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ABOUT THE JOURNAL:

Dental Journal of Central India (DJCI) an official publication of Government Dental College and Hospital Nagpur, is multidisciplinary, peer-reviewed, wide scope and open access semi-annual journal, publishing original contributions describing ideas, basic research and clinical investigation in dentistry. The journal's full text is available online at www.gdcnagpur.edu.in. The journal allows free access (Open Access) to its contents and permits authors to self-archive final accepted version of the articles on any OAI-compliant institutional / subject-based repository. The journal does not charge for submission, processing or publication of manuscripts. DJCI is a peer-reviewed, multidisciplinary, open-access journal intending to impart spirit of research and innovation in dentistry. The journal aims to publish the recent innovations in dental sciences through original studies, short communications, systematic and narrative reviews and rare case reports.

SCOPE OF THE JOURNAL:

This journal provides a platform to all dental professionals including undergraduates, postgraduates, academic and general practitioners. We openly welcome original research, reviews and case reports from across Central India. The journal is concerned with epidemiological studies, clinical research, oral mucosal diseases, oral radiology, cariology, oral rehabilitation through prosthodontic and orthodontic care, TMJ disorders, implantology, periodontology, orthodontics, forensic odontology, oral pathology and microbiology, paediatric dental care, dental trauma, geriatric oral health, dental practice management, preventive dentistry, health services research, health education, quality of life, analysis of risk and quality assessment. It is of interest to healthcare personnel in medicine and dentistry and to other professionals concerned with oral disease prevention, health service planning, ethics and oral health promotion throughout the world aiming to add value to the existing knowledge in the field of dentistry and related Sciences.

THE EDITORIAL PROCESS:

Manuscript should be submitted to editordjci@gmail.com. The submitted manuscript will be reviewed for possible publication with the understanding that it is being submitted to Dental Journal of Central India (DJCI) alone at that point in time and has not been published anywhere, simultaneously submitted, or already accepted for publication elsewhere. The journal expects that authors would authorize one of them to correspond with the Journal for all matters related to the manuscript. All manuscripts received are duly acknowledged. On submission, editors review all submitted manuscripts initially for suitability for formal review. Manuscripts with insufficient originality, serious scientific or technical flaws, or lack of a significant message are rejected before proceeding for formal peer-review. Manuscripts that are unlikely to be of interest to the Journal of Oral Research and Review readers are also liable to be rejected at this stage itself. Manuscripts that are found suitable for publication in Dental Journal of Central India (DJCI). The journal follows a double-blind review process, wherein the reviewers and authors are unaware of each other's identity. Every manuscript is also assigned to a member of the editorial team, who based on the comments from the reviewers takes a final decision on the manuscript. The comments and suggestions (acceptance/ rejection/ amendments in manuscript) received from reviewers are conveyed to the corresponding author. If required, the author is requested to provide a point-by-point response to reviewers' comments and submit a revised version of the manuscript. This process is repeated till reviewers and editors are satisfied with the manuscript.

Manuscripts accepted for publication are copy edited for grammar, punctuation, print style, and format. Page proofs are sent to the corresponding author. The corresponding author is expected to return the corrected proofs within three days. It may not be possible to incorporate corrections received after that period. The whole process of submission of the manuscript to final decision and sending and receiving proofs is completed online. To achieve faster and greater dissemination of knowledge and information, the journal publishes articles online as 'Ahead of Print' immediately on acceptance.

AUTHORS GUIDELINES:

Dental Journal of Central India (DJCI) is a peer-reviewed, semi-annual journal. Manuscripts must be prepared in accordance with “uniform requirements for manuscripts submitted to Biomedical Journal developed by International Committee of Medical Journal Editors (December 2013). Submission of a paper is intended to entail that it presents original unpublished work, including the illustrations, which it is not under consideration for publication elsewhere.

Editorial policy: The Editorial board reserves the right to make changes that may clarify or condense papers where this is considered desirable.

Clinical trial registry: Dental Journal of Central India(DJCI) favours registration of clinical trials and would publish clinical trials that have been registered with a clinical trial registry that allows free online access to public. Registration in the following trial registers is acceptable: http://www.ctri.in/; http://www.actr.org.au/; http://www.clinicaltrials.gov/; http://isrctn.org/; http://www.trialregister.nl/trialreg/index.asp; and http://www.umin.ac.jp/ctr. This is applicable to clinical trials that have begun enrolment of subjects on or after June 2008.

Type of submission: Original articles, Case reports, Clinical studies, short communications/Clinical tip, Letters to the editor, Reviews (Including meta and systematic analysis).

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EDITORIAL

It is with profound pleasure, humility and anticipation that we celebrate the launch of Dental Journal of Central India (DJCI) with this inaugural issue. On behalf of the DJCI Editorial Team,I would like to extend a very warm welcome to the readership of DJCI. I take this opportunity to thank our authors, editors and anonymous reviewers, all of whom have volunteered to contribute to the success of the journal.

Dental Journal of Central India (DJCI)is primarily focused on basic research and clinical investigation in dentistry. The topics covered in the journal include but not limited to: epidemiological studies, clinical research, oral mucosal diseases, oral radiology, cariology, oral rehabilitation through prosthodontic and orthodontic care, TMJ disorders, implantology, periodontology, orthodontics, forensic odontology, oral pathology and microbiology, paediatric dental care, dental trauma, geriatric oral health, dental practice management, preventive dentistry, health services research, health education, quality of life, analysis of risk and quality assessment. We welcome contributions that can demonstrate near-term practical usefulness, particularly contributions that take a multidisciplinary/convergent approach because many real world problems are complex in nature. DJCI provides an ideal forum for exchange of information on all of the above topics and more, in various formats: original studies, short communications, systematic and narrative reviews and rare case reports.

The journal's editorial board is strongly convinced this initiative will provide science-driven, peer-reviewed articles conforming to international standards. DJCI is published twice a year. To ensure rapid dissemination of information, we aim at completing the review process of each paper within 2 months of initial submission. DJCI is committed to publishing all manuscripts receiving a high or top priority recommendation during the review process, whereas those receiving medium priority will be considered for publication on a case-by-case basis. In addition, publication of manuscripts receiving the top priority will be fast tracked, that is, they will be published online within a month. This policy reflects my interest in quickly publishing all manuscripts judged to be the most impactful during the peer review process. Further, we will periodically issue special calls for papers to modernize and strengthen areas of research and development showcased in Advanced dentistry and will be published as special issues.

I close this message by inviting everyone to submit their exciting research to DJCI. All papers receiving a high degree of enthusiasm in the peer-review process will find a home in DJCI. Therefore, we are committed to publishing all discoveries, methods, resources, and reviews that significantly advance the field of Dentistry and its applications. Once again I welcome you to this journal – your journal! With your support as authors, reviewers, and editors, I see very bright prospects for DJCI to serve dental science and the scientific community even better in the future. Ultimately, we will improve more lives and, consequently, our communities.

DR. ABHAY DATARKAR
Dean
GDCH,Nagpur

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Original **Article**

Evaluation of maximal mouth opening for children aged 3-14 years in Central India: impact of age, gender, height, weight and body mass index – A cross-sectional study

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ABSTRACT

Introduction: Maximal mouth opening (MMO)is the measurement taken when the mouth is open as wide as possible and the greatest distance between the incisal edge of the maxillary central incisor to the incisal edge of the mandibular central incisor in the midline is recorded. One of the classical signs for any pathology of the stomatognathic system is reduced mouth opening ability.

Aim: The aim of this study was to study the impact of age, gender, height, weight and Body Mass Index (BMI) on the unassisted maximal mouth opening capacity (MOC) of healthy children aged 3 -14 years.
Materials and methods: This study was a cross-sectional study that was conducted on a total of 450 children. These children were randomly selected after meeting the inclusion criteria and their height, weight, age, gender, and maximum mouth opening were recorded.

Result synthesis: The inter-group comparison was done using Man-Whitney U and Kruskal Wallis test, followed by post hoc analysis. P value <.05 was considered statistically significant. The median age of the participants was 8.0 with the inter-quartile range (7.0-10.0) years. The median BMI was 14.4 with the inter-quartile range (13.2-15.9) Kg/m^2. The median mouth opening for males was seen to be 40 mm with the inter-quartile range (36.0-45.0 mm) and for females, it was 39 mm with the inter-quartile range (35.0-43.0 mm) and the difference was found to be statistically significant. Also, a statistically significant moderate positive correlation between maximal mouth opening and all of our continuous variables age, height, weight and BMI was seen.

Conclusion: It can be concluded that there is an impact of age, gender, height, weight and BMI on maximal mouth opening.

Keywords: Maximal Mouth opening, Body Mass Index, Temporomandibular joint disorders

INTRODUCTION:

Maximal mouth opening is the measurement taken, when the mouth is open as wide as possible painlessly and the greatest distance between the incisal edge of the maxillary central incisor to the incisal edge of the mandibular central incisor in the midline is recorded or it may also be calculated as interincisal distance plus the overbite.[1]

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A variety of factors may account for the restricted mouth opening such as odontogenic infections, temporomandibular disorders such as ankylosis, the trauma of the mandible or midface fractures, craniofacial malignancies, neuromuscular disorders and oral submucous fibrosis.[2]

This limited ability cause masticatory as well as social difficulties for the patient, also compromises the treatment options. It may also interfere with the intubation of patients when needed. So, it is of great concern for dentists, anesthetists, oral surgeons as it affects treatment planning.
A normal range of mouth opening is needed, which allows clinicians to objectively evaluate the mandibular functions. The mouth opening capacity differs dramatically with age, gender, height, weight, ethnicity, mandibular size, cranial base size still many studies have attempted to compile an average range of physiological mouth opening capacity measurements.[3]

So, to study the impact of age, gender, height, weight and

Body Mass Index on the unassisted maximal mouth opening capacity (MOC) of healthy children aged 3 -14 years this cross-sectional study was undertaken.

Material and methods:

The present cross-sectional study was undertaken in the Department of Pedodontics and Preventive Dentistry, Government College of Dentistry, Indore over a period of six months after obtaining clearance from the ethical committee. A total of 450 children visiting the outpatient department were randomly selected after meeting with the following inclusion criteria.[1]

1. There should not be history of any type of facial trauma
2. They should have erupted maxillary and mandibular central incisors.
3. There should not be any clicking sound or pain in the Temporomandibular joint
4. They should not be wearing any prosthesis for anterior teeth
5. They should not be having any congenital dental or facial anomalies or systemic conditions such as juvenile rheumatoid arthritis
6. They should not have any history of bruxism.
7. They should not have any severe skeletal or dental malocclusions such as anterior crossbite, proclination or retroclination of incisors, etc

Exclusion criteria:

1. History of any type of facial trauma
2. Unerupted maxillary and mandibular central incisors.
3. Clicking sound or pain in the Temporomandibular joint
4. Prosthesis for anterior teeth
5. Congenital dental or facial anomalies or systemic conditions such as juvenile rheumatoid arthritis
6. History of bruxism.
7. Severe skeletal and dental malocclusions such as anterior crossbite, proclination or retroclination of incisors, etc

Figure 1. Measuring mouth opening using metallic ruler

Those children who did not meet the above criteria were excluded from the study. A chart was prepared on which age, gender, height (in cms), and weight (in kgs), was recorded for each participant. For the measurement of the maximal mouth opening, the children were made to sit in a comfortable upright position, keeping the head straight, and were verbally encouraged to open their mouths as wide as possible. A metallic ruler having a ruling in millimeter was placed between the edges of the upper and lower central incisor Three readings were done simultaneously and the maximum reading was included in calculations.(Figure 1)

Statistics:

The data was entered into the excel sheet. The data was analysed using SPSS (Statistical Package for Social Sciences) 21.0 version. The data was analysed for probability distribution using the Shapiro-Wilk test, p value <.05 indicated that the data was not normally distributed thus non-parametric tests of significance were applied. The inter-group comparison was done using the Man-Whitney U test and Kruskal Wallis test, followed by post hoc analysis. The comparison of the dental and chronological age was done using the Wilcoxon-sign rank test. The correlation between the continuous variables was analysed using Spearman's correlation coefficient. P value <.05 was considered statistically significant.

RESULTS

The study included 450 participants. The mean age of the participants was 8.4867±2.49562 years (Range- 3 to14 years). The number of male participants was greater than the number of female participants (56.7% vs 43.3%).

The majority of the patients belonged to the normal BMI grade (53.8%), followed by underweight (39.8%). Only 4.4% and 2.0% of patients respectively belonged to the over-weight and obese category. (Table 1, Figure 2 and 3)

Table 1: Description of study participants based on different criteria.

Parameter		No. of subjects	Percentage
Gender	Male	255	56.7
	Female	195	43.3
BMI grade	Underweight	179	39.8
	Normal	242	53.8
	Overweight	2	04.4
	Obese	9	2.0

Figure 2. Distribution of study subjects based on gender.

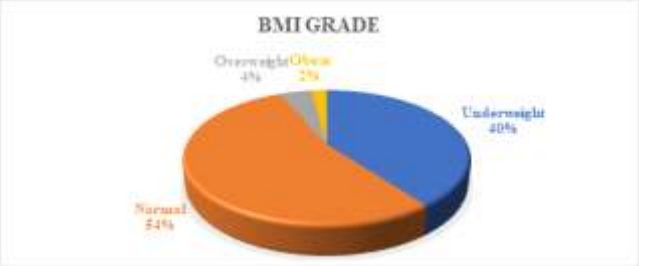

Figure 3. Distribution of study subjects based on BMI grade.

The median age of the participants was 8.0 (7.0-10.0) years. The median height was 126.8 cm (115.42 – 137.1 cm). The median weight was 22.0 (18-28 kg). The median mouth opening was 40.0 mm (36.0-44.0 mm). The median BMI was 14.4 Kg/m² (13.2-15.9 Kg/m2). [Table 2]

Table 2. Description of various continuous variables amongst the study subjects.

	Median	Inter-quartile range
Age (in years)	8.0	7.0-10.0
Mouth opening (in mm)	40.0	36.0-44.0
Height (in cm)1	26.8000	115.4250-137.1000
Weight (in Kg)	22.01	8.0-28.0
BMI (in Kg/m2)	14.41	3.2-15.9

Man-Whitney U test was applied and the median mouth opening for males was seen to be 40 mm with the inter-quartile range (36.0-45.0 mm) and for females, it was 39 mm with the inter-quartile range (35.0-43.0 mm). [Figure 4] The mouth opening of male participants was significantly greater than that of female participants (p value <.05). Kruskal-Wallis test was applied and the median mouth opening for the underweight category was 40 mm (35.0-44.0 mm), for the normal category was 40 mm (36.0-44.0 mm), for the overweight category was 40 mm (37.5-45.0 mm) and for the obese category was 38 mm (33.5-38.0 mm). [Figure 5] The difference among them was not statistically significant. [Table 3]

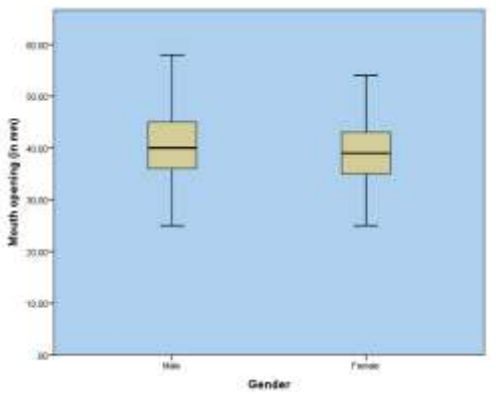

Figure 4. Comparison of mouth opening (in mm) between males and females.

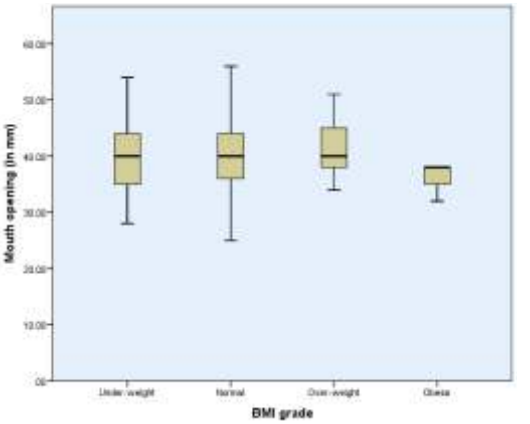

Figure 5. Comparison of mouth opening (in mm) between different BMI grades.

Table 3. Comparison of mouth opening (in mm) amongst different gender and BMI grades.

		Median	Inter-quartile range	P value*
Gender	Male	40.0	36.0-45.0	<.05[a]
	Female	39.0	35.0-43.0	
BMI grade	Underweight	40.0	35.0-44.0	>.05β
	Normal	40.0	36.0-44.0	
	Overweight	40.0	37.5-45.0	
	Obese	38.0	33.5-38.0	

*p value <.05 was considered statistically significant.
[a] Man-Whitney U test. β Kruskal-wallis test.

A comparison between age, height, weight and BMI for males and females was done and the results showed that the age, height, weight and BMI did not differ significantly between males and females **[Table 4]**

	Male		Female		P value
Age (in years)	8.0	7.0-10.0	8.0	6.0-10.0	>.05 a
Height (in cm)	126.0	115.5-138.0	127.5	115.0-136.0	>.05 a
Weight (in Kg)	22.0	18.0-27.5	22.5	18.0-28.5	>.05 a
BMI (in Kg/m2)	14.3	13.1-15.6	14.6	13.4-16.3	>.05 a

[a] Man-Whitney U test

There was a statistically significant moderate positive correlation between mouth opening and all the variables including age (= .430, p value <.05), height (= .432, p value <.05), weight (= .422, p value <.05) and BMI (= .130, p value <.05).[Table 5, Figures 6-9]

There was a statistically significant moderate positive correlation between mouth opening and all the variables including age (ρ= .430, p value <.05), height (ρ= .432, p value <.05), weight (ρ= .422, p value <.05) and BMI (ρ= .130, p value <.05).[Table 5, Figures 6-9]

Parameters	Spearman's correlation coefficient	P value*
AMouth opening & age	.430	<.001
Mouth opening & height	.432	<.001
Mouth opening & weight	.422	<.001
Mouth opening & BMI	.130	<.05

*p value<.05 was considered statistically significant

There was a statistically significant moderate positive correlation between mouth opening and all the variables including age (ρ= .430, p value <.05), height (ρ= .432, p value <.05), weight (ρ= .422, p value <.05) and BMI (ρ= .130, p value <.05).[Table 5, Figures 6-9]

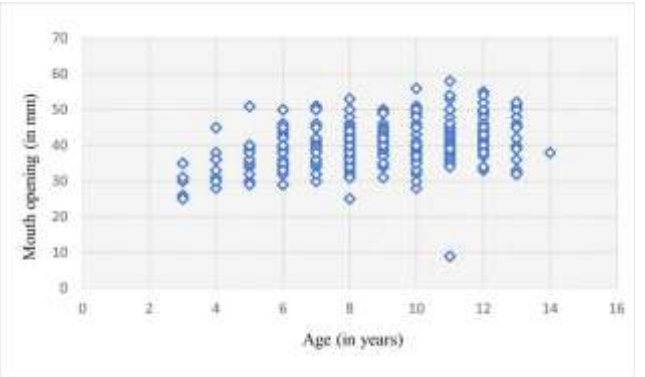

Figure 6. Correlation between mouth opening (in mm) and age (in years)

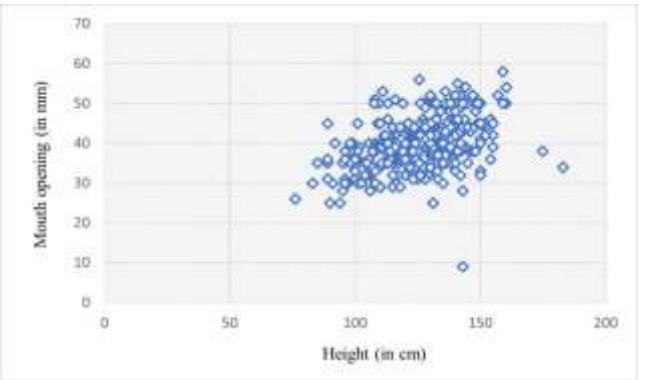

Figure 7. Correlation between mouth opening (in mm) and height (in cm).

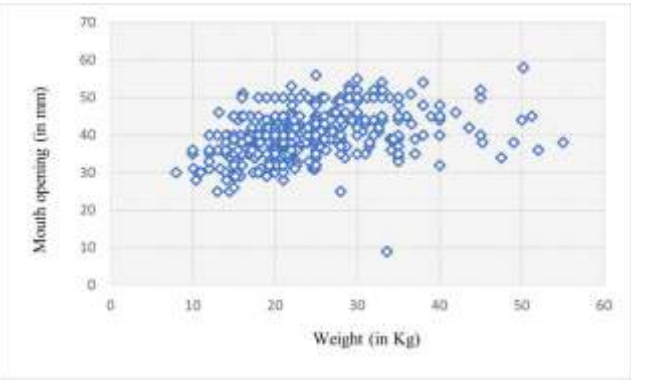

Figure 8. Correlation between mouth opening (in mm) and weight (in kg).

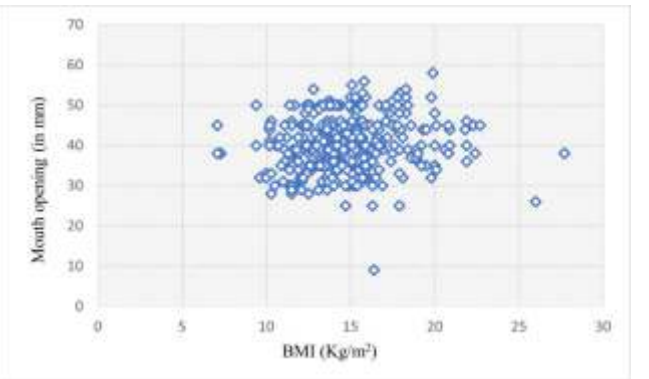

Figure 9. Correlation between mouth opening (in mm) and BMI (in Kg/m2).

Discussion:

It has been essential to lay down some parameters which influence the mouth opening and various researches have shown that the mouth opening measurement significantly differs with age, gender, and stature along with geographical and ethnic variations.

A variety of methods for recording the mouth opening has been described in the literature. In 2003, **Zawawi et al.**[4] suggested a strong positive correlation between MOC, and the width of three fingers at first interphalangeal folds and can be used as a valuable tool. **Cox and Walker**[5] studied the interincisal measurement was done using a Vernier caliper. **Wood and Branco**[6] concluded by comparing Two extraoral techniques with a direct technique using a ruler for measuring the maximal opening of the mouth and found out that the direct measurement using a ruler was the most accurate. To quantitate MOC different measurement tools have been used in various studies including various gauges, Vernier calipers, a fiber ruler, and the Therabite® scale.7

The most accurate reflection of the vertical distance travelled by the mandible is the inter-incisal opening plus the overbite. Furthermore, along with a large overbite, a large overjet also evidently increases the mouth opening. To avoid this

complicated assessment we used the interincisal distance as the maximal mouth opening.

The position of the head plays a crucial role in determining the maximum jaw opening. According to **Higbie et al** [8] the mouth opening was greatest in forward head positioning followed by neutral and retracted head positions. So, to overcome this difference neutral head position was selected in the present study.

Muller et al [9] found that during the MOC examination if done repeatedly, the mean values increased significantly from first to second and second to third measurements. So to increase the reliability and to obtain the highest values a warm-up procedure to mobilize the TMJ by performing MOC three times was carried out in the present study.

Most of the previous studies have reported that the males exhibit marginally greater mean mouth opening than females, it may owe to the longer mandible and more strong muscles compared to the females.1,9 We had come across similar findings in our study, the median mouth opening for males was seen to be 40 mm with the **inter-quartile range** (36.0-45.0 mm) and for females, it was 39 mm with the **inter-quartile range** (35.0-43.0 mm) with a significant statistical difference. Some studies have found contradicting results as a study done by **Pullinger et al**[10] stated that females have a greater range of mouth opening owing to the greater laxity of joints in females. This greater laxity may be held accountable for a higher frequency of Temporomandibular joint disorders in females.

We found a moderate positive correlation between age and mouth opening of children, indicating that mouth opening increases with increasing age but has shown a wide range even within children of the same age group This finding was consistent with other studies like by **Hirsch et al.**[11] who assessed a sample of 1011 children aged 10–17 years and found a small but significant increase of MOC with age accompanied by large ranges in every age group. The slight increase can be explained by growth in the mandible which geometrically influences the linear interincisal measurements.

A moderate positive correlation was also observed between height and maximal mouth opening. This is in support of the observation of **Landtwing**[12] where MOC had a better correlation with height (0.69) than with age (0.66) of the children, in the present study also MOC had a slightly better correlation with height (0.432) than with age (0.430).

Weight also showed a moderate positive correlation with the MOC. **Yang Li et al** [3] had also reported similar results. However, some of the studies reported no such relation between body weight and MMO.

The differences in craniofacial morphology and skeletal age along with the mandibular length affect the wide range of MOC within every age group. So, to overcome the bias that can be caused by inter-individual differences of mandibular morphology linear measurements of MOC longitudinally within the same subject over time as recommended by **Dijkstra et al.** [13]

Body mass index was found to have a moderate positive correlation with the mouth opening. This finding was consistent with the study done by **Venkatraman et al in 2020,**[7] who concluded that with an increase in BMI there was an increase in mouth opening.

Conclusion: It can be concluded that there is an impact of age, gender, height, weight and BMI on maximal mouth opening. Mouth opening for males was significantly higher than females. A moderate positive correlation between height, weight, BMI, age has been found in the present study.

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Original **Article**

Immediate Temporization of Implant in Aesthetic Zone Using a Customized Prefabricated Tooth Shell.

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ABSTRACT There are many reasons of loss of teeth dependent on physical, physiologic, mechanical, aesthetic and hygienic factors. Aesthetics is a major concerning factor for most of the patients visiting the dental clinics. Following surgery, it is vital to temporise a dental implant, particularly in the anterior region. Replacement of lost tooth with dental implants is now considered to be the best treatment option available when all the pathological factors are considered. Immediate temporization is the best treatment option especially in the anterior region. Using the tooth shell technique, provides immediate temporization with better aesthetic results. Tooth shell provides a good patient specific, aesthetic and economic alternative to other temporization methods for a single tooth.

Introduction

Aesthetics is a major concerning factor for most of the patients visiting the dental clinics. Especially when it is related to loss of or decayed or fractured teeth in the anterior region[1]. There are many reasons of loss of teeth dependent on physical, physiologic, mechanical, aesthetic and hygienic factors. Following surgery, it is vital to temporise a dental implant, particularly in the anterior region[1]. The provisional phase of therapy allows for surgical healing, gingival architecture preservation, and, most significantly, tooth replacement in the edentulous space for patient acceptance. Despite the fact that there are numerous strategies for temporising implants, the process has proven to be time consuming and stressful for both clinicians and practitioners[2].

Replacement of lost tooth with dental implants is now considered to be the best treatment option available when all the pathological factors are considered[2]. Also the increase in people awareness regarding dental implants and their high success rate of treatment, it has made the treatment a desirable one among the patients. Immediate temporization of implants now has paved the way for providing better aesthetic results immediately with placement of implants[2]. The tooth shell techniques is a unique one giving patient customized temporary tooth to fill the missing tooth space. The tooth shell also acts as a guide in placement of implant in proper position Antero posteriorly and mesiodistally. This technique provides immediate temporization with better esthetic results.

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Case Report-

A 29 year old patient reported to the Department of prosthodontics, VSPM Dental College and Research Centre, Nagpur with the chief complaint of poor aesthetics due to missing teeth in lower anterior region of jaws since 2 months. He had a history of football trauma to the anterior region of jaw where he lost his incisor tooth to fracture. After that root piece was extracted. After proper healing the patient reported to the dept for replacement of missing teeth. He was proposed with all the option available and patient opted for replacement of teeth with implant. CBCT was advised to the patient. Diagnostic impression were made, Centric bite was taken and mounting was done.

On the mounted maxillary and mandibular casts a wax up of the missing tooth was done and on that wax up a temporary shell was made with tooth coloured acrylic resin. Implant size was decided on the CBCT Imaging and surgery was scheduled. On the day of surgery, local anaesthesia was administered, full

thickness flap was opened and osteotomy at the desired height and width was done

Then temporary cylinder/ abutment was attached to the implant and cut to the appropriate length. The tooth shell was then attached to the temporary cylinder and adjusted according to the occlusion and adjacent tooth. The tooth shell was shaped with the help of flowable composite and cemented with the composite cement. After cementation the apically displaced flap and suturing was done.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Discussion:-

Aesthetics has been a major concern for most of the dental patient, a long osseointegration period of three months is not acceptable to most of the patients. They might go with other treatment options because of this. Hence Immediate temporization is necessary. Immediate temporization in such cases has paved the way to better and successful implants treatments. There are several methods for temporising dental implants. To replace the missing tooth, the typical method includes constructing a removable partial denture, sometimes known as a flipper. Because the denture must be appropriately manufactured to minimise stresses on the healing cap and/or healing implant body, this procedure is challenging. Other factors negating this procedure include the more costs incurred from a temporary prosthesis, patient acceptance is not good due to bulkiness and speech impediment issues, and the overall hygienic concerns of the denture. In that, replacing the single tooth with a customized prefabricated tooth shell that is specific to each patient is a easier treatment for immediate temporisation. The tooth shape and form of the temporary can be carved according to specifications. The tooth shell technique is easier to fabricate a temporary and is very less technique sensitive. It is quite economical as well. Other temporization shells such as prefabricated shells can also be used for immediate temporization but it can be expensive and not patient specific. Tooth shell provides a good patient specific, aesthetic and economic alternative to other temporization methods for a single tooth. Thus increasing patient acceptability of the temporary treatment.

Conclusion:-

Immediate temporization is the best treatment option especially in the anterior region. Using the tooth shell technique, provides immediate temporization with better aesthetic results. Tooth shell provides a good patient specific, aesthetic and economic alternative to other temporization methods for a single tooth. It also increases the patient acceptability of the immediate temporary as it is custom made. Preliminary investigations also suggest that temporization with CAD/CAM systems, allows for convenient in-office laboratory procedures to be performed. These advances simplify the procedure and reduce the cost, ultimately allowing a greater accessibility for both patients

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Case report on Mucormycosis

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ABSTRACT The coronavirus disease 2019 (COVID-19) pandemic led to a concerning resurgence of mucormycosis. More than 47,000 cases of mucormycosis were reported in three months from India. The state of Maharashtra witnessed over thousand active cases during the second wave by June 2021.Surgical intervention for the treatment of Mucormycosis leaves the patient with surgical defect in the maxillary, facial and orbital region which demands Prosthodontic rehabilitation. Prosthodontic rehabilitation is the most practical, convenient, and cost- effective treatment mode and has the added advantage of removing prosthesis and evaluating the infected site efficiently at regular intervals. This article describes a case report where a spring retained flexible obturator was fabricated for rehabilitation of an acquired maxillary defect in a post Covid-19 mucormycosis patient. Interim denture bases have several advantages over the traditional rigid denture bases; hence it was selected as material of choice for the definitive prosthesis in this case.

INTRODUCTION:

Mucormycosis also known as the black fungus was one of the dreaded complications of COVID -19 infection during the second wave in India. The most common causes attributed to the rise of mucormycosis in COVID-19 patients are uncontrolled diabetes, the excessive use of corticosteroids for immunosuppression, and long-term stays in the intensive care unit. Even though no official figures about mucormycosis in COVID-19 cases were released by the Union Health Ministry during the first wave of COVID-19, India contributed to approximately 71% of the global cases of mucormycosis in patients with COVID-19 based on published literature from December, 2019, to the start of April, 2021.Early diagnosis and treatment reduced the mortality and morbidity of this lethal fungal infection. Treatment principles included antifungal agents along with surgical debridement or resection1.

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Impaired chewing, fluid leakage into the nasal cavity, and hypernasal speech are all common symptoms of the post-surgical maxillary defect2. The main goals of prosthodontic rehabilitation are to cover up the facial deformities and restore the function of mastication, deglutition, and speaking. Restoration of such flaws should focus on ensuring appropriate retention, greater stability, and robust vertical support. 4. The size of the defect, the number of remaining teeth, the quantity of remaining bone tissue, and the patient's capacity to adapt to the prosthesis are the elements that determine the success of the treatment.

CASE REPORT

INTRAORAL VIEW Maxillary arch with defect Mandibular archA 66 year old patient reported to the Department of Prosthodontics, two months after undergoing surgery for post covid mucormycosis with the chief complaint of leakage of water, liquids and food through nose, inability to chew food and nasal twang in speech. A surgical closure was attempted in the past but was unsuccessful. Intra oral examination revealed a small l oro-antral communication and on posterior soft palate .

Fig:1. Intra-oral Defect (mirror view)

The preliminary impression was made with irreversible hydrocolloid and a stone cast was poured

Trial denture base was made of self-cure resin and clasp retained prosthesis.

Fig : 2. Interim prosthesis was made and Prosthesis in patient`s mouth

The final prosthesis was inserted into the patient's mouth (Fig 2) and it was checked for proper occlusion

The patient was instructed about the handling and maintenance of the hygiene of prosthesis and was recalled for regular post- insertion visits. Adequate retention, stability and support were observed on weekly recalls and at 6 month follow up. The patient was pleased with the drastic improvement in speech, mastication, facial appearence and retention of the prosthesis.

DISCUSSION

The oral and nasal canals communicate as a result of acquired abnormalities in the maxilla brought on by surgical resection, which impairs deglutition, speech, and aesthetics. The sufferer cannot freely communicate with others due to the psychological stress that results. Smaller abnormalities are typically repaired surgically, but larger ones are frequently prosthodontically restored by obturators7. In this instance, a main closure was made, but it failed. This case report discusses rehabilitation of a class 1 defect , by a flexible obturator. The primary aim of fabricating a flexible obturator was to decrease the weight and minimize the rotation of the prosthesis. The lightness of the obturator also does not cause excessive atrophy as it reduces the pressure on surrounding tissues and physiological changes in muscle balance8.

The patterns of forces affecting the obturator prosthesis are complex because of their concurrent occurrence and mostly destabilize the prosthesis2. These destabilizing forces need to be controlled by effectively and strategically positioning the indirect retainers2. In this case, a modified buccal flange was placed over the unressected side and was connected to the obturator. This provision in the prosthesis helped in minimizing the rotation of prosthesis2.

Flexible dentures absorb a tiny amount of water to improve their compatibility with soft tissues. With flexible prosthetics, the likelihood of warpage and brittleness is relatively minimal. Since there are no metallic visible clasps and they are more comfortable, removable dentures are preferable in terms of aesthetics. The material's complete biocompatibility is also made possible by the absence of monomer and metal, which are the primary triggers of allergic reactions in conventional denture material 5.

CONCLUSION

Restoration of a surgical defect caused by post-COVID-19 mucormycosis is difficult since it necessitates the improvement of speech, mastication, and deglutition capabilities while also reducing psychological trauma. Flexible obturator, which is biocompatible, lightweight, and moldable, proven to be an ideal material of choice for rehabilitation in this instance.

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Case **Report**

Prosthodontic Rehabilitation of a patient with Post COVID Mucormycosis: A Case Report

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ABSTRACT This clinical report describes management of post COVID mucormycosis by definitive obturator. Restoration of esthetic and cosmetic appearance of patient along with restoration of function, protection of tissues, therapeutic and healing effect, psychological therapy and improving the quality of life are main objectives of rehabilitation. The rehabilitation successfully done with a cast partial denture in a case presented with partial maxillectomy is explained in given case report.

Keywords: Partial maxillectomy; Mucormycosis; cast partial denture

INTRODUCTION:

Resection of maxilla due to tumours or any infection leads to facial disfigurement, impaired functions like speech due to hypernasality, unfavourable mouth opening and closing. This leads to significant impact on patients quality of life. Post COVID-19 infection is that which occurs after SARS-CoV-19 had a rampage in the human body.[1] It leads to secondary bacterial and fungal infections, especially in critically ill patients subjected to invasive emergency procedures, mechanical ventilation and prolonged hospital stays. Further, corticosteroid treatment in these highly susceptible hosts and high fungal spore counts in the environment creates the favourable condition for mold infections. Antifungal agents along with surgical debridement or resection are treatment modalities for such kind of infection.[2,3]

This article discusses an innovative fabrication technique to treat an acquired maxillary defect due to post Covid-19 mucormycosis. Multidisciplinary approach is required for management of such maxillary defects treated with surgical resection. The most practical convenient and cost effective treatment mode along with advantage of removable prosthesis which helps in evaluation of infected side efficiently is provided by prosthodontic rehabilitation.

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CASE REPORT EXAMINATION AND TREATMENT PLANNING:

A 40 years old male patient visited with chief complain of inability to chew food and difficulty in opening and closing jaw due unilateral missing teeth in upper right region.

On past medical history, it was found that the patient underwent with partial maxillectomy for post Covid-19 necrosis of maxilla due to mucormycosis 1 year back. The treatment plan was to fabricate a cast partial denture. On Extra-oral examination facial asymmetry with collapsed cheek and prominent nasolabial fold on right side of the face was found. On intraoral examination well healed residual maxillary defect with surgically closed oro-antral communication in partial maxillectomy on right side was found. On right side 11, 12, 13, 14, 15, 16, 17, 18 and alveolar ridge were missing with obliteration of labial and buccal vestibule on same side. On panaromic radiographic examination we observed missing maxillary teeth on the right side with a radiolucency extending into the maxillary sinus. After examining the defect, treatment plan was made. It was decided to rehabilitate the patient with cast partial denture.

METHODS:

Initially examination of maxillary and mandibular arch was done (Figure 1, 2) and then primary impression was made with irreversible hydrocolloid impression material using a

stock tray and poured to obtain diagnostic cast. After retrieval the primary cast, surveying was done and undercuts determined. Then the design decided for cast partial denture was complete palate major connector with meshwork as a minor connector. I bar and embrasure clasp on 1st and 2nd molar as a direct retainer and cingulum rest in canine and mesial rest in premolar were decided. Mock preparation was done in diagnostic cast after finalization of design. Mouth preparation prepared as per decided design. Addition silicone impression were made for final cast. Framework adapted on the cast and check its fitting in intraorally (Figure 3). Record base adapted on the metal framework with occlusal rim. Bite registration was done (Figure 4). After that maxillary and mandibular casts were mounted. Accordingly, teeth were arranged. After that Try-in was done (Figure 5). Evaluation of Occlusion, aesthetics, and phonetics was done and found to be acceptable by the patient (Figure 6,7,8). After final finishing and polishing, insertion of the prosthesis was done and post-insertion instructions were given. Results were satisfied after 1 month follow up.

DISCUSSION:

Mucormycosis is rare opportunistic fungal infection. According to the Jain., et al. surgical and anti-fungal treatment can be used in combination. Following are the types of mucormycosis - rhinocerebral, rhinomaxillary, pulmonary, cutaneous, gastrointestinal, and central nervous system. Among these rhinocerebral and pulmonary forms are predominant in diabetes patients. Rhinocerebral form occurs by inhalation of air borne spores.[4]

The action of mononuclear and poly morphonuclear phagocytes in the subcutaneous tissue begins immediately after inhalation of pores. As in diabetic patients, rhizopus produces ketoreductase an enzyme. That enzyme makes use of the patient's ketone bodies leading to reduced phagocytic activity. Early diagnosis and early management prevent complications. Mucormycosis can be fatal to the patients. IV liposomal amphotericin, IV lipid complex, hyperbaric oxygen therapy is introduced recently. [5]

Depending on the phase of treatment or prosthetic rehabilitation of acquired hard palte defect, obturator can be classified as Immediate surgical, Interrim and Definitive. [6] Maxillofacial rehabilitation is a multidisciplinary task. Communication with the surgeon as far as extent of disease, precise surgical technique, anticipated postoperative defects and healing time could help to plan the treatment. It is well established, among those involved in maxillofacial rehabilitation, that the fewer the teeth remaining in the arch, the more complicated is the closure of the maxillary defects by means of flaps. Moreover, the support thus provided to the prosthesis gives way during mastication loads. Recommendations can be made for the preservation of tissues or to improve the existing anatomical structures to improve the retention, stability and support for the prosthesis. In the above presented cases, our aim was to provide adequate functions of chewing, swallowing, and speech, as well as acceptable esthetic appearance and to obtain the proper guidance for closure of mouth [7]. The prosthetic rehabilitation of large maxillectomy defect is challenging task. Retention is severely compromised in these patients resulting in difficulties in speech and mastication. Simple technique has been described in this article is for the fabrication of the cast partial denture with direct retainer on abutment teeth offer additional prosthetic retention which restores patient's original dentition and facial and palatal tissue form. In the present case, additional retention was achieved by indirect retainer of cingulum and mesial rest on canine and 1st premolar. As there was already no bone support in defected site, maxillary palatal plate was selected as a major connector. To establish occlusal function missing teeth was replaced with acrylic teeth.

Obturators with teeth may be made using several methods, using a celluloid matrix, modifying a surgical obturator, using a denture duplicator, or using light cured or heat-polymerized acrylic resin [8]. The obturator fabricated with this technique utilises heat cured acrylic denture base resin which is easily available in market.

In this technique, putty elastomeric impression material is used as final impression as the buccal vestibular flap was used for closure of defect, patient was having reduced mouth opening. So, there was no sufficient space to record the functional impression. Trial denture was flasked, dewaxed and processed. In an attempt to improve the esthetic characteristics of a patient, spacing between the anterior teeth was intentionally given for bilaterally symmetrical appearance.

The potential benefits of the technique are availability and ease of fabrication of the prosthesis with additional retention using clasps. The defect was closed, and a satisfactory esthetics, phonation and function was established.

CONCLUSION:

Definitive prosthodontic treatment is one of the final therapies which are instituted and it attempts to alleviate any anatomical and functional deficiencies. A good prosthesis serves the purpose of rehabilitation of the patient's lost function and aesthetics also it gives confidence and comfort in society.

Fig.1: Maxillary Arch

Fig.2: Mandibular Arch

Fig.3: Metal framework trial

Fig.4: Maxillary Arch

Fig.5: Mandibular Arch

Fig.6: Metal framework trial

Fig.7: Maxillary Arch

Fig.8: Mandibular Arch

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Case **Report**

Infected Globulomaxillary Cyst – A Case Report

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ABSTRACT The Globulomaxillary cyst has traditionally been described as a fissural cyst found between the maxillary lateral incisor and the canine. Current theory holds that most cysts that develop in the globulomaxillary area are actually of odontogenic origin. The term globulomaxillary can be justified only in an anatomic sense. This article presents a successful case of surgical management of an infected globulomaxillary cyst in a 15 year old female child patient.

Keywords: Cyst, Fissural cyst, Globulomaxillary cyst

Introduction

A number of different types of fissural (or inclusion) cysts of bone occur in the jaws and have generally been considered arising, as the name would indicate, along the lines of fusion of various bones or embryonic processes. The Globulomaxillary cyst has traditionally been described as a fissural cyst found between the maxillary lateral incisor and the canine.[1] Current theory holds that most cysts that develop in the globulomaxillary area are actually of odontogenic origin.[2] The differential diagnosis of radiolucencies which occur in the globulomaxillary region includes a variety of odontogenic cysts and tumors, inflammatory lesions, and a number of non-odontogenic conditions.[3] The globulomaxillary cyst seldom produces any clinical manifestation. Nearly every recorded case has been discovered accidently during routine radiographic examination. The treatment of choice is dependent on the size and localization of the lesion, the bone integrity of the cystic wall and its proximity to vital structures. Nevertheless, no matter what choice it might be, the treatment option should be kept as conservative as possible.[4] The purpose of this article is to present a case of an infected globulomaxillary cyst in a 15 years old female child and discuss about the management strategies.

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Case Report

A 15 year old girl presented to the department of with the history of pain in upper left anterior teeth region since last two days. On thorough questioning it was revealed that the patient met with a trauma in the same region two days prior. Intra oral examination, revealed swelling, redness of the area between lateral incisor (22) and canine (23), which was found to be tender on palpation and percussion [Figure 1]. Orthopantomogram as well as intra oral periapical radiograph were performed as a diagnostic measure with respect to 22 and 23 [Figure 2]. A well defined unilocular radiolucent area of inverted pear shape measuring 12 x 18 mm (breath x length), was observed between the maxillary lateral incisor and the canine, leading to displacement of the roots of the respective teeth. Pulp vitality test were performed and both 22 and 23 were found to be vital. Based on the history, clinical examination and radiographic examination, a clinico-radiographic diagnosis of infected globulomaxillary cyst in relation to 22 and 23 was made and a treatment plan was formulated to manage the case through surgical enucleation.

Under complete aseptic precautions and under local anaesthesia, a crevicular incision was given from 21 till 23 followed by placing two vertical releasing incisions. A full thickness muco-periosteal flap was raised and the surgical area of the globullomaxillary cyst was exposed by removing

the thin layer of cortical bone present between the lateral incisor and canine [Figure 3]. Complete enucleation of the cyst was performed, followed by irrigation with normal saline [Figure 4]. The flap was re-approximated and sutures were placed using 3-0 black silk suture material. It was not possible to enucleate the cyst in – situ as a whole. Post operatively the enucleated tissue was made available for histopathological examination. The post operative period was uneventful and the sutures were removed after a period of one week. The histopathological examination revealed the connective tissue stroma made up of bundle of fibres, area of chronic inflammation, hemorrhage and inflammatory exudates. The cyst couldn't be differentiated between odontogenic and non-odontogenic type due to the disruption of the epithelium because of secondary infection. Osseous repair of the lesion was noticed after one month of follow-up and the patient was kept under observation [Figure 5].

Discussion

A good preoperative assessment, complete removal of the cystic lesion, and close radiographic follow-up are essential for a successful outcome in jaw cysts. Christ[5] in his survey of the literature over 50-years period revealed that a wide variety of the other lesions present clinically and radiologically as globulomaxillary cysts included adenomatoid odontogenic tumours, myxoma and haemorrhagic bone cysts. It was believed for many years that these were fissural cysts arising from non-odontogenic epithelium included at the site of fusion of the globular process of the median process and the maxillary process. This concept has been questioned, however, because the globular portion of the medial nasal process is primarily united with the maxillary process and a fusion does not occur.[6] Therefore, epithelial entrapment should not occur during embryologic development of this area. Current theory holds that most cysts that develop in the globulomaxillary area are actually of odontogenic origin.[2] Thus today the term globulomaxillary can be justified only in an anatomic sense, with definitive diagnosis of lesions located in this area made by combined clinical and microscopic examination.[7] The clinical and microscopic examinations for definitive diagnosis of these lesions are:

- Nonspecific designation for any lesion in the globulomaxillary area (between maxillary lateral incisor and canine)
- Inverted pear –shaped radiolucency
- Asymptomatic; teeth vital; divergence of roots
- May represent odontogenic cyst or neoplasm, or nonodontogenic tumor
- Biopsy necessary to establish definitive diagnosis

Because of the array of potential diagnosis, the histology varies considerably from case to case. Kuntz and Reichart[8] have reported a case of an adenomatoid odontogenic tumor simulating a globulomaxillary cyst and Vedtofte and Holmstrup[9] have described a series of inflammatory cysts in the globulomaxillary region which they considered to be paradental cysts. Treatment of cysts in the globulomaxillary area usually consists of surgical enucleation.[10]If the lesion can be related to an adjacent nonvital tooth, then endodontic therapy may be appropriate. Prognosis depends on the specific histopathologic type of cyst. Thus in definite diagnosis of this cyst, it is deemed that a comprehensive diagnosis is required including operative findings upon its removal and the pathohistological findings of the removed matter in addition to the radiographic and clinical findings.[11]

Conclusion

The clinical case report presented in this article was managed successfully with surgical enucleation. Globulomaxillary cyst have to be diagnosed alternatively after a thorough clinical, radiological and histological examination and also the term 'Globulomaxillary' can be justified only in an anatomic sense, with definitive diagnosis of the lesions.

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Figure1: Intraoral Photograph showing swelling, redness of the area between lateral incisor (22) and canine (23).

Figure2: Cropped image of orthopantomogram showing well defined unilocular radiolucent area of inverted pear shape between lateral incisor (22) and canine (23).

Figure3: Intraoral Photograph showing raised full thickness muco-periosteal flap between lateral incisor (22) and canine (23).

Figure4: Intraoral Photograph showing the surgical area of the globullomaxillary cyst which was exposed by removing the thin layer of cortical bone present between lateral incisor (22) and canine (23).

Figure5: Intraoral periapical radiograph showing osseous repair of the lesion after one month follow-up.

Case **Report**

Comparison between Acetate peel technique and dye penetration method in the evaluation of microleakage - A preliminary study

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ABSTRACT

Aim : To compare and evaluate the reliability of acetate peel technique against the standard dye penetration method in the estimation of microleakage.

Materials and Method: Standardized class V cavities were prepared and restored in ten human extracted maxillary premolars. All the premolars were stored in methylene blue dye for 24 hours. These premolars were sectioned buccolingually into two halves and observed under stereomicroscope at 40X magnification. The scoring for microleakage was carried out by two independent examiners. After a period of one week the same samples were then utilized for estimation of microleakage using acetate peel technique. All the samples were etched with 37% phosphoric acid for 1-2 minutes. Acetone was flooded onto the etched surface and a pre-cut acetate film of 3X3 cm was placed onto it by bending it from one side so as to prevent entrapment of air bubbles. As the acetone evaporated the acetate peel was removed gently and mounted on a glass slide and observed under research microscope at 4X and 40X magnification. The evaluation of the interfacial gap was also carried by two independent examiners. All the data obtained were subjected to statistical analysis

Results: Interexaminer reliability for both the methods showed no significant difference between the two examiners. There was a statistical significant difference in the scores between both the techniques by both the examiners.

Conclusion: The dye penetration method still remains the standard method in the evaluation of microleakage in comparison with acetate peel technique.

Key words: Microleakage, Dye penetration, Interfacial gap, Acetate peel

INTRODUCTION:

The ultimate success of a restoration is determined by its longevity. The integrity around the margins of the restoration is an essential factor to determine the longevity of the restoration. The most common drawback with these restorative resins is polymerization shrinkage, thermal expansion and water adsorption which can eventually lead to microleakage. The gap created between the tooth and restoration allows ingress of cariogenic bacteria. They have the potential to proliferate in this area and cause secondary caries and pulpal response. It also provides nutrition for the bacteria that remain behind in the smear layer during cavity preparation.[1] Thus estimating microleakage is very essential in evaluating the clinical success of any restorative material which can lead to post operative sensitivity, enamel fracture, recurrent caries, marginal staining, and eventually failure of the restoration. Various methods like Organic dyes[1], Scanning Electron Microscope[2], Radio-isotopes[3], Silver nitrate technique[4], Bacteria[5], Air pressure[6], Neutron activation analysis[7] and electrochemical method[8] have been used to determine microleakage. Till date, dye penetration method has been considered to be the gold standard for

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microleakage evaluation. Füsun et al in 2005 used acetate peel technique to study the gross and fine structures of dental hard tissues and they concluded that this technique can be used in the investigation of restoration-cavity marginal integrity. [9] Utilizing the same concept, Mohapatra A et al in 2011 studied the resin-tooth interface and concluded that this technique is a reliable tool in measuring the interfacial gap that can lead to microleakage only at a higher magnification. [10]

Thus, the aim of the present study was to compare and evaluate the reliability of acetate peel technique against the standard dye penetration method in the estimation of microleakage.

Materials and Method

Collection and preparation of the samples:

Ten sound human maxillary premolar teeth extracted for orthodontic reasons were selected for this study. The teeth with enamel cracks, fractures, carious lesion, restorations or erosions were excluded from the study.[11] Immediately after extraction, the teeth were thoroughly washed under running water to remove blood and any adherent tissue was removed using hand scalers. All the teeth were stored in distilled water with thymol crystals added to it until the processing of the specimens. Standardized class V cavity was prepared in all the samples having the dimensions of 3mm mesio distally, 2mm occluso cervically and 1.5mm deep and restored with composite resin (Beautifil II, Shofu, Japan).

Dye penetration Method:

All the restored samples were stored in distilled water at 37C for 24 hours (ISO test type-1) and then subjected to thermocycling of 500 cycles between 5ºC – 55ºC with a dwell time of 20 seconds and transfer time between baths of 10 seconds (ISO test type-2). The samples were stored in methylene blue dye having concentration of 4.75 g/L, pH – 6.98 with H_2PO_4-/ HPO_4^{2}- buffer for 24 hours and then washed with a slurry of pumice to remove the superficial dye. The samples were then sectioned buccolingually into two halves with the help of the diamond disc under copious irrigation of water and polished with wet silicon carbide paper of 1000 grit (3M ESPE). All the sectioned samples were coded and observed under a stereomicroscope (SMZ645; Nikon Co., Tokyo, Japan) at 40X magnification and the microleakage at the occlusal and gingival walls in each section was evaluated by two independent examiners according to the following scoring system, 0: No penetration of the dye solution; 1: Infiltration of the dye up to the enamel-dentin junction in the occlusal wall or penetration up to 1/3 of the length of the gingival wall; 2: Penetration of the dye up to 2/3 of the length of the cavity wall; 3: Penetration of the dye extending for the total depth of the cavity wall. The wall showing the highest score has been considered for final scoring.

After a period of one week, the samples which were used for the dye penetration method were further utilized to evaluate microleakage using the acetate peel technique. All these samples were placed in alcohol to remove the dye and prepared for acetate peel technique.

Acetate peel technique:

Each sectioned sample was made flat with a wet silicon carbide paper of 1000 grit (3M ESPE) and embedded in a block of epoxy resin (M-seal, Pidilite, India) such that the flat surface of the tooth remained on top of the block. Commercially available acetate paper (Grafix plastics, Cleaveland, USA) of thickness 0.003 inches as described by Füsun et al and acetone were utilized in this study. [9] The sectioned samples were washed with distilled water and air dried with oil free compressed air. All the samples were etched with 37% phosphoric acid for 1-2 minutes and then thoroughly washed with distilled water and dried with oil free compressed air for 20 seconds.[9] Acetone was flooded onto the etched surface with the help of a dropper and a pre-cut acetate paper of 3x3 cm was placed onto it by bending it from one side so as to prevent entrapment of air bubbles. As the acetone starts evaporating, the film gets pulled onto the tooth surface and the details of the sectioned teeth get imprinted on the acetate paper. The film is left over to dry for about 15-20mins. The acetate paper is removed from one corner by pulling it gently with the help of a tweezer. The excess acetate paper is cut off with the scissors and all the peels were mounted on glass slides and covered with a cover slip.

Each slide was coded with the number in the same order used for dye penetration method. The samples were observed under research microscope (OLYMPUS BX 41) with a mounted digital Olympus SLR camera E330. Each sample was observed under 4X magnification where the entire occluso-gingival wall was visible. The occlusogingival wall was now divided arbitrarily into three parts as followed in the dye penetration method using the arrow mark in the eyepiece of the microscope and the magnification was changed to 40X to evaluate the interfacial gap. The scoring for the microleakage was done by two independent examiners who were unaware of the coding done on the slide. The scoring criteria were as follows: 0: no interfacial gap seen at the cavosurface margin, 1: interfacial gap present from the occlusal surface till one third of the wall, 2: interfacial gap present from the occlusal surface till two third of the wall, 3: interfacial gap present from the occlusal surface till the pulpal floor.

Statistical analysis

Interexaminer reliability was evaluated for both the techniques. Wilcoxon signed rank test was performed to determine the statistical significance (using $P< 0.05$) between scorings obtained from the two techniques.

Results:

The interexaminer reliability for dye penetration method was Kappa(K)=0.831 ($p < 0.05$), whereas for acetate peel technique was Kappa(K)=0.615 ($p< 0.05$), showing no significant difference in evaluation between the two examiners. The individual scores for both the techniques are shown in Table-1 and 2 respectively. In the dye penetration technique, 5 out of 10 samples had leakage till the pulpal floor (score 3) whereas the same samples in the acetate peel technique did not show any interfacial gap throughout the marginal wall. The statistical comparison between both the techniques by both the examiners is shown in Tables 3 and 4 respectively. There was a statistical significant difference in the scores between both the techniques by both the examiners ($p<0.05$). The reliability of the acetate peel technique was statistically not significant when compared to the dye penetration method (Data not shown)

Discussion

The achievement of an optimal marginal seal is a key factor for the success in restorative dentistry, as the presence of marginal deficiencies has been reported to be one of the main reasons for restoration failure.[12-14] Dye penetration method has been considered as the gold standard in microleakage evaluation. Recently, Mohapatra et al measured the interfacial gap between the tooth and the restoration using acetate peel technique and concluded that this technique can be used for microleakage evaluation. [10] In this study, comparison was made between the two techniques to find out the reliability of acetate peel technique against the dye penetration method. Each technique was evaluated by two independent examiners to find out the accuracy of both the techniques. To prevent the bias during evaluation, the examiners were blinded. The interexaminer reliability between both the examiners were statistically significant ($p<0.05$).

In the dye penetration technique, the score for most of the samples were 3 which indicate that the dye has penetrated the pulpal floor (Figure-1). We assume that there was some amount of interfacial gap between the tooth and the restoration which allowed the dye to leak till the pulpal floor. But the same samples when evaluated using acetate peel technique, no interfacial gap was visible at the cavosurface margin itself. Moreover, if the interfacial gap present at one third distance of the cavity wall but absent at the cavosurface margin, the leakage couldn't have occurred (Figure-2). The acetate peel was observed at 40X magnification because it was possible to visualize the interfacial gap only at this magnification. There was a highly statistical significant difference in the scores obtained between the two techniques by both the examiners ($p<0.05$). The reliability of the acetate peel technique against the standard dye penetration technique was not significant statistically ($p>0.05$). Initially, it was thought that if the interfacial gap between tooth and restorative material was 250-400 µm, there were chances for recurrent caries. [15] But later it has been claimed that there seem to be no clear correlation between the dimensions of the marginal gap around the restorations and development of recurrent caries. [16] Moreover, one of the important characteristic features of any composite resin restoration is formation of a hybrid layer between the composite and the tooth. The interfacial gap present could be between the composite resin and the hybrid layer, within the hybrid layer or between the hybrid layer and tooth. There are various limitations of acetate peel technique like pre-requisite of a flat surface for making the peel, etching of this flat restored tooth surface prior to peel making, curling of the acetate film onto the surface and the entrapment of air bubbles while making the peel which makes the identification of the interfacial gap difficult.

Conclusion

Acetate peel technique is easy and a quick way in making replicas of the restored teeth but because of the limitations of this technique it is not possible to comment on microleakage aspect. The dye penetration method still remains the standard method in the evaluation of microleakage.

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Table 1: Individual score for Dye penetration method by both the examiners

Sample No	Examiner 1	Examiner 2
1	2	2
2	1	1
3	2	2
4	2	2
5	2	2
6	3	2
7	3	3
8	3	3
9	3	3
10	3	3

Table 2: Individual score for Acetate peel technique by both the examiners

Sample No	Examiner 1	Examiner 2
1	0	1
2	1	1
3	0	0
4	1	1
5	0	0
6	1	1
7	1	1
8	0	0
9	0	1
10	0	0

Table 3: Wilcoxon signed rank test of both the groups by first examiner

	N	Mean	Std dev	Min	Max	25th	50th (median)	75th
G1E1	**10**	**2.40**	**.699**	**1**	**3**	**2.00**	**2.50**	**3.00**
G2E1	**10**	**40**	**.516**	**0**	**1**	**.00**	**.00**	**1.00**

Wilcoxon Signed Rank Test

		N	Mean rank	Sum of rank	Z value	p-value
G2E1-G1E1	Negative rank	9	5.00	45.00		
	Positive rank	0	.00	.00	-2.724	0.006
	Ties	1				
	Total	**10**				

Table 4: Wilcoxon signed rank test of both the groups by second examiner

	N	Mean	Std dev	Min	Max	25th	50th (median)	75th
G1E1	**10**	**2.40**	**.699**	**1**	**3**	**2.00**	**2.50**	**3.00**
G2E1	**10**	**40**	**.516**	**0**	**1**	**.00**	**.00**	**1.00**

Wilcoxon Signed Rank Test

		N	Mean rank	Sum of rank	Z value	p-value
G2E1-G1E1	Negative rank	9	5.00	45.00		
	Positive rank	0	.00	.00	-2.724	0.006
	Ties	1				
	Total	**10**				

Figure 1: Sectioned sample showing dye leaked till the pulpal floor

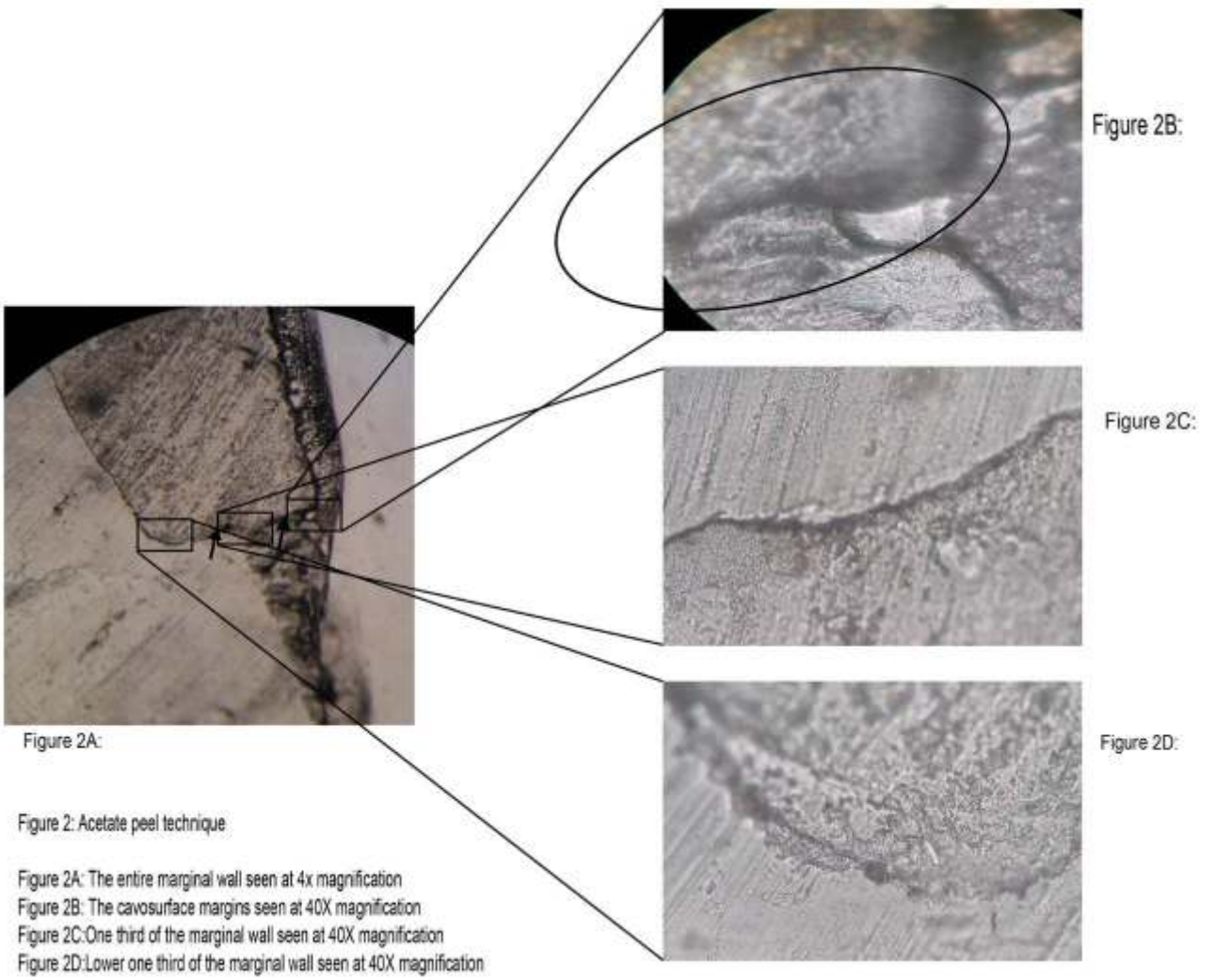

Figure 2: Acetate peel technique

Figure 2A: The entire marginal wall seen at 4x magnification
Figure 2B: The cavosurface margins seen at 40X magnification
Figure 2C:One third of the marginal wall seen at 40X magnification
Figure 2D:Lower one third of the marginal wall seen at 40X magnification

Case **Report**

Eye Over An Eye: Rehabilitation Of Phthisis Bulbi Using Scleral Shell In Pediatric Patient

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ABSTRACT Phthisis bulbi is an ocular condition characterized by atrophic eye and loss of vision as a result of trauma, infection, inflammation etc. Sclera shell is a custom made ocular prosthesis that is fitted over a phthisical eye. The following report presents the case of a pediatric patient in which a novel technique has been used to position the iris in a custom made ocular prosthesis.

Keywords: ocular defect, phthisis bulbi, scleral shell

Introduction

Patients with maxillofacial defects suffer from emotional and psychological distress. The life-long agony of social non-acceptance eventually leads to deterioration of the quality of life. Hence, the duty of a maxillofacial prosthodontist not only lies in the rehabilitation of the defect but also restoring the patients self- esteem. Ocular defect is one such maxillofacial defect that requires special care. The need for an ocular prosthesis arises in various situations like congenital deformity, trauma, neoplasm, etc.

Phthisis bulbi is an ocular condition that arises due to infections, inflammation, trauma, failed surgical procedures, avitaminosis A, and malignancies as well as systemic cardiovascular conditions. The word Phthisis is derived from the Greek word phthiein or phthinein which means a shrunken globe, usually due to ceased aqueous humor formation. The word was first used by Galen. The intraocular content in a phthisical eye approaches zero, as a result the ocular volume collapses. The cornea is often edematous and the lens cataractous. It causes atrophy and disorganization of the intraocular content. Till date the restoration of vision in a phthisical eye has been not possible. Prosthetic rehabilitation of the phthisical eye using 'sclera shell' is the preferred treatment of choice. Surgical intervention like enucleation or evisceration is advisable only if there is pain in the associated eye. Any prosthetic device that is fitted on the residual globe of the eye as in phthsis or atrophic bulbi or micropthalmos is referred to as 'sclera shell'. A sclera shell is a customized ocular prosthesis worn over a shrunken, discoloured or an atrophied eye.

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An ocular prosthesis may be either custom made or pre fabricated. A custom made ocular prosthesis always gives superior esthetic results over the pre-fabricated stock eye. It helps in better positioning of the iris, shaping of the contour of the eye, color matching and better functional adaptation. A good texture, color matching and movement of the prosthesis gives it a life-like appearance. The positioning of the iris button in custom made prosthesis plays an important role in gaining symmetry and hence improves the cosmetic appearance. Proper positioning of the iris is crucial as it helps to obtain a natural gaze.

Till date various methods have been used for iris positioning. These include Robert pupillometer, graph grid method, Mc Arthur Ocular locator etc.

The present case report discusses the case of prosthetic rehabilitation of phthisis bulbi in a pediatric patient where a

novel technique using Hanau Wide Vue spring bow and graph grid has been used for positioning the iris. An extensive research shows that the graph grid has not been used along with the spring bow to obtain proper symmetry.

Case report

A 10 year old pediatric patient reported to the Department of maxillofacial Prosthodontics with the chief complain of sunken left eye. The patient gave history of fever when she was 2 years old following which she had infection in the left eye which led to loss of vision. The patient did not wear any prosthesis. Over the years she noticed the shrunken appearance of the eye which gave an unesthetic appearance [Figure: 1]. The patient wanted fabrication of a prosthetic eye.

The patient was clinically examined by the maxillofacial prosthodontist. There were no signs of pain, inflammation or watery discharge from the eye. The eye showed absence of corneal sensitivity. The patient presented with corneal opacity and had mild enopthalmos. The sclera of the patient was intact. The patient was tested for vision by an ophthalmologist. Right eye of the patient showed normal vison. The left eye did not show any signs vision, had synchronous movement and the socket was shrunken. It was diagnosed with phthisis bulbi of the left eye by the opthalmologist. After proper diagnosis, fabrication of sclera shell was the decided as the treatment plan in which positioning of the iris button was done with Hanau spring bow. The treatment procedure was explained and written consent was obtained from the guardian of the patient.

Primary impression was made in ophthalmic irreversible hydrocolloid (Factor II, Inc., Lakeside, AZ, USA) [Figure 2A&B] and was poured in impression plaster. A stock tray was made in self cure acrylic [Figure 3A&B] (Trevalon, Dentsply India Pvt. Ltd., Gurgaon, India) with a small handle. Final impression was made with polyvinyl siloxane elastomeric impression material (Aquasil, ULTRA LV, Dentsply) [Figure 4]. Care was taken to slowly inject the impression material into the socket to avoid any air entrapment. During the setting of the material the patient was made to do all the functional movements- lateral, up and down and circular motion till the material sets. Upon retrieval, the impression was evaluated for its extent and presence of any bubble or void. Impression was then poured in die stone in two sections with triangular notches as orientation grooves for repositioning and three dimensional recording of the defect area. Molten wax was poured in the defect area and the wax sculpt obtained was properly carved and contoured to simulate the natural eye. During wax trial the patient was made to do all movements to assess the retention and support of the wax pattern and the extent of coverage and movement of the prosthesis. An iris button was obtained by trimming the stock eye whose color resembled the contralateral eye of the patient. The color of the scleral portion was selected using tooth coloured acrylic resin which matched the colour of the natural eye.

The positioning of the iris button was done using face bow along with graph-grid that is customized for the patient. The technique is unique in a way that the face bow helps in providing the centering effect with the face bow and the graph grid helps in customizing the arrangement according to the size of the patients face and eyes.

A hanau wide vue spring bow (Hanau Springbow; Whip Mix Corp) was assembled. The bite fork was loaded impression compound to stabilize it in the patients mouth and U-shaped frame attached to it. A square frame of ice- cream sticks was made and graph paper was attached to it [Figure 5]. The graph-grid assembly was placed on the U- shaped frame of facebow and stabilized with the help of paper clip [Figure 6]. The present technique uses the centering effect of the facebow and customized grid for mesio- distal positioning. The face bow provides a rigid platform for placement of the grid. The patient was asked to look at a distance with a natural gaze and the iris position of the natural eye was marked on the grid paper with a marker. The same position was transferred on the defect side [Figure 7]. The iris button was placed on the defect side. Wax trial was done after the placement of the iris button [Figure 8].

Colour matching was done with that of the natural eye and similar shade was obtained with tooth colored acrylic (SC 10, Pyrax, Roorkee, India). Red threads were placed to replicate the veins to simulate esthetics similar to that of the natural eye. The prosthesis was processed using tooth colored white acrylic resin (Factor II, Inc., Lakeside, AZ, USA). Flasking was done under compression [Figure 9]. Upon retrieval the stock of the iris button, the flash of acrylic resin and the irregularities on the surface of the prosthesis was removed with acrylic trimmer and glass like finishing was obtained on polishing with pumice. The prosthesis was inserted in the patients eyes and checked for all functional movements [Figure 10]. All the procedure was done by a single operator on a single visit.

DISCUSSION

Our eyes not only help us to see but is also a powerful mode of expression and communication. Hence, loss of an eye not only effects what we see, but also changes our own perception about the world. Cosmetic rehabilitation of an ocular defect thus plays an extremely vital role and requires a multidisciplinary approach towards its fabrication. Hence the role of a psychologist, an opthalmologist and a maxillofacial

prosthodontist is crucial for the success of the prosthesis. '

In the above case the child was suffering from phthisis bulbi. It is a condition that is usually The patient was given a custom made scleral shell rather than a stock eye. A stock eye lacks proper fit and adaptation. Its is usually made of glass and has more weight than an acrylic prosthesis. Its main purpose is to prevent scar contracture. However, a custom made sclera shell has a better fit, enhanced appearance, creates space for expansion of the socket, helps in movement of the residual muscles and also improves the eyelid competence. It is light in weight, can be adjusted easily, has better adaptation over the tissue bed and hence provides better mobility. There is less accumulation of tear fluid because of the proper adaptation of the sclera shell on the atrophic eye. Hence, sclera shell in a phthisical eye has a flush fitting adaptation and gives noteworthy results and should always be preferred over a stock eye. The primary impression has been made in alginate with the help of syringe to establish a controlled flow in the socket. Final impression has been made with polyvinyl siloxane light body as it provides better flow and coverage of full size of the defect. Prefabricated iris button had been in the present case as it requires less chairside time. Iris painting technique has not been used as it very tedious procedure.

Obtaining of symmery is the critical step that plays role in cosmetic enhancement of an ocular prosthesis. Symmetry can be obtained by using simple mathematically accurate devices. In the present case report Hanau Wide Vue spring bow and the grid has been used to obtain equal measurements in all three dimesions- anterio- posterior, mesio-distal and vertical. The U- shaped frame helps us to obtain an equal anterio-posterior measurement. The use of graph-grid help obtain vertical as well as horizontal measurements. Hence, a proper interpupillary distance is measured and symmetry is obtained. This technique offers the advantage of using simple instruments which are used widely in the field of dentistry, hence, new equipments are not required. The present technique offers customization of the grid according to the patients facial dimension and the size of the iris. One of the disadvantage of this technique is that it cannot be used in patients with large defects involving the ear as it is difficult to stabilize the ear piece attached to the U- shaped frame of the face bow. On finishing and polishing a glass like finish is obtained to avoid any kind of abrasion to the eye.

CONCLUSION

Rehabilitating an ocular defect in a pediatric patient is one of the biggest challenges and needs to be addressed with utmost care. It is a multidisciplinary approach and requires a lot of empathy to not only change the patients appearance but also the way of thinking. Sclera shell over an atrophic eye offers a non-invasive, cost effective and a simple approach towards rehabilitation. The use of a Hanau spring bow helps to refine, improve and enhance the cosmetic result by establishing symmetry.

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Figure 1: Phthisis bulbi in pediatric patient.

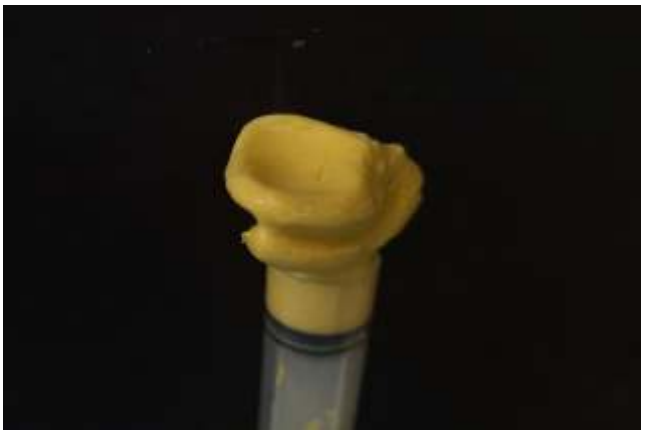

Figure 2 (A & B): Primary impression.

Figure 3(A & B): Custom Tray.

Figure 4: Final Impression.

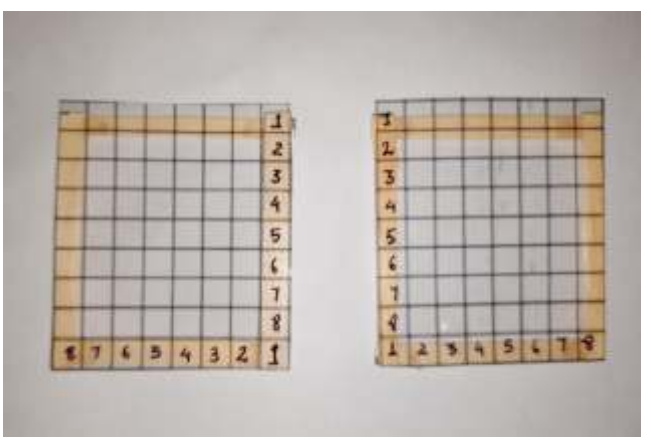

Figure 5: Graph- grid.

Figure 6: Face-Bow assembly with graph-grid.

Figure 7: Marking of iris position.

Figure 8: Wax trial.

Figure 9: Flasking the wax pattern.

Figure 10: Final Prosthesis.

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