential to regenerate in response to damage which can be considered an alternative conservative treatment option for young permanent teeth with immature roots. This procedure exploits the full potential of the pulp for dentine deposition and produces a stronger mature root that is better able to withstand the forces than can result in fracture¹¹. In order to preserve this pulp tissue, the canal should not mechanically debrided, but a mixture of metronidazol and ciprofloxacin is applied as the intracanal antibacterial dressing. As a result, the bacteria in the coronal pulp are presumably removed, allowing the vital, well-nourished apical pulp cells to proliferate into the open space. To allow successful revascularization, therefore it would be necessary to first remove the bacterial challenge from the coronal pulp by irrigating with sodium hypochlorite, disinfect the canal with tri antibiotic paste and leave the canal space filled with blood clot which acts a scaffold for regeneration & finally provide a sufficient coronal seal to prevent additional bacteria from entering the space provided.¹² The question is, whether the thickened root was formed by pulp tissue from the remaining vital pulp tissue at the apical region that was resistant to infection, or the thickened root was formed by periodontal ligament (PDL) tissue, which grew into the root canal from the apical foramen and deposited the cementum onto the inner surface of the root dentin.⁴ It is possible that a few vital pulp cells remain at the apical end of the root canal^{13,14}. These cells might proliferate into the newly formed matrix and differentiate into odontoblasts under the organizing Influence of cells of Hertwig's epithelial root sheath, which are quite resistant to destruction, even in the presence of inflammation.¹⁵ The newly formed odontoblasts can lay down atubular dentin at the apical end, causing apexogenesis (elongation of root), as well as on lateral aspects of dentinal walls of the root canal, reinforcing and strengthening the root. Another possible mechanism of continued root development could be due to multi potent dental pulp stem cells, which are present in permanent teeth¹⁶ and might be present in abundance in immature teeth. These cells from the apical end might be seeded onto the existing dentinal walls and might differentiate into odontoblasts and deposit tertiary or atubular dentin.

The third possible mechanism could be attributed to the presence of stem cells in the periodontal ligament^{17,18}, which can proliferate, grow into the apical end and within the root canal, and deposit hard tissue both at the apical end and on the lateral root walls. The evidence in support of this hypothesis is presented by documentation of cementum and Sharpey's fibers in the newly formed tissues.

The fourth possible mechanism of root development could be attributed to stem cells from the apical papilla or the bone marrow. Instrumentation beyond the confines of the root canal to induce bleeding can also transplant mesenchymal stem cells from the bone into the canal lumen. These cells have extensive proliferating capacity. Transplantation studies have shown that human stem cells from bone marrow can form bone or dentin in vivo^{19,20}. Another possible mechanism could be that the blood clot itself, being a rich source of growth factors, could play an important role in regeneration. These include platelet-derived growth factor, vascular endothelial growth factor (VEGF), platelet-derived epithelial growth factor, and tissue growth factor and could stimulate differentiation, growth, and maturation of fibroblasts, odontoblasts, cementoblasts, etc from the immature, undifferentiated mesenchymal cells in the newly formed tissue matrix²¹.

Advantages of revascularization over traditional calcium hydroxide and MTA apexification are as follows:

1. It requires a shorter treatment time,
2. After control of infection, it can be completed in a single visit
3. It is also very cost-effective, because the number of visits is reduced, and no additional material (such as MTA) is required.
4. Obturation of the canal is not required. Revascularisation results in continued root development (root lengthening) and strengthening of the root as a result of reinforcement of lateral dentinal walls with deposition of new dentin/hard tissue.

Limitation of revascularization are as follows.

1. Long-term clinical results are as yet not available.
2. It is possible that the entire canal may become calcified, compromising aesthetics and potentially increasing the difficulty in future endodontic procedures if required.
3. In case post and core are the final restorative treatment plan, revascularization is not the right treatment option because the vital tissue in apical two thirds of the canal cannot be violated for post placement¹⁸.
4. Clinical complication like crown discolouration, development of resistant bacterial strains and allergic reaction to the triantibiotic paste may occur. Sealing the dentinal tubule will prevent direct contact between tooth and medicament but further research is warranted to seek an alternative infection control capable of preventing allergic reactions & development of resistant strains of bacteria as well as a biological material capable of inducing angiogenesis & allow a more predictable scaffold & tissue regeneration.²² Presently we can only say with certainty that the pulp space has returned to a vital state, the tissue in the pulp space is more similar to

periodontal ligament than pulp tissue. It appears that there is about 30% chance of pulp tissue re-entering the pulp space.²³⁻²⁵ Further research is necessary to clear the concept.



Fig 1- Radiograph showing the open apex with apical periodontitis.



Fig 2- Radiograph showing completion of root after revascularisation.

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