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JOURNAL OF INDIAN DENTAL ASSOCIATION - KOCHI

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Chief Editors Message

Greetings and Xmas wishes from Team JIDAK.

We are happy to announce with immense pride, the launch of the last issue of JIDAK for this year, in the beautiful month of December!

As we are approaching the fag end of 2019 and eagerly awaiting 2020 with new hopes and dreams, we promise to keep the momentum going of the academic enrichment for our fraternity through JIDAK.

A big "thank you" from our heart for all the support and help that's been offered to us and we further request everyone's support and blessings in the coming year as well !

Thank u

Jai JIDAK

Jai IDA

Dr. Meera Gopalakrishnan
Chief Editor- JIDAK
IDA Kochi

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ORIGINAL RESEARCH ARTICLE

PREPAREDNESS TOWARDS BIOTERRORISM: A SURVEY AMONG POST GRADUATE STUDENTS AND FACULTY MEMBERS OF DENTAL COLLEGES OF DAVANGERE CITY, KARNATAKA

ABSTRACT

Background: Bioterrorism agents include bacteria, viruses, fungi and other microorganisms, as well as biotoxins produced by microorganisms, plants and animals that can kill or incapacitate. agents have the unique potential to make an environment more dangerous over time. If used for hostile purposes, any disease-causing microorganism could be considered a weapon. The dental profession could potentially play a significant role in the emergency response toa major bioterrorism attack.

Methodology: A cross sectional questionnaire based study was conducted among 363 dental post graduate students and teaching faculty members of 2 dental colleges in Davangere city, Karnataka to assess their preparedness towards bioterrorism. A prefaricated, validated questionnaire consisting of 15 questions was used in assessing the objective of the study. The responses were tabulated as percentage of responses and inferential analysis was done using Chi Square test.

Results: Of the 363 subjects who participated in the study, 45.2%) were males and 54.2% were females. About 68% comprised of post graduate students and the rest 32% were faculty members.75.2% of the respondents had come across the term 'bioterrorism' during their practice period. Only 25.3% among the respondents were aware of the diseases that have a potential to spread from person to person. 65.8% were aware that inhalational form of anthrax is the most deadliest form of anthrax and only 25.3% could differentiate an upper respiratory tract infection from inhalational anthrax. 98% had not undertaken any training for dealing with bioterrorism event and 88.6% were interested to participate in training programs. 92.8% opined that dentists should be prepared for handling any such bioterrorism.

Conclusion: The results of the present study revealed that the dental post graduate students and the dental faculty members have deficiencies with respect to their knowledge, perceived ability to recognize and preparedness towards a bioterrorism event. This deficiency was more frequently observed among the faculty members than the post graduate students.

Key Words: Bioterrorism, dentist, knowledge, preparedness.

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INTRODUCTION

Throughout history, warriors have sought to devise more effective means of mass destruction. Biological weapons have been of interest for centuries and have been utilized in numerous battles. State-sponsoredprograms have intensively researched optimal organisms and techniques for their dissemination. Recent advances in molecular biology have allowed successful manipulation of bacteria and viruses to provide resistance to conventional treatments. Large stockpiles of such altered bio-weapons now exist and are available for terrorist use.[1]

As defined by the Centers for Disease Control (CDC), bioterrorism is the "intentional or threatened use of bacteria, fungi, or toxins from living organisms to produce death or disease in humans, animals and plants," and involves "intimidation of nations or people to accomplish political or social ends."[1]

Bioterrorism agents include bacteria, viruses, fungi and other microorganisms, as well as biotoxins produced by microorganisms, plants and animals that can kill or incapacitate. Because they can reproduce, biological agents have the unique potential to make an environment more dangerous over time. If used for hostile purposes, any disease-causing microorganism could be considered a weapon. These agents typically are found in nature, but it is possible that they could be changed to increase their ability to cause disease, to be resistant to current medicines or to be spread into the environment. Biological agents can be spread through the air, through water or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. Some bioterrorism agents, such as the smallpox virus, can be spread from person to person, while others, such as anthrax, cannot. [2]

Public health systems are designed to deal with a regular stream of crises that span a wide range. Health professionals are part of these systems and include, for instance, communicable disease specialists and emergency responsepersonnel, who must be ready to respond to natural and man-made disasters. The public health system has an integral and critical role in responding to threats to public well being, and thus requires a well-prepared workforce.[3]

The dental profession could potentially play a significant role in the emergency response toa major bioterrorism attack. If a major attack were to occur, little time will be available to develop a response. In preparation for fulfilling such a role if called upon, it is vital to identify the specific areas in which the dental profession can provide emergency assistance and to prepare dentists adequately. Dentists, as health professionals should be aware of the medical sequelae of bioterrorism including the diseases it spreads, systemic and oral manifestations it produces and most importantly the management of such patients who have encountered biological agents and developed health problems.[4]

Dentists play an important role as they are well prepared at the time of catastrophic events and are experts in barrier techniques and infection control. They are trained and skilled in administering drugs by injection, can place sutures and control bleeding. Also, they are able to participate in interdisciplinary professional groups; and well adapted at managing uncomfortable patients. They can be employed in prescription of medications, immunization, and distribution of medical supplies as well as manages victim triage.[5] Dental identifications using forensic odontology helps in victim identification during natural and manmade disaster situations and in particular mass casualties normally associated with aviation disasters.[6,7]

It is the recommendation of the American Dental Association (ADA) that the dental professionals can be a resource and with targeted education and training can effectively respond and assist during natural and other catastrophic disasters8Tocarry out these roles effectively, a thorough knowledge and adequate training in bioterrorism preparedness and management, as well as the willingness to provide them are essential.[9]

Thus, this survey was conducted to assess the base of objective knowledge about bioterrorism, the perceived readiness to respond to a bioterrorismassociated event and

the willingness to respondto such an event among the faculty members andpostgraduate students of the dental colleges of Davangere city, Karnataka.

OBJECTIVES

1. To assess the knowledge, perceived readiness to respond to associated events and the willingness to respond to bioterrorism events among the faculty members and post graduate students of dental colleges of Davangere city, Karnataka.
2. To compare the knowledge, perceived readiness to respond to associated events and the willingness to respond to bioterrorism events between the faculty members and post graduate students of dental colleges of Davangere city, Karnataka.

METHODOLOGY

Study Design: A cross sectional descriptive questionnaire based survey was conducted among the faculty members and post graduate students in two dental colleges of Davangere city.

Study population:

The survey was conducted in two dental colleges of Davangere city, Karnataka.. Questionnaires were distributed to the subjects who were present at the time of data collection. The subjects who were not willing to participate in the study and who did not return the questionnaire even after repeated intimation were excluded from the survey. A total of 363 samples that included 247 PG's and 116 faculty members participated in the survey. Prior to the survey, the permission was obtained from the Principals of the respective colleges and the programme was scheduled accordingly.

Questionnaire:

A structured, pretested questionnaire which consisted of 15 questions was employed to assess the knowledge, attitude and preparedness regarding bioterrorism among post graduate students and faculty members of the dental colleges in Davangere city, Karnataka. The questions used were mainly close-ended.In the beginning of the questionnaire, the personal information regarding the respondents was obtained like age, sex, designation and teaching experience.

Ethical considerations:

Ethical approval was obtained from the ethical committee of College of Dental Sciences, Davangere. Informed consent was obtained from all the participants.

Statistical Analysis:

All returned questionnaires were coded and analyzed. Results were expressed as a number and percentage of respondents for each question and were analyzed using the SPSS Version 21 software. Chi-square test was performed to analyze the significant difference in the response if any between the faculty members and post graduate students. The level of significance was set at $p = 0.05$.

RESULTS

Of the 363 subjects who participated in the study, 45.2% (n=164) were males and 54.2%(n=199) were females. About 68% (n=247) of the samples comprised of post graduate students and the rest 32% (n=116) were faculty members.(Table I)

TABLE I: Profile of respondents

VARIABLE	N	%
GENDER		
MALE	164	45.2%
FEMALES	199	54.8%
QUALIFICATION		
POST GRADUATE STUDENT	247	68%
FACULTY	116	32%

Table II shows response in percentage to the questions. Majority of the respondents (75.2%) had come across the term 'bioterrorism' during their practice period. Only 25.3% (n=92) among the respondents were aware of the diseases that have a potential to spread from person to person in any such event. The response differed significantly among post graduate students in comparison to faculty members ($p<0.001$). When asked about the various diseases which can be used as biological terrorism threats in case of any bioterrorism events, very few (31.1%) of the respondents said that botulism, anthrax, smallpox and plague are the diseases, the correct response being significantly greater among post graduate students ($p = 0.008$).

Most of the respondents (65.8%) were aware that inhalational form of anthrax is the most deadliest form of anthrax and only few of the respondents (25.3%) could differentiate an upper respiratory tract infection from inhalational anthrax. The difference in giving a correct response was significantly different among postgraduate students and faculty members ($p = 0.001$) for both the questions.

Over half the number of respondents, 55.4% (n=201) were aware of the infection control measures which are recommended in case of a suspected or confirmed case of smallpox (Table III). Only 37.7% (n=137) of the respondents were aware of the critical measures to be used in case of preventing any contact transmission of vaccinia virus (Table IV). There was a significant difference in the awareness between staff and faculty members ($p<0.001$) in both the cases.

About 43% of the respondents were able to identify the most common early presenting symptoms associated with the majority of the high risk bioterrorism associated diseases. When asked about their ability to identify and recognize a bioterrorism event, only 47.7% of the respondents said they had fair knowledge.

About ninety eight percent (n=352) of the respondents had not undertaken any training for dealing with bioterrorism event and majority (88.6%) of the respondents were interested to participate in any such training programs regarding bioterrorism.

Vast majority (92.8%) of the respondents were of the opinion that dentists should be prepared for handling any such bioterrorism events and 93.6% (n=338) were of the opinion that the subject of bioterrorism should be included in the curriculum of dental students

Only 53.2% (n=192) of the respondents agreed that they could recognize the oral manifestations of the bioterrorism agents used in any bioterrorism event. Vast majority (95%) of the respondents were willing to provide assistance to the state in response to any such bioterrorism event.

TABLE II: Response to the questions

Sl.No.	QUESTION	OPTIONS	RESPONSE
1	Have you come across the term 'bioterrorism'?	Yes	75.2%
		No	24.8%
2	Which of the following diseases have potential for person to person spread?	Anthrax and plague	57.85%
		Plaque and botulism	5.50%
		Botulism and brucellosis	4.95%
		Small pox and plague	25.34%
		Small pox, plague & anthrax	6.33%
3	Which of the following is the deadliest form of anthrax?	Cutaneous	14.32%
		Gastrointestinal	12.94%
		Inhalational	65.84%
		Bubonic	6.88%

4.	Which of the following symptoms is/are not commonly found in inhalation anthrax and if present could help differentiate an upper respiratory tract infection from anthrax?	Rhinorrhoea& sore throat	27.54%
		Dyspnoea	13.49%
		Meningeal signs	41.87%
		Vomiting	17.07%
5.	The most common early presenting syndrome associated with the majority of high risk ("Category A") bioterrorism-associated diseases (i.e., anthrax, botulism, plague, smallpox, tularemia,and viral hemorrhagic fevers) is:	Acute bloody diarrhea	15.97%
		Influenza like illness	42.97%
		Acute hepatitis	7.71%
		Fever and rash	33.33%
6.	How do you perceive your ability to identify and recognize a BT (bioterrorism) event in	Very good	4.40%
		Good	17.63%
		Fair	47.65%
		Poor	30.30%
7.	Have you undertaken any training for dealing with BT(bioterrorism) event?	Yes	2%
		No	98%
8.	Are you interested in participating in the training procedures?	Yes	86.6%
		No	13.4%
9.	Do you feel it is important for dentists to be prepared for any such bioterrorism event?	Yes	92.8%
		No	7.2%
10.	Is it worth to include the knowledge of bioterrorism in the curriculum of dental schools?	Yes	93.6%
		No	6.4%
11.	Perceived ability to recognize oral manifestations of bioterrorism agents.	Yes	53.2%
		No	46.8%
12.	Are you willing to provide assistance to the state in response to a bioterrorism event?	Yes	95%
		No	5%

TABLE IV:
Response when asked about the critical measures used to prevent the contact transmission of vaccinia virus.

Option	Response (%)
Isolation of the person in a negative air pressure room.	7.7
Protective clothing for healthcare workers in contact with patients.	6.6
Vaccination of persons involved with direct medical care of suspected cases.	26.5
Monitoring contacts of suspected smallpox cases for febrile illness.	3.8
All of the above	55.4

TABLE III:
Response when asked about the infection control measures recommended for a suspected or confirmed person with smallpox.

Option	Response (%)
Thorough hand washing after contact with vaccination site.	37.7
Isolation of vaccinated person.	20.6
Use of a porous bandage to cover vaccination site.	9.9
Antibacterial ointment applied to the vaccination site.	5.2
Application of the vaccine at an anatomical site normally covered by clothing.	25.6

DISCUSSION

Bioterrorism has become a significant threat to the world and a challenge to public health if not diagnosed early. Exposure of civilians to bioterrorism agents may result in severe health problems if not treated within sufficient time, and the effects may last longer or can be transferred to the next generation.[10]

In June 2002, the American Dental Association (ADA) convened a national workshop to determine the potential role for dentistry in the event of a bioterrorism attack. A consensus statement arose from the workshop recognizing the valuable assets that dentists could contribute in response to a bioterrorism event. [11]

Dentists in the armed forces have been trained in handling various emergency situations. Galligan has reported that dentists were a part of Disaster Mortuary Operational Response Teams and contributed to disaster management[12]. Dental professionals' involvement in identifying victims and human remains, and in dealing with mass suicides, mass graves, homicides, and terrorist attacks also have been reported[7,13].

The present study included 247 post graduate students and 116 faculty members of the two dental colleges of Davangere city, Karnataka.

Majority of the respondents (75.2%) had come across the term 'bioterrorism' during their practice which reflects that the respondents have some knowledge of such an event. When asked about the diseases that have the potential to spread from person to person, only 25.3% (n=92) were aware that smallpox and plague are the diseases. These results were in accordance with the study conducted by Menon I. et al on dental faculty members in Uttar Pradesh, India in the year 2010[4] and the results are in contrast with the study conducted by Katz AR et al among Hawaii dentists in the year 2006[11] wherein majority (87.2%) of the dentists responded correctly.

Only 31.1% (n=113) of the respondents were able to identify the diseases which can be good biological threats in any bioterrorism event. The results of our study were similar to the study conducted by Menon I. et al. in Uttar Pradesh, India in 2010[4] and the results were in contrast to the study conducted by Katz AR et al in Hawaii in 2006[11]. Most number of the respondents (65.8%) were aware that inhalational anthrax is the most deadly form of anthrax in the present study, the results of which are in accordance to the studies conducted by Menon I. et al in Uttar Pradesh, India,[4] and by Katz AR et al in Hawaii[11] .

About 25.3% (n=92) of the respondents could identify the symptoms that could differentiate inhalational anthrax from an upper respiratory tract infection. These results show that the respondents lack the abilities in diagnosing a case of inhalational anthrax from an upper respiratory tract infection. The results of our study are similar to the study conducted by Menon I. et al in Uttar Pradesh, India[4] and are in contrast to the study conducted by Katz AR et al in Hawaii[11] which shows that the dentists of Hawaii are able to diagnose such cases of anthrax more efficiently.

Most of the respondents (55.4%) in our study were aware of the infection control measures that are recommended for a person with suspected or confirmed diagnosis of small pox. The results are in concordance with the study conducted by Katz AR et al in Hawaii[11]. Only 37.7% (n=137) of the respondents were aware of the critical measures to be undertaken in preventing the contact transmission of vaccinia virus. This depicts the poor knowledge of the respondents regarding the various infection control measures to be undertaken in such cases. The results are in contrast with the surveys conducted by Katz AR et al in Hawaii[11]and by Menon I. et al in Uttar Pradesh[4].

Around 43% (n=156) of the respondents could recognize the most common early presenting syndrome associated with the majority of the high risk bioterrorism associated diseases. The results are similar with the studies conducted by Katz AR et al in Hawaii[11] and by Menon I. et al in Uttar Pradesh[4].

Forty eight percent (n=173) of the respondents said that they had fair knowledge with respect to identifying and recognizing a bioterrorism event. Less than 3% of the respondents had received previous bioterrorism preparedness training, and this result is in accordance with studies conducted by Katz AR et al in Hawaii11and by Bhatt et al in India[9].

It is note worthy that despite low objective knowledge test scores and the perception of being ill-prepared, more than 95% (n=343) percent of dentists expressed willingness to provide assistance to the state in response to abioterrorism event. These findings are similar to the studies conducted by Katz AR et al and Menon I. et al In Hawaii and Uttar Pradesh[4,11] respectively.

Around 90 % of the respondents showed their willingness to participate in training procedures regarding bioterrorism and were also of the opinion that the topic regarding bioterrorism is worth to be included in the curriculum of dental students so that in the future if any such event occurs, the dentists can assist the country to fight back such an in-human act. In addition, the ADA and the American Dental Education Association recommended that a core set of competencies related to bioterrorism preparedness be incorporated into the curriculum of all dental schools, and that "all dentists should receive at least a basic level of bioterrorism training, including training that would enable them to recognize diseases."[14]

As Jeffcoat wrote in a Journal of American Dental Association(JADA) editorial, "All of us, dentists and physicians alike, need a crash course on the specifics of bioterror weapons. … Learn what can be done for the victim, by you and by others. Learn how each disease is transmitted, and how to protect yourself and others from infection."[15]

It is this recommended that all dental students should be trained in a core set of competencies enabling them to respond to a significant bioterrorism attack, help contain the spread of the attack, and participate in surveillance activities as appropriate upon direction of proper authorities.[7]

CONCLUSION

The results of the present study revealed that

the dental post graduate students and the dental faculty members have deficiencies with respect to their knowledge, perceived ability to recognize and preparedness towards a bioterrorism event. This deficiency was more frequently observed among the faculty members than the post graduate students. The results indicate that the post graduate students and faculty members are less well prepared in managing cases of any such bioterrorism event thus highlighting the need of introducing the topic of bioterrorism in the curriculum. Additional bioterrorism preparedness training should be made available through continuing education. Even with their perceived weaknesses on the subject, the post graduate students and faculty members expressed their willingness to assist the state in its bioterrorism response activities, according to the survey in this study. Hence, it is strongly urged that a high priority be set for providing these professionals with the knowledge and training necessary to improve their ability to respond effectively in such an event.

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REVIEW ARTICLE

MANAGEMENT OF CHILDREN WITH SPECIAL HEALTH CARE NEEDS - A REVIEW

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ABSTRACT

Children are entitled as the future of the society and we have to ensure their healthy growth and development. Children with special health care needs (SHCN), because of their disabilities affect the dental condition too. They have comparatively poor oral hygiene and high prevalence of dental caries and periodontal problems. Parents of special children generally do not pursue for dental treatment unless some emergency issues happen to the kid. In earlier days emphasis was given on providing basic dental care to these special children, but recently, the dentistry has shown an enhanced interest in delivering overall oral health care to the mentally and/or physically-challenged children. The specialty of Pediatric and Preventive Dentistry provides both primary and comprehensive, preventive and therapeutic oral health care to these special children. Special children needs to be rehabilitated inorder to help them in their supreme level of functioning, regularize their life and spin-out their life expectancy.

Keywords: Special health care needs, Oro-dental health problems, Pediatric Dentist.

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INTRODUCTION

Children with special health care needs are not weird or odd. They only want what everyone else also wants to be accepted. The American Academy of Pediatric Dentistry (AAPD) defines special health care needs (SHCN) as "any physical, developmental, mental, sensory, behavioural, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs. The condition may be congenital, developmental, or acquired through disease, trauma, or environmental cause and may pose limitations in performing daily self-maintenance activities or substantial limitations in a major life activity. Health care for individuals with special needs requires specialized knowledge acquired by additional training, as well as increased awareness and attention, adaptation and accommodative measures beyond what are considered routine.[1] Special children have relatively high prevalence of deprived oral hygiene with poor gingival and periodontal health and high risk of dental caries. Oro-dental health problems and its treatment creates a huge burden in these special children. Neither the special children nor their caregivers practice proper oral hygiene or follows appropriate diet. Parents already have a mind block because of the burden of medical problems and their treatment. And because of this reason they generally do not go for a routine dental check up. Also, the health planners will overlook the need for oral health care in these children. This article reviews on commonly seen oral health care problems in special children and their management in a dental clinic. Proper understanding about potential barriers to oral health care and the consequences of compromised oral health in special children may help health professionals identify high risk patients early, bestow anticipatory guidance, and timely reference to pediatric dentists.

ORAL HEALTH CARE PROBLEMS COMMONLY SEEN IN CHILDREN WITH SPECIAL HEALTH CARE NEEDS (SHCN)

The oro-dental condition of children with SHCN can be directly or indirectly correlated to their disabilities. Abnormal growth and compromised medical conditions have an impact on oral health too. Also the oro-dental problems can have a shattering effect on the general health of these special children.[2] Commonly seen oral problems in children with special needs and the management in a dental clinic is listed below.

Tooth eruption and dental anomalies

Early, delayed or normal eruption of the teeth are seen in children with SHCN. Delayed eruption is mostly seen in children having Down syndrome and hypothyroidism. Variations in the shape, size, and/or number of the teeth are common in special children. Abnormal teeth usually have a cosmetic concern and the crowded teeth will increase the risk for dental caries.[3]

Malocclusion and crowded teeth

Malocclusion and crowded teeth more mostly seen in children with special health care needs like those with cerebral palsy, Down syndrome, and craniofacial abnormalities. Mal-aligned teeth is due to disharmonious relationship between extraoral and intraoral musculature. Hypertonicity of facial muscles seen in spastic type of cerebral palsy often leads to constriction of both maxillary and mandibular arches. This results in anterior open bite and posterior crossbite. But in case of athetosis type of cerebral palsy, the facial musculature is hypotonic and hence flaring or spacing between teeth is seen. Crowded teeth resists effective cleaning of the tooth surfaces and increases the risk of dental caries and periodontal disease.[4]

Enamel hypoplasia and enamel demineralization

Children with genetic diseases, preterm babies (low birth weight) and/or with developmental disturbances are at a greater risk for the development of enamel hypoplasia. Enamel hypoplasia is mostly visible on the middle or occlusal third of the teeth. Enamel demineral-

ization due to poor oral hygiene and an enhanced acidic oral cavity either due to snacks or liquid medications are mostly seen in and around the gingival line. The white spot lesions best depicts the initial demineralization that are best seen by lifting the lip procedure.[5]

Dental Caries

Children with SHCN generally presents an increased prevalence of dental caries. The contributing factors accounts for

a. Lack of proper cleaning of the oral cavity by a weak tongue following an uncoordinated chewing may leave more food in the mouth in children with cerebral palsy.[6]

b. Compromised manual dexterity leads to inefficient tooth-brushing and the related issues like gagging due to toothbrush, paste, or saliva leads to incomplete cleaning of all areas.

c. Because of the child's inability to spit, swallowing of toothpaste happens

d. Frequent snacking and unhealthy eating habits that including soft and sweetened diet provides a favorable acidic environment for the cariogenic bacteria to act.

e. Dry mouth(Xerostomia) due by medications taken for altered medical conditions.

f. Gastroesophageal reflux disease (GERD) and frequent vomiting.

g. Gingival hyperplasia and crowded teeth will increase the risk.

h. Frequent intake of liquid medications often contains sugar and acids (to make it palatable).

I. Developmental disturbances of enamel like hypoplasia and demineralisation especially in the maxillary incisors and primary molars.[7]

Gingival hyperplasia

Gingival hyperplasia is seen in children taking medications for seizures like in epilepsy, especially phenytoin. The other medications that causes gingival hyperplasia includes calcium channel blockers like nifedipine and immunosuppresants like cyclosporine A. Chronic gingivitis due to lack of proper oral hygiene will exacerbate the medication/drug-induced gingival overgrowth. Although gingival hyperplasia demands cosmetic concern, it will also lead to other problems like altered tooth eruption, difficulty while chewing, and gingival inflammation.[8]

Trauma and bruxism

Special children those who have seizures, poor muscle coordination, abnormal protective reflexes and developmental delays, often encounter with trauma to the face and mouth. Some special children also presents self-injurious behavior (Masochism) which damages the oral structures. Those children suffering from cerebral palsy or severe mental retardation like in Down syndrome often brux the teeth. This tooth grinding leads to enamel loss. Also a difficulty with chewing can occur due to tooth sensitivity. Bruxism often leads to flattened tooth surfaces, headaches, pain on TMJ, and gingival and periodontal diseases.[8]

MANAGEMENT OF DENTAL PROBLEMS IN SPECIAL CHILDREN

Management of oro-dental problems in special children includes relieving the oro-dental pain and control of oral infections, treatment of the existing untreated disease and planning for the prevention of further anticipated oral diseases. There is no difference in treatment procedures for dental diseases in special children except for sedation even for procedures like prophylaxis, restorations, and minor oral surgery. If there is any concern about a special child's cooperation or his/her ability to tolerate dental procedures, he/she should be referred to a pediatric dentist or a specialist that has undergone training in sedation.

Daily preventive care at home

Daily preventive dental care at home has to be tailored to meet the specific needs of the child. This can be best addressed by the dental and health professionals associated with providing

caring for the special child. The concept of Dental home provides preventive and routine care for special children.

Toothbrushing: If the child swallows toothpaste while brushing, care takers should be careful to restrict the amount of toothpaste to a smear that is less than a pea-sized amount or else can opt a non-fluoridated toothpaste. If gagging is exagerrated by the toothpaste, the teeth can be alternatively brushed with fluoride mouth rinse.

Fluoridated toothpaste: AAPD recommends smear of toothpaste for infants and children under age 3 and a pea-sized amount for children aged 3 through 6. Care should be taken to prevent the ingestion of toothpaste. For children between age 3 to 6 who finds it difficult to spit can be allowed to drool into a cup. If the child continues to swallow the toothpaste, a non-fluoridated toothpaste have to be used.

Fluoride rinses: Care should be taken while using fluoride rinses in special children. It should be recommended only in children those who can swish and spit. Most of the special children have oral motor dysfunction and they tend to swallow the rinse. Hence it should be applied with a cotton swab. Alcohol-free mouth rinses preferred.[9,10]

Professional care

This type of fluoride treatment with gel, foam or varnish finds to be beneficial for children those who are unable to use fluoride rinses at home and who are at high risk for dental caries. Modifications are needed for children with oral motor dysfunction like abnormal reflexes or muscle control and oral hypersensitivity like overreaction to touch, taste, and/or smell. Gels or foams are applied in trays and requires constant use of suction in order to prevent choking, excessive drooling of saliva and aspiration of gels or foams. Trays will aggravate hyperactive gag reflexes in special children. Hence brushing the teeth with gel or foam while using suction finds to be more effective. Fluoride varnish seems to be the best type of professionally applied fluoride for children with SHCN. Application has to be repeated every 3-6 months in children who are at high risk for dental caries.[9]

Dental sealants

Special children usually cooperate with dental sealant application as its application does not require either an injection or the placement of a rubber dam. Wet bond dental sealants are useful in special children as they chemically bond to moist teeth and do not require a dry field for their application. But isolation seems to be difficult with some special children those who have oral motor dysfunction. Effective and efficient suctioning is required for successful application of dental sealants. Dental sealants cannot be used in special children who severely brux their teeth because of cognitive disabilities, cerebral palsy, or autism as such teeth have flattened occlusal surfaces.[8]

Antimicrobial agents

Antimicrobials are highly recommended for special children with disorders like leukemia, kidney failure, immune deficiencies, and in fungal and opportunistic infective conditions and also in cases when there is moderate to severe gingivitis or periodontitis.[11] Antimicrobial rinses should be used only in children who can swish and spit.

Chlorhexidine (CHX): Chlorhexidine helps to prevent dental caries and periodontal diseases as it is effective against Streptococcus mutans the key bacteria causing dental caries. It is available in the various forms like gels, chewing gums, varnishes, and rinses. It is available in various concentrations too. Varnishes and gels seems to be more useful than rinses for many children with SHCN. Rinses has to be applied with a cotton swab twice a day. Chlorhexidine is highly effective in children with high caries risk.

Xylitol: It is a low-calorie sugar substitute and short-term exposure to xylitol has been shown to decrease S. mutans levels in both saliva and plaque. It has got additive dental caries preventive action along with fluoride. Children over age 3 can use xylitol containing chewing gums if they are able to chew without choking. Xylitol gums has to be chewed for 3–5 min per session and has to be repeated three to five times per day.

Oral prophylaxis

Heavy calculus deposits are seen in special children caused by inadequate salivary flow, metabolic disorders, mouth breathing, tube feedings, oral motor dysfunction, kidney failure, or inadequate oral hygiene. If the ultrasonic scaling is intolerable to the child hand scaling can be considered.[12]

ORAL EXAMINATION

The oral examination of a special child is not different than routine oral examination of a normal child. However, oral defensiveness, increased gag reflex, and oral motor hypotonicity can make the oral examination little more difficult and it should be documented. The primary care physician should make an increased effort to complete an oral examination too. They should examine the areas like teeth, gingiva and palate and document if any oro-facial anomalies present. Early referral to a pediatric dentist can be done to ensure complete oral examination.[8]

BARRIERS TO ACCESS TO DENTAL CARE IN CHILDREN WITH SPECIAL HEALTH CARE NEEDS

Oral health care seems to be the most common unmet need among the special children. McIver[13] has pointed out the following barriers to access dental care in special children

1. Primary medical care system: Dental health is given least priority as the child has got more urgent medical health care. And most of the times dental treatment seems to be practically difficult with the child's present medical issues.
2. Parents: The child's parents or caretakers think that the child's milk teeth will eventually fall off which further complicates the dental condition of the child. Also most of the parents also find it difficult to access a dentist who can treat children with SHCN. The dental treatment of special children is more time consuming too.
3. Child: The child himself poses numerous problems to get dental treatment because of inability to understand the importance of oral procedure and not able to behave cooperatively in a dental clinic.
4. The dentist: General practitioners find it difficult to deliver dental treatment to special children because of inadequate knowledge and clinical experience of the dentist in handling such kids. Other non-educational factors such as special arrangements like access to dental clinic (having lift if in top floors), spacious enough to accommodate wheel chair also causes hindrance to delivery of proper dental care to special children.
5. Payments for dental care: Multiple visits and dental treatment charges cause an extra financial burden on parents along with medical expenses.

REFERRALS

AAPD recommends that all children should be referred to a dentist 6 months after the first tooth erupts or by age 12 months (whichever comes first) for establishment of a proper dental home.[14] All children with Special health care needs (SHCN) fall into high risk category and should be referred to a dentist by 1 year of age. Children with SHCN needs to visit a pediatric dentist every 2-3 months for professional preventive care, depending upon the risk factors Any child with evidence of caries, gingival or eruption anomalies should be referred to a pediatric dentist immediately.

CONCLUSION

The birth of a child is always eagerly awaited by family and friends as it is always an event of bundle of joy and happiness. However it becomes apparent that something is amiss with their newborn, their world is worn out. With great anger denial and depression parents of such children suffer great agony. Sometimes parents lose their temper and outburst on the innocent child who suffers for no fault of his own. The maintenance of good general and oral health of such children seems to be very difficult and their oral cavity may be ravaged by dental caries and periodontal diseases. Hence the management of these God"s Forgotten Children is really a task which requires special effort on the part of dental sur-

geon and the pediatric dentist. It is essential to understand the psychology of both the special child and the parents. Parental anxiety should also be taken into consideration.

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REVIEW ARTICLE

INKJET PRINTING OF CERAMICS - A REVIEW

ABSTRACT

Ceramics have been used to fabricate a wide variety of restorations including inlays, onlays, implants, crowns and fixed partial dentures on account of their biocompatibility, wear resistance and better esthetics. The presently used subtractive manufacturing techniques remove material from raw ceramic blanks to form the restorations which leads to considerable wastage of ceramics. Additive manufacturing (AM) techniques may overcome such deficiencies through bottom-up processing approaches, where 3D objects are built up by adding layer-upon-layer of material. Additive manufacturing techniques that are of special interest to ceramics are stereo-lithography, 3D printing, laser sintering, laser melting and direct inkjet printing. This novel technique has great potential to produce, cost-efficiently, all-ceramic dental restorations at high accuracy and with a minimum of materials consumption.

Key words: Ceramics, additive manufacturing, inkjet printing, piezoelectric.

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INTRODUCTION

The introduction of CAD-CAM milling revolutionized the dental field by making zirconia a standard material for dental prosthetic restorations. A major disadvantage with the currently used techniques for the manufacture of ceramic restorations is the considerable wastage of raw material from which the restoration is milled out. This method is called subtractive manufacturing because the ceramic restoration is made by cutting sections out of hard sintered ceramic block or by cutting from soft green ceramic and subsequent sintering. The unused portions of the raw ceramic material must be discarded after milling, as the recycling of this excess material is not feasible. This procedure is time consuming and also because of the short milling cycles used, the tools are exposed to heavy abrasion from sintered hard ceramic blocks. Moreover, the surface damage produced by the milling procedure significantly reduce the strength of zirconia which could be further weakened by different surface treatment methods.[1] Even though milling from soft green ceramic saves considerable amount of time, the shrinkage during subsequent sintering can affect the contour and shape of the restorations.

Additive manufacturing of ceramics

The terms "rapid prototyping", "rapid manufacturing", "solid freeform fabrication" and "generative manufacturing processes" are often used as synonyms for "constructive" possibilities. The above-named terms cover various generative manufacturing processes in which 3-dimensional models or components are prepared from computer-aided design data (CAD data)[2]. Examples of typical rapid prototyping processes are stereolithography, 3D printing and inkjet modelling. The principle of rapid prototyping is based on the layered construction of a three-dimensional component. Two-dimensional layers (XY plane) are laid on top of one another. Depending on the thickness of the layers, there is a greater or lesser degree of gradation of the component in the direction of construction (Z direction)[3]. It is expected that this preparation is substantially more cost-effective to implement than processes involving the removal of material. The main potential for savings lies in the use of less material. In addition, constructive processes allow a parallel manufacture which will bring a significant saving in time and increase in productivity.[4]

Additive manufacturing techniques like direct inkjet printing may overcome such deficiencies through bottom-up processing approaches, where 3D objects are built up by adding layer-upon-layer of material.[5] First, a 3D model of the restoration is designed by using Computer Aided Design (CAD). This is sent to a 3D printer which will read the digital data and create the restoration by printing multiple layers using raw materials. The ceramic ink drops ejected through the printer nozzle land on the substrate at the desired position by applying precise digital control where they form drops due to surface tension. These drops are then fused to form three-dimensional ceramic restorative structures. This direct inkjet printing of a ceramic suspension provides the possibility of generating dense green bodies at a high resolution and complex shape.[6]

In comparison with traditional ceramic processing methods, ceramic inkjet printing has a number of advantages. It requires minimum tooling and gives great design and fabrication flexibility[7].

Piezoelectric Inkjet printing of ceramics

Piezoelectric technology is considered to be more feasible for inkjet printing of ceramic restorations[8]. Piezoelectric materials are materials such as certain ceramics that can produce electricity in response to applied mechanical stress, such as compression. Piezo materials can also expand or contract when an electrical charge is applied. The expansion or contraction of the piezo crystal under voltage moves it forward or backward. This slowly pushes or pulls the actuator material that is

attached to the piezo crystal. The movement of actuator generates a pressure pulse that ejects the fluid through the nozzle of the printing head. Direct ceramic inkjet printing (DCIJP) uses ceramic powder in a carrier medium which is deposited through a delivery system actuated by a piezoelectric device. Successful printing depends on the preparation of suitable ceramic ink which is essentially a well-dispersed suspension of a fine powder. The dispersion must be stable and free from agglomerates.[9]

J. Ebert et al manufactured a posterior ceramic crown using direct inkjet printing from a tailored zirconia-based ceramic suspension. This ceramic ink consists of approximately 27 vol% of zirconia powder, 55% distilled water, Boehmite sol to prevent agglomeration of the ceramic particles and to increase the green body strength, and dispersants. They injected the ceramic suspension into an empty standard HP cartridge by means of a syringe. The printing device was based on a modified drop-on-demand Deskjet printer (HP DeskJet 930c, Hewlett Packard). The ceramic crown was then 3D-printed and subsequently sintered. They concluded that this novel technique has great potential to produce cost-efficiently, all-ceramic dental restorations at high accuracy and with a minimum of materials consumption.[10]

Drawbacks of current Inkjet printing technology

Typical nozzle diameter of piezoelectric printers ranges from 10-15 µm. So all the particles have to be 50 times smaller than the diameter of the nozzle to avoid clogging of nozzle. A mean ceramic particle size of 90 nm has been achieved during piezoelectric inkjet printing of zirconia ceramic dental components. Sometimes, the drops generated from the print head of an inkjet printer may show the characteristic elongated tail and the formation of satellite drops. The satellite drops may land in a different location from the parent drop, hence compromising the resolution of a printed object.[11] Particle analysis of the powders is necessary to determine ceramic powder particle size and particle distribution is important to prevent agglomeration in the nozzles. Irregular particle size with a wide distribution of particles could possibly increase the chances of agglomeration.[12]

Good contact between ceramic suspension drops is required for homogenous distribution of the material and for the desired characteristics of the resulting restorative material. The distance between the centers of two adjacent drops is called drop spacing. Optimal drop spacing produces a line with smooth edge and uniform thickness. Isolated drops appear on the substrate when drops are printed at a drop spacing larger than twice the drop's radius. If we decrease the drop spacing, the drops partly overlap and merge together, forming a scalloped pattern. Another problem with current technique is the "coffee stain" defect that occurs during drying. It is caused by particle migration from the center to the edge of a drying drop and leading to nonuniform printed structures.[13]

CONCLUSION

Ceramic ink development is now relatively mature and has great potential to produce, cost-efficiently, all-ceramic dental restorations at high accuracy and with a minimum of materials consumption. Though the experiments are in a naïve phase, additive manufacturing technology has potential in terms of cost, productivity and time.[14] With the ability of manufacturing parts directly from a CAD model with adequate accuracy and minimal waste, additive manufacturing holds great potential for the future production of custom dental restoration parts.

There is the important fact that advanced technologies eliminate the risk of dimensional changes of the impressions and casts because they skip these procedures – the prosthetic field can just be scanned and the model directly printed without any disruption of the tissues. The dental laboratory does not need more square meters now because everything is stored simply in the computer hard disk.[15]

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REVIEW ARTICLE

PLATELET RICH FIBRIN AND IMPLANTS - A REVIEW

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ABSTRACT

Platelet rich fibrin (PRF) is a fibrin matrix in which platelet cytokines, growth factors and cells are trapped and may be released after a certain time and that can serve as a resorbable membrane. Choukroun and his associates were amongst the pioneers for using PRF protocol to improve bone healing in implant dentistry. Autologous PRF is considered to be a healing biomaterial, and presently, studies have shown its application in various disciplines of dentistry.

Keywords: Platelet rich fibrin, implant, fibrin, growth factors.

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INTRODUCTION

In order to restore a dental implant optimally, it must be placed in an ideal anatomic position. However, this is not always possible, since physiological wound healing following tooth extraction, trauma, or pathology, often results in a deficiency of both hard and soft tissue.1Unless augmentation procedures are carried out, placing an implant in these tissue-deficient sites would ultimately compromise the functional and aesthetic results.

Although several different augmentation procedures have been developed, many of them are associated with a number of disadvantages such as increased overall cost, the requirement for a second surgical site and the use of animal derived products. With the aim of minimizing the need for tissue augmentation, several alveolar ridge preservation (ARP) techniques or socket preservation have been developed most of which include the use of foreign graft materials and therefore increase the risk of disease transmission.

Among the great challenges facing clinical research is the development of bioactive surgical additives regulating inflammation and increasing healing. The healing of hard and soft tissue is mediated by a wide range of intra and extracellular events that are regulated by signaling proteins. Understanding the entire process is still incomplete. However, it is known that platelets play a crucial role not only in hemostasis, but also in the wound healing process.[2]

PLATELET CONCENTRATE EVOLUTION

Platelets are anucleate cytoplasmic fragments derived from bone marrow megakaryocytes and measure 2-3 µm in diameter. They contain many granules, few mitochondria and two prominent membrane structures, the surface connected canalicular system and the dense tubular system.

In 1974, platelets regenerative potentiality was introduced, and Ross et al.,were first to describe a growth factor from platelets.[3] Platelet growth factors are a well-known source of healing cytokines, usable for clinical applications. Numerous techniques of autologous platelet concentrates have been developed and applied in implant dentistry. These techniques finally lead to a fibrin and platelet concentrate for topical application.[2]

Although the use of fibrin adhesives is well documented from the past 30 years[4] their use is still controversial due to the complexity in preparation and risk of cross-infection.

After that concentrated platelet-rich plasma (cPRP) was developed with a less complex production protocol. It is prepared from the patient's own blood and is activated by the addition of thrombin and calcium. The structure consists of a three dimensional biocompatible fibrin scaffold with a limited volume of plasma enriched in platelets. When PRP is activated the growth factors and proteins are released to the local environment accelerating postoperative wound healing and tissue repair. The disadvantage of using PRP is that its properties can vary depending on the concentration of platelets, amount of leukocytes, the type of activator used and time of placement of fibrin scaffold after clotting. The presence of bovine thrombin in PRP can result in the development of antibodies to the clotting factors V, XI and thrombin which can adversely affect the coagulation process. All these have led to the generation of a new family of platelet concentrate called platelet-rich fibrin which overcomes many of the limitations of PRP. PRF is a potent autologous regenerative material with many clinical applications in the field of implant dentistry as it accelerates both soft tissue and hard tissue healing[5].

PLATELET-RICH FIBRIN- A NATURAL FIBRIN MATRIX

PRF was first developed in France by Choukrounet al in 2001 to improve bone healing in implant dentistry. PRF represents a new revolutionary step in the platelet gel therapeutic concept.[6]

Leukocyte and platelet-rich fibrin (L-PRF) is a newly developed platelet concentrate that is prepared from the patient's own blood. This

second generation platelet concentrate eliminates the risk associated with the use of bovine thrombin.[7] Production protocol of PRF attempts to accumulate platelets and released cytokines in a fibrin clot. It is nothing more than centrifuged blood without any addition, which makes it possible to avoid all the restrictions of the French law related to blood-derived product reimplantation. This technology requires a PC-02 table centrifuge and a collection kit from Process (Nice, France).

Platelet rich fibrin (PRF) is a fibrin matrix in which platelet cytokines, growth factors and cells are trapped and released after a certain time and that can serve as a resorbable membrane.[3] Autologous PRF or Choukron's Platelet-rich fibrin (PRF) has been recently proposed as an aid for promoting hard and soft tissue regeneration[1]. Fibrin membranes are prepared from the patient's own blood free of any anticoagulant or other artificial biochemical modifications.[1]

PRF is a consistent fibrin biomaterial that releases high amounts of growth factors such as [8] - Transforming growth factor B1 (TGF B-1), Platelet-derived growth factor AB (PDGF-AB), Vascular endothelial growth factor (VEGF), Fibroblast growth factor (FGF), Epidermal growth factor (EGF), Hepatocyte growth factor (HGF), Insulin-like growth factor (IGF), Matrix glycoprotein such as thrombospondin-1.

All of these play a role in replacing lost tissue, resurfacing of the wound and restoring vascular integrity. [8] Compared to other platelet concentrates, L-PRF releases these factors at a sustained rate over a longer period, thereby optimizing wound healing & hemostasis.[8] L-PRF promotes bone growth and maturation, graft stabilization and improves the handling properties of graft materials.[3] The PRF clot forms a strong natural fibrin matrix, which concentrates almost all the platelets and growth factors of the blood harvest and shows a complex architecture as a healing matrix with unique mechanical properties which makes it distinct from other platelet concentrates.[3]

PRF is superior to other platelet concentrates like PRP due to its ease and inexpensive method of preparation and also it does not need any addition of exogenous compounds like bovine thrombin and calcium chloride. It is advantageous than autogenous graft also because an autograft requires a second surgical site and procedure. [8]

Literature quotes several ways in which PRF can be used in implant dentistry:

Hafez et al (2015) used PRF membrane in successfully maintaining particulate autogenous bone graft and achieving primary coverage over immediately placed implants.[8]

Mazor et al (2009) successfully used L-PRF as the only grafting material in a series of sinus augmentation procedures. With this technique, Mazor et al were able to demonstrate that L-PRF could stimulate new bone formation in areas that were previously deficient of the amount of bone required for implant placement[9].

Peck et al (2011) used L-PRF in an ARP procedure to limit ridge resorption after tooth extraction and to maximize the tissue available for ideal implant placement[10].

In a similar 6-year follow-up study, Simonpeiri (2012) et al were able to demonstrate that using L-PRF as a sole grafting agent was a viable long-term option in sinus augmentation procedures.[11]

Del Corso et al (2012) reports the successful use of leukocyte-PRF during immediate post extraction implantation and loading for esthetic replacement of a fractured maxillary central incisor with promising results.[13]

Vijayalakshmi et al (2012) describes application of PRF along with bone graft and guided tissue regeneration (GTR) membrane in the treatment of fenestration defect around an implant.[3]

An In vivo study by Tatullo et al. in 2012 showed the use of PRF and piezo surgery reduced the healing time, favoring optimal bone regeneration. It was possible to achieve good primary stability of endosseous implants, though lacking of functional loading.[13]

Hafez et al (2015) used PRF membrane in successfully maintaining particulate autogenous bone graft and achieving primary coverage over immediately placed implants.8

In vitro studies show expression of osteopontin and osteocalcin and late osteogenic markers and confirmed PRF is useful in stimulating tissue healing and bone regeneration.[14]

PREPARATION OF PRF

The classical technique for PRF preparation was invented by Dr. Choukroun in 2001. It is the current PRF technique authorized by the French Health Ministry in which PRF is prepared without using an anticoagulant during blood harvesting or bovine thrombin during gelling.[6]

The first step is collection of whole venous blood (5ml) in two sterile vacutainer tubes (6ml) without anticoagulant. Vacutainer tubes are placed in a centrifugal machine. This is then centrifuged at 3000rpm for 10minutes after which it settles into three layers: Upper straw-coloredacellular plasma, red-colored lower fraction containing red blood cells and the middle fraction containing the fibrin clot. Upper straw-colored layer is then removed and middle fraction is collected.[6]

ADVANTAGES OF PRF

The clinical benefit of PRF depends on time interval between speed of handling between blood collection and centrifugation as PRF is prepared without any additional anticoagulants. This provides good soft tissue coverage over the immediate implants and it enhanced bone stability and provides complete coverage of the implants and blending to surrounding tissues.[3] PRF technique was easy to perform and released growth factors for at least 7 days. Moreover being an autogenous graft, no adverse immune response was expected.[1]

This technique requires no biochemical handling of blood and shows favorable healing due to slow polymerization.[3]

DRAWBACKS OF PRF

PRF membranes should be used immediately after preparation as it will shrink resulting in dehydration altering the structural integrity of PRF. Dehydration also results in the decreased growth factor content in PRF and leukocyte viability will be adversely affected altering its biologic properties.

PRF when stored in refrigerator can result in risk of bacterial contamination of the membranes. These limitations with the use of PRF can be circumvented by sticking onto a standard protocol for preparation and preservation.

CONCLUSION

PRF as a biomaterial acts by releasing high-concentration growth factors to the wound site, thereby stimulating healing and new bone formation.

Unlike other ARP procedures, the use of L-PRF is a simple method that requires minimal cost and reduces the need for specialized grafting material. Because it is a completely autologous product, the risk of disease transmission and graft rejection does not arise.

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DISTALIZATION- A BOON

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ABSTRACT

Maxillary molars needs to be frequently distalized in class II non extraction patients. Distalizing maxillary molars may be indicated for patients with minor skeletal discrepancies. In this review article, we discuss some of the appliances and modalities used for molar distalization. These informations were gathered from previous literature.

Key Words: Distalization, Class II malocclusion, skeletal discrepancies.

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INTRODUCTION

The conventional approach to gaining space in contemporary orthodontic treatment has been through extraction of premolars. However this is a bit invasive due to loss of functional teeth. Proximal stripping or slenderization has also been used in order to achieve space, however this has been of limited use in cases of severe crowding and proclination. Arch expansion was another alternative, however was applicable only in certain malocclusions.

Edward H Angle considered non extraction as mode of treatment. Non-extraction orthodontic treatment aids in the correction of malocclusion without sacrificing permanent tooth/teeth and thereby improves facial profile, aesthetics and smile.[1] Modern orthodontic viewpoint have been directed towards conservative regimen approach i.e., to avoid the need for extraction.[2] As a result, distalization is gaining popularity as a mean of gaining space. Molar distalization procedures play a pivotal role in non-extraction borderline case management.[3]

HISTORY

The first person who tried to move the maxillary teeth backwards by means of headgear in 1892 was Kingsley.[3] Later,the use of occipital anchorage for distalizing maxillary teeth into correct relationship without disturbing mandibular teeth was advocated by Oppenhein.

Renfroe in 1956, reported distal movement of lower molars sufficient to achieve a class II molar relation from the existing class I relation using lip bumper.

INDICATIONS

1. Cases with a class II molar relation
2. Patients with Class I malocclusion along with highly placed/ impacted canine
3. End on molar relationship with mild to moderate space requirement
4. Lack of space for eruption of premolars
5. Acceptable soft tissue profile
6. Borderline cases
7. Mild to moderate space discrepancy
8. Normal or hypo divergent growth pattern[1]

CONTRAINDICATIONS

1. Patients with severe arch length tooth size discrepancy.
2. Patients having high mandibular angle are contraindicated for distalization of molars.
3. Treatment by distalisation is also difficult in fully grown patients. Anterior anchorage loss can occur due to the forces required for distalisation of third molar.[4]
4. According to William Wilson in 1978, molar distalisation should not be done before 11 years of age as the maxillary tuberosity enters its rapid growth phase which may lead to second and third molar impaction.[5]

APPLIANCES USED FOR DISTALIZATION

Pendulum Appliance :

It is a hybrid appliance introduced by Dr. Hilger in 1992. A large Nance acrylic button in the palate is used for anchorage purpose. This is used along with 0.032" TMA spring that deliver a light, continuous force.[5,6] The pendulum spring produces a light continuous force on the maxillary 1st molars. Molars have a tendency to move palatally when distalized. To compensate for this the horizontal adjustment loop is opened utilizing a bird beak plier, which lengthens the pendulum springs.[7]

The preactivation of appliance is done by giving a 90 degree bend to the springs. This was described by Hilger. During insertion of appliance, 30 degree of activation might be lost. This would result in 60 degree activation for distalization of molars.[8]

MODIFICATIONS OF PENDULUM APPLANCE:

Pendex Appliance:

Dr.Hilgers introduced this modification. Its design is same as original pendulum appliance except for presence of a palatal expansion

screw in the midline. Cases where transverse expansion is needed, this appliance come into play.[6]

Modified Pendulum Appliance/ M Pendulum:

It was given by Dr. Scuzzo et al in 1999. For bodily movement of maxillary molars, omega loops are inverted in this pendulum appliance. Loops are activated by opening it. This results in buccal and/or distal uprighting of molar roots. Hence the appliance produces bodily movement of maxillary molars.[9]

Modified Pendulum with removable arms:

This modified version of pendulum was put forth by Scuzzo. Here, springs of appliance can be removed for activation extra orally. Rest part remains fixed in the appliance. The active components of the appliance are inserted into acrylic sheaths of Nance palatal button. These can be easily removed for activation from the sheaths.[10]

Hegde et algave another modified design. In this version of modification, round 0.036" tubes are soldered onto the first premolar bands lingually and retaining wires are inserted. The springs are inserted into lingual sheaths of first molar bands. Thus the appliance can be easily removed and placed again.[11]

Modification for Anterior Anchorage Control:

This modification is used when anterior anchorage is critical. Four removable arms are present for both molars. Four stainless steel tubes are embedded in acrylic button. This aids in the insertion of four removable arms.[12]

Design of pendulum appliance modified by Alberto had Nance palatal button being retained in position by soldering to first premolar bands. First premolar bands are soldered lingually with 0.036"stainless steel wire. This wire is further contoured to the lingual surface of maxillary incisors. Debonding of appliance is minimized through this new design. Anterior anchorage is also reinforced during distal movement of molars.[13]

T- REX APPLIANCE

This appliance could be used for both maxillary expansion as well as molar distalization. The appliance comprises of two wires which tend to extend from the palatal acrylic. These wires are soldered to lingual surface of maxillary first molar bands.[14]

FRANZULUM APPLIANCE

Byloff introduced this appliance and used for distalization of molars in mandibular arch. An acrylic button is positioned lingual and inferior to mandibular anterior teeth. This extends from canine to canine and provides anchorage. 18mm length NiTicoil springs are used for molar distalization. A force of 100-120 grams per side is applied. A J shaped wire passes through each coil spring which gets inserted into corresponding tube in the anchorage unit. Mandibular first molar band having lingual sheath are inserted with that part of the wire which is posteriorly curved. Rests made from 0.032" stainless steel wire are placed on canine and 1st premolars. Active components are present in tubes between second premolars and first molars.[15]

MINI DISTALIZING APPLIANCE

This new design is a combination of pendulum appliance and rapid palatal expander (RPE). It is also an all metal appliance. The appliance has dual purposes, that of expansion as well as molar distalization. The appliance uses RPE and pre activated 0.032" removable TMA springs. It gives more patient comfort, easy access for oral hygiene and there is no tissue impingement.[16]

PENDULUM K APPLIANCE

An orthodontic screw is incorporated into the appliance which divides acrylic button into two parts. Wire retainers help to join the anterior component with four anchorage teeth and these are fixed to teeth with composite. The

posterior part has active pendulum springs. These are pre activated by applying certain bends prior to insertion. This appliance allows for translatory distalization of molars. It also corrects or prevents distal tipping and palatal movement. [17]

BONE ANCHORED PENDULUM APPLIANCE (BAPA)

It is a modified bone anchored pendulum appliance. Beyza et al used titanium screws of 2mm diameter and 8mm length. They were placed 7 to 8mm posterior to incisive foramen and 3 to 4mm away from paramedian suture. They achieved both molar and premolar distalization without any kind of anterior anchorage loss.[18] Cambiano et al used screw of 2.4mm diameter and 14mm length, placed them 6 to 9mm posterior to incisive foramen and 3 to 6mm lateral to paramedian suture. Screw heads of size 8mm were visible in oral cavity. They were covered by Nance acrylic button. Two TMA springs were inserted into telescopic tubes. These springs were preactivated in order to generate force of 250 grams. A 15 degree antibending inclination was incorporated to decrease palatal movement of molar.[19]

K LOOP

The appliance comprises of TMA wire bent into a K-loop which provides the forces and moments and a Nance button to resist anchorage loss. The K-loop is made of .017" x .025" TMA wire. They can be activated twice as much as stainless steel before it undergoes permanent deformation. Each loop of the K should be 8mm long and 1.5mm wide. The legs of the K are bent down 20°.They are later inserted into the molar tube and the premolar bracket. The 20° bends in the appliance legs produce moments. These moments counteract the tipping moments created by the force of the appliance.[20]

HEADGEAR

They are very efficient method of distalization. Other teeth are not affected by reciprocal forces. Centre of Resistance of the molar along with magnitude of force determines the Molar movement which also depends on direction of force. Both intrusive and posterior direction of pull is exhibited by high pull headgears. They are used in Long face class II patients with high MPA. Force through Centre of Resistance causes intrusion and distal movement of molar. Cervical headgears may be used in short face class II maxillary protrusion cases with low MPA and deep bites. This type of headgear produces extrusive and distalizing effect.[1]

3D BIMETRIC DISTALIZING ARCH

These are modular phase appliances designed for multidirectional functional class II treatment. Maxillary molars and buccal segments are distalized bilaterally or unilaterally without headgear, using a 3DBimetric Distalizing Arch and 3D mandibular Lingual Arch with Class II elastics. Elgiloy open coil spring is placed between omega loop and buccal tubes for activation. [21]

ACCO APPLIANCE

It is an acronym for acrylic cervical occipital anchorage. It consists of labial bow made from 0.022 x 0.028 wire. The ACCO appliance is a removable acrylic appliance. This was used in conjunction with a Northwest Headgear to effect distal mass movement of buccal segments. Maxillary buccal segments are usually involved, but the appliance can also be used on mandibular buccal segments. The appliance was originally devised by Dr. Herbert Margolis.[22]

TRACY J REINER

Modification of the traditional Nance holding arch. The class I side uses 0.036" stainless steel wire framework similar to that of a quadhelix. This arm aids in resisting the horizontal moment that would rotate the molar distally and cause expansion in the bicuspid region. In the active, Class II side, an arm is bent with the most anterior terminus being soldered to first bicuspid band. 0.020" omega loop is soldered to

the appliance framework's anterior end. This facilitates the distal end of the loop to slide distally when it is opened for activation. A 10mm long, open-coil spring is placed between the omega loop and the first molar band. After cementation of the appliance, the omega loop is opened so that it compresses the coil spring to a length of 7mm, which had previously been measured to deliver about 150g on a force gauge.[23]

JONES JIG

Jones Jig appliance, uses an open-coil nickel titanium spring. Over a compression range of 1-5mm, the appliance delivers about 70-75g of force to the molars. Jones jig produces the distal molar movement to a class I relationship with second molars erupted or unerupted, in the mixed or permanent dentition, unilaterally or bilaterally and in the growing and non growing individuals.

DISTALIZATION OF MOLARS WITH REPELLING MAGNETS

Gianellyet al used intra-arch repelling magnets to distalize the maxillary molars. The magnets are attached to headgear tube of maxillary first molar bands and repelling surfaces are brought in contact by passing a .014" ligature wire. The force exerted by the magnets (Halda tension gauge) measure 200-225g but drop substantially as space opens beyond 1mm. The molars are distalized about 3mm in seven weeks if second molars are absent. The rate of molar movement in patients with second molars is usually .75-1 mm per month.[1]

DISTAL JET APPLIANCE

In this appliance, bilateral tubes of .036" internal diameter attached to an acrylic nance button. Coil spring and screw clamp tend to slide over each tube. Wires that extend from acrylic through tube ends in a bayonet bend which is inserted into lingual sheath. Reactivation of the appliance can be done by sliding the clamp closer to the first molar once a month.[25]

TANDEM YOKE

Hogs in 1970 introduced this appliance, which consist of biometric arch module design for ease of insertion and removal. It comprises of 0.045" round tube that slides on the 0.040" end section of biometric round arch and a retractor of 0.018" along with 0.045" coil spring for the distal movement of the molar with intermaxillary traction.[26]

ATKINSON BUCCAL BAR

In 1959, Guerrero James illustrated a method using this device for moving posterior teeth distally. This appliance produces minimum strain on mandibular anchorage unit. When it is used with minimum amount of elastic force, i.e., 2ounces; this appliance will move the buccal segments posteriorly irrespective of whether second molars are present or not. The forces were measured with a Richmond or a postal scale. Cervical anchorage was used to position the anterior teeth.[27]

HERBST APPLIANCE

Originally designed by Emil Herbst in 1909, the appliance was popularized by Pancharz in 1979. It has the ability to inhibit anteroposterior growth of maxilla. This also produces an increase in mandibular length and lower facial height. The intrusive and distal movements of maxillary molars including tipping of crowns distally and mesial drift of the mandibular anterior and posterior teeth are observed. Treatment in mixed dentition is not recommended using this appliance.[28]

SAIF SPRING

Armstrong in the late 1960 or early 1970s, introduced the pace spring which was later called as Multicoil spring, and finally called as Saif spring. It is nickel-titanium closed spring that applies intermaxillary traction. It contains two springs within each other and loops fused to springs in both sides. It is attainable in 7mm and 10mm diameter.[29]

JASPER JUMPER

James J. Jasper made an appliance for correcting class II malocclusion in 1987 which was identical to the herbst device in terms of design and force vectors. fully banded upper and lower fixed appliances were attached with two vinyl coated auxillary springs to. Posteriorly, the springs were adhered to maxillary first molars whereas anteriorly to mandibular arch wire. They retained the mandible in a protruded position. In both the dental arches, rectangular shaped stainless steel arch wires are used. In anterior region of mandibular arch to strengthen lower anchorage, labial root torque is combined. Transpalatal bar and lower lingual arch are used for anchorage.[30]

CONCLUSION

Distalizing appliance is selected keeping in mind the amount of space required and the amount of patient compliance required. This being a non invasive approach, it is gaining popularity in comparison to the extraction modality of treatment.

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CASE REPORT

REHABILITATION OF AN ENUCLEATED EYE WITH A CUSTOM MADE OCULAR PROSTHESIS - A CASE REPORT

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ABSTRACT

Surgical procedures in the removal of an eye can be broadly classified as: Evisceration (where the contents of the globe are removed leaving the sclera intact), Enucleation (most common, where the entire eyeball is removed after severing the muscles and the optic nerve) and Exenteration (where the entire contents of the orbit including the eyelids and the surrounding tissues are removed). Treatment of such cases requires fabrication of an ocular prosthesis to restore a more normal facial appearance.

Key Words: Ocular prosthesis, custom made ocular prosthesis, enucleation.

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INTRODUCTION

Loss of an eye due to cancer, trauma, or congenital defect creates a deep psychological impact on an individual's life affecting social and professional life. Custom-made prosthesis, compared to stock prosthesis, provides a better fit to the eye socket, better cosmetic results, and less discomfort to the patient in the long term.1The eye is a vital organ and an important component of facial expression. Enucleation of the eye is therefore normally followed by fabrication of an ocular prosthesis to improve esthetics.2A less complex technique for fabrication of an ocular prosthesis is described in this report.

CASE REPORT

A 65-year-old male patient reported to the Department of Prosthodontics with a defect in right eye. The defect was caused by trauma due to an injury in an accident during his childhood. On inspection, the sclera and iris were absent which left behind only the socket with the eye lids intact [Figure 1 and 2]. No inflammation was present. The muscle function of both the upper and lower eyelid seemed normal. Considering such findings the only option available for the patient was fabrication of a custom made prosthetic eye. Consent of the patient was taken for the procedure.

Figure 1 :
Preoperative Photograph

Figure 2 :
Defect following enucleation

Steps for fabrication of custom made ocular prosthesis:

1. Preliminary impression making:

The patient was made to look straight and keep all facial muscles relaxed. A very runny consistency of alginate (one-third greater quantity of water than recommended) was injected into the socket with a syringe. It was slowly filled into the defect to prevent overfilling. A little amount flowing out through the inner canthus indicates adequate material filling of the socket.

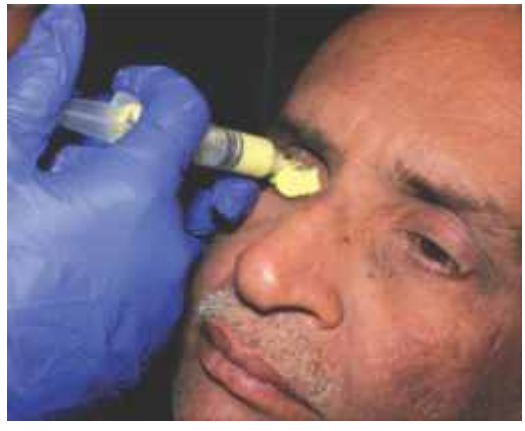

Figure 3 :
impression making using syringe

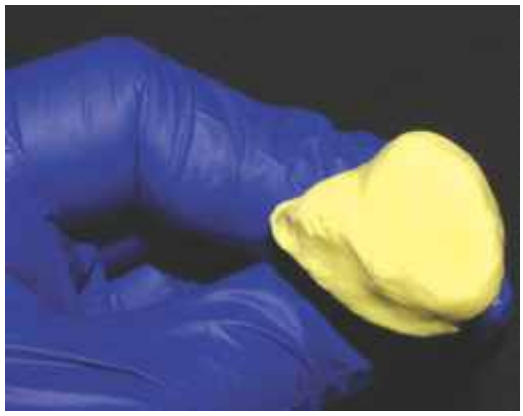

Figure 4 :
Preliminary impression

Preliminary cast is obtained in Die stone using two pour technique [Figure 5].

Figure 5 :
preliminary cast for fabricating custom tray for final impression

2. Custom tray for making final impression: custom tray was fabricated using self cure acrylic resin [Figure 6].

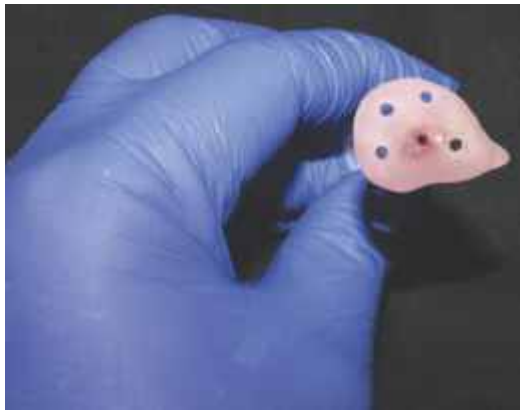

Figure 6:
Custom tray

3. Checking the fit and comfort of the custom tray: [Figure 7]

Figure 7

4. Making the final impression: [Figure 8]
Final impression was made using Poly vinyl siloxane Light Body material. Syringe was loaded with light body material and flown through the custom tray. Patient was asked to carry out the desrired eye movements.

Figure 8: Final impression making

5. Wax pattern:[Figure 9]

Figure 9:

6. Trial of wax pattern: [Figure 10]

Figure 10: Trial of wax pattern

7. Final custom made ocular prosthesis: [Figure 11]

This prosthesis was fabricated using Tooth coloured acrylic for the scleral base and transparent heat-cured PMMA to simulate corneal translucency. To give a more life like appearance Red silk fibres were incorporated in the dough.

Figure 11: Final prosthesis

8. Post insertion photograph: [Figure 12]

DISCUSSION

Defects of the eye may include en bloc removal of the entire orbit - exenteration or enucleation of only the eyeball-scleral defects.[3,4,5] Enucleation is the surgical removal of the globe and a portion of the optic nerve from the orbit, and often considered as a treatment for primary intraocular malignancies because it permits histopathologic examination of the intact globe as well as determination of intraneural or extrascleral spread of the disease.[6] In the Indian subcontinent, trauma, tumors and congenital absence of orbit are the main causes of such defects.[7,8] A multidisciplinary approach including a prosthodontist, ophthalmologist, surgeon and maxillofacial prosthetist should be considered for an esthetic and stable outcome.[9]

This technique describes the fabrication of a prosthesis with materials that are easy available and regularly used by Maxillofacial Prosthetist. The prosthesis, though not functional, is a very suitable esthetic replacement for such patients. It restores self-confidence in patients and prevents social embarrassment.10 The procedure ensures a good fit of the artificial eye and a natural esthetic outcome. This technique would also be relatively easy to perform, saving on the laboratory time. The close adaptation of the custom-made ocular prosthesis to the tissue bed provides maximum comfort and restores full physiologic function to the accessory organs of the eye.

Figure 12: Post insertion photograph

CONCLUSION

Custom-made prosthesis allows better esthetic and functional results to the patient in comparison to stock prosthesis. To prevent potential problems that may come with long-term use of this custom made prosthesis, further follow-up is necessary to check the condition and fit of the ocular prosthesis.

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REVIEW ARTICLE

MODIFIED IMPRESSION TECHNIQUE FOR MANAGEMENT OF FLABBY RIDGE-A CASE REPORT

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ABSTRACT

The presence of displaceable denture-bearing tissues often presents a difficulty when making complete dentures. Unless managed appropriately, such 'flabby ridges' adversely affect the support, retention and stability of complete dentures. Many impression techniques have been proposed to help overcome this difficulty. While these vary in approach, they are similar in their complexity, are often quite time-consuming to perform, and rely on materials not commonly in use in contemporary general dental practice. The purpose of this paper is to present a modified window technique for the impression of anterior maxillary flabby tissues for improved and controlled application of polyvinylsiloxane impression material.

Keywords: management of flabby ridge, modified window technique.

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INTRODUCTION

Impression making plays critical role in complete denture fabrication. A particular problem is encountered if a flabby ridge is present within an otherwise 'normal' denture bearing area.. Flabby ridge can be defined as a mobile soft tissue which is located on the superficial aspect of the alveolar ridge[1]. Flabby ridge can also be called a displaceable ridge or a fibrous ridge. A fibrous or flabby ridge is a superficial area of mobile soft tissue affecting maxillary or mandibular alveolar ridges. Typically these "flabby ridges" are composed of mucosal hyperplasia and loosely arranged fibrous connective as well as more dense collagenised connective tissues. In the soft tissue, varying amounts of metaplastic cartilage and/or bone have been reported.

Flabby ridge is predominantly seen in the upper anterior region and is commonly associated with features of combination syndrome, as mentioned by Kelly. Earlier studies show that prevalence of flabby ridges vary in either arches, with edentulous maxillae prevalence being 24% and edentate mandibles 5% [4,5]. Another reason for flabby tissue is lack of planned dental extraction[6].

In the presence of displaceable ridge, fabrication of a stable denture becomes an arduous challenge. Flabby ridges get easily displaced under occlusal forces owing to poor support, resulting in compromised denture retention as a consequence of loss of peripheral seal[1]. According to MacEntee, support for the complete dentures is significantly compromised if the flabby ridge has more than 2mm displacement under pressure[7]. An impression technique is required which will compress the non flabby tissues to obtain optimal support and at the same time, will not displace the flabby tissues.

MATERIALS & METHODOLOGY

A 45year old female patient reported to the department of prosthodontics with a complaint of ill-fitting maxillary complete denture since one year. On intra-oral examination, an edentulous maxillary arch with severely displaceable anterior flabby ridge

Fig.1
Edentulous maxillary arch with displaceable anterior flabby ridge

was observed (Fig. 1). It was planned to provide the patient with a new maxillary conventional complete denture. A special window impression technique using PVS material for the definitive impression was considered8. The technique is as follows,

1. A Primary maxillary impressions were made with alginate material (Zhermack tropicalgin) using edentulous rim lock stock trays .
2. A maxillary cast was poured (Dental stone, Type III, Kuzler) and the flabby ridge area was marked, followed by fabrication of

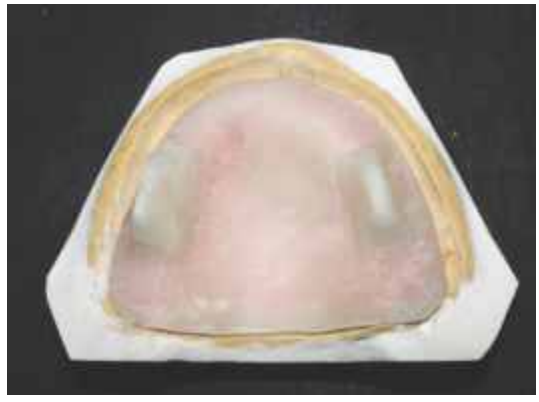

Fig.2 Custom tray with two posterior handle

custom tray [spaced (2mm), tissue stops] with two posterior handles (Fig.2).

3. A vacuum heat pressed polyethylene sheet of 0.5mm thickness was adapted on the custom tray(Fig.3)

Fig.3
Polyethelenesheet(0.5mm)
adapted on custom tray

4. The window was removed and holes of similar dimensions were placed on the polyethylene sheet in the window area
5. The tray was tried in the patient mouth and the flanges were adjusted to be 2mm shorter than the depth of sulcus using a slow-speed motor and carbide acrylic-trimming bur.
6. Border molding was performed using the conventional technique with green stick impression compound (Dental Kerr impression compound). Following which a maxillary impression was made using medium body PVS impression material (Aquasil Monophase).
7. The impression was evaluated carefully for defects and any excess material on the periphery was removed. In addition, the impression material in the area of flabby ridge was carefully removed using scalpel blade (Fig.4)

Fig.4
Impression using medium body PVS impression material and the material from window area was removed

8. The impression was re-seated in the patient mouth and a light body PVS impression material (Zhermack Elite HD Plus) was injected starting from one of the side holes passing through the middle of the polyethylene sheet until some excess material poured from the holes (Fig.5,6)

Fig.5
Light body PVS material was injected through hole

Fig.6
Completed Final impression

9. A master cast was poured from the impression (by using boxing and pouring) and wax rims were fabricated and jaw relation procedure was carried out (Fig.7)
10. Facebow record (Hanau Springbow) was made and transferred to the

Fig.7
Jaw relation recorded

Fig.8
Facebow record

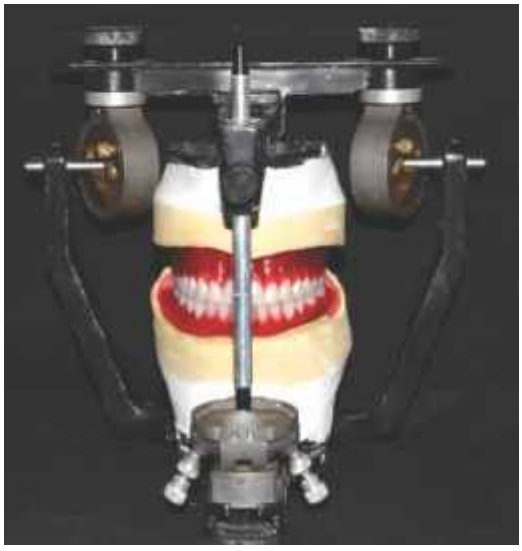

Fig.9
Teeth arrangement on semi adjustable articulator

semiadjustable articulator (Hanau Wide-Vue). Teeth arrangement was done in balanced occlusion for occlusal stability. (Fig.8,9)

11. Following try-in(Fig.10), a conventional complete denture was completed with characterization using brown pigment for natural looks (Fig.11,12).

Fig.10
Try-in

Fig.11
Denture insertion

Fig.12
Post operative photograph

DISCUSSION

Various techniques have been recommended and there is controversy as to whether a mucodisplacive technique which compresses the mobile tissue aiming to achieve maximum support from it or whether a mucostatic technique with the aim of achieving maximum retention should be employed. Liddlelow[9] in 1964 described a technique whereby two separate impression materials were used in a custom tray (using 'plaster of Paris' over the flabby tissues and zinc oxide eugenol over the normal tissues). In 1964, Osborne[10] described a technique where two separate impression trays and materials were used to separately record the 'flabby' and 'normal' tissues and then related intra-orally. Magnusson et al.[2] described a technique where two impression materials are used in a custom tray using zinc oxide and eugenol over the normal tissues and impression plaster over the flabby area. Crawford et al.[11] described a two-tray impression technique where two trays are fabricated and impression is recorded with two different materials and is then oriented intraorally. The elastic recoil of flabby fibrous soft tissue during function results in instability and loss of denture retention and dislodgement[1,2].The clear polyethylene sheet in this modified window technique (described by N Labban) performed as a stent for holding and preventing the low viscosity material from dropping away from the tissue (allowing control and uniform application). In addition the visibility from the clear tray helps clinicians to see the adaptation of impression material to the flabby tissue. Therefore authors recommend clinical application of this modified window technique using PVS impression materials for final impression of flabby maxillary ridge in the fabrication of complete dentures.

SUMMARY

Mucostatic techniques may not make the best use of the available tissue support and movement of the denture base relative to the support tissues may be a problem. The use of selective pressure or minimally displacive impression techniques should help to overcome some of these limitations. With modified impression techniques, these ridges can be managed effectively without any additional clinical visits as compared to patients with normal edentulous ridges.

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