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ORIGINAL ARTICLES

CASE REPORTS

REVIEW ARTICLE

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J Oral Maxillofacial Surg 1985; 43(4): 510-516.

2. Uematsu H, Sato N, Hossain MZ, et al. Degradation of arginine and other amino acids by butyrate-producing asaccharolytic anaerobic gram-positive rods in periodontal pockets. Arch Oral Biol 2003; 48: 423-429.

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2. Chapter in a book: Ingle JI, Simon JH, Machtou P. Outcome of endodontic treatment and re-treatment. In: Ingle JI, Bakland LK, editors. Endodontics. 5th ed. Ontario: BC Decker, 2002: P. 747-765.

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ORIGINAL ARTICLE

Assessment of Oral Health Literacy Among Malaysian Adults: a cross sectional study

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Abstract

Dental health practitioners are currently focusing on oral health literacy to assess and better comprehend the general public's dental and overall health needs. Gender, age, socioeconomic condition, and education status all play a role in determining the level of understanding of basic oral health literature. Our research focuses on the oral health literacy of Malaysian adults who attended the Lincoln University College (LUC) Dental Clinic. We want to know if our findings support other people's studies in different circumstances. This also allows us to assess our patient population and better tailor our oral health education to LUC future patients. We used a validated research questionnaire developed by Jaafar et al. 2020. The questionnaire was delivered to respondents via a Google link and print copy upon request. The data collected was evaluated using SPSS version 30 with a significance level of p-value >0.05. The results were described using analysis of variance (ANOVA). The findings of our study show that Oral Health Literacy (OHL) varies by social demographic profile (SDP), which validates the previously stated general assumptions. Better education and socioeconomic circumstances result in a better overall awareness of oral health knowledge.

Keywords:

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Introduction

The World Health Organization[1] identifies oral health as a fundamental component of overall health, well-being, and quality of life.[2] Despite being largely preventable, oral diseases remain a significant public health concern globally, affecting individuals across their lifespan and resulting in pain, discomfort, disfigurement, and even mortality in severe cases.[1] These conditions have wide-reaching consequences, not only on physical health but also on social functioning, economic productivity, and emotional well-being. According to the Global Burden of Disease 2019, approximately 3.5 billion people worldwide are affected by oral diseases, with untreated dental caries in permanent teeth being the most prevalent health condition.[1] The burden of these diseases is disproportionately high among socioeconomically disadvantaged populations and is anticipated to escalate due to social and habit factors.[2] Oral diseases are influenced by a range of modifiable risk factors that are also common to other non-communicable diseases, including unhealthy dietary habits, tobacco and alcohol use, inadequate oral hygiene, and poor access to healthcare, all of which are shaped by broader social determinants of health.[1] Social determinants of health are defined as the conditions in which individuals are born, grow, live, work, and age, as well as the systemic forces that shape these conditions.[3] These determinants encompass various factors such as neighborhood environments, accessibility of healthcare resources, income, wealth, education, and employment opportunities. Among these, education plays a particularly critical role, not only in providing individuals with knowledge and skills but also in shaping attitudes, beliefs, and lifelong behaviors. Education is a continuous process that supports personal growth and social development, and it is

closely linked to health outcomes, including oral health. In the context of oral health, education serves as a crucial preventive measure. Oral health education seeks to improve knowledge and foster behaviors that contribute to maintaining good oral hygiene and reducing disease risk.[4] While education at the population level has been shown to be one of the most cost-effective strategies for disease prevention, it does not always result in behavior change. This disconnect underscores the importance of not only disseminating information but also ensuring that individuals are equipped to understand and apply it effectively in their lives.

This leads to a growing emphasis on oral health literacy (OHL). Oral Health Literacy (OHL), defined as an ability to obtain, understand, and apply information related to oral health, plays a crucial role in promoting effective oral health outcomes and behaviors.[5] In today's digital age, where smartphones and the internet have made access to health information more widespread than ever. The challenge is no longer the availability of information, but the ability to comprehend, evaluate, and utilize it in meaningful ways. Oral health literacy is defined as the degree to which individuals can obtain, process, and understand essential oral health information and services needed to make informed health decisions.[6] Low levels of OHL have been identified as a significant contributor to disparities in oral health outcomes and are associated with increased rates of disease and negative health experiences (Journal of Public Health Dentistry, 2005).

In Malaysia, where ethnic, linguistic, and socioeconomic diversity is prominent, addressing oral health literacy is crucial for reducing health inequalities. Malaysia's population includes Malays, Chinese, Indians, and Indigenous groups, each with distinct cultural practices and health beliefs. The national language is Malay, but English and other languages are widely spoken, and varying literacy levels exist across regions and demographic groups. Access to dental services also varies significantly, with rural populations and lower-income communities often facing barriers to care.

The primary goal of this study is to evaluate the oral health literacy (OHL) levels among adult Malaysians who attend the LUC dental clinic. By understanding how well individuals comprehend, process, and apply oral health information, we can gain insights into their capacity to make informed decisions about their oral health. This study aims to highlight current literacy trends, identify gaps in knowledge, and ultimately help inform better communication strategies and interventions within the dental setting.

Methodology

This cross-sectional study was conducted among Malaysian adults attending the Lincoln University College (LUC) Dental Clinic. A systematic sampling method was employed to recruit participants during the study period. Eligible participants were Malaysian adults aged 18 years and above, fluent in the Malay language, and residing in Malaysia for at least one year. Individuals attending emergency dental visits, those with cognitive impairment or diagnosed mental illness, non-Malaysians, and individuals unable to read Malay were excluded. The sample size was determined using OpenEpi Version 3 based on a population of 3,000 patients, an anticipated prevalence of 7.2% (Jaafar et al., 2020), and a 5% margin of error. The minimum required sample size was 100 participants; allowing for a 20% non-response rate, a total of 120 participants were recruited.

Data were collected using the validated Malay Oral Health Literacy Instrument (OHLI-M) developed by Jaafar et al. (2020). The questionnaire was administered in printed form or via Google Forms following informed consent. It comprised two components: reading comprehension and numeracy. Reading comprehension was self-administered, whereas the numeracy section was conducted through face-to-face interviews using medication labels, a dental appointment card, and post-extraction instructions. Each correct response was awarded one mark, and weighted scores were calculated to obtain a total OHLI-M score ranging from 0 to 100, categorized as inadequate (0–59), marginal (60–74), or adequate (75–100). Data were analysed using descriptive statistics, including frequencies, percentages, means, and standard deviations. Statistical significance was considered at $p < 0.05$.

Results

A total of 120 participants were successfully recruited in this study as portrayed in our methodology. Participants were all adult patients that attended LUC dental clinic during the time of the research. 75 (62.5%) out of 120 were female and the rest 45 (37.5%) were male participants as shown in Table 4.1 and Figure 4.1. Table 4.1 is included at the end of this section and consists of comprehensive data that had been collected and analyzed in this study such as OHL mean, standard deviation (SD) value.

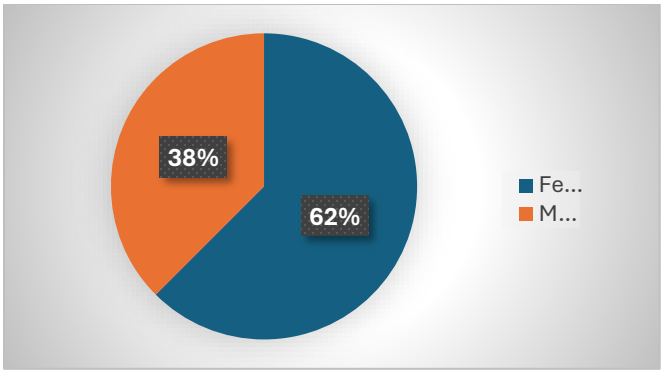

Figure 4.1 Total female and male participants percentage in our study.

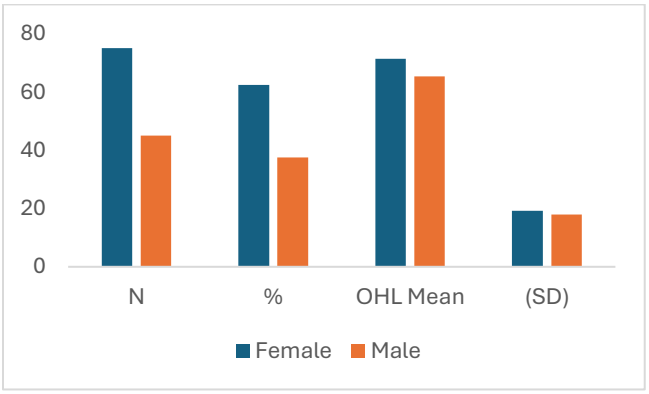

Figure 4.2 OHL mean score according to gender of participants. N, number; % total percentage of participants.

Oral Health Literacy Among Gender

In comparison between female and male participants, females had a higher OHL mean score (71.45 ± 19.9) in Table 4.1. Among male participants, the OHL mean score is lower, recorded at (65.27 ± 17.99). The SD values indicate that the range of score is wider amongst female participants.

Oral Health Literacy Based on Education Status

From the perspective of education status, the OHL mean score increases based on the level of education as shown in Figure 4.3. The range of score starts from an average of 61.63 with an upward value till 73.10 for university level of education status as shown in Figure 4.3 and Table 4.1. There were no representative values from primary school and middle school education status as no participants were recruited in this category. However, there was an outlier data with an OHL score of 78.96, which is the highest score, with no formal education.

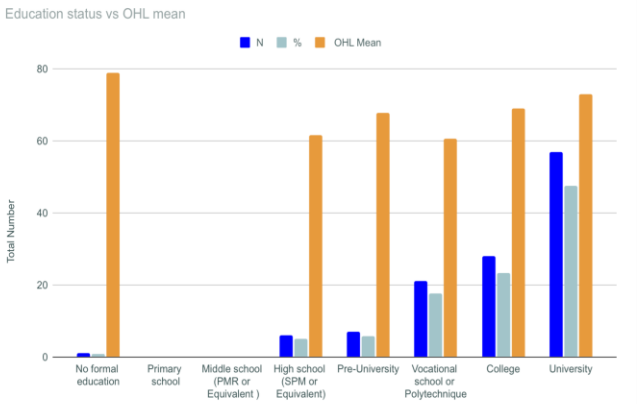

Figure 4.3. Total of participants in each Education Category, percentage and OHL mean for each category. N, number; % total percentage of participants.

Ethnicities in this study were divided into 5 broad categories in this study which are Chinese, Malay, Indian, Native and others. A total of 25 (20.8%) Chinese participants, 76 (63.3%) Malay participants, 18 (15%) Indian participants , 1 (0.8%) Native participants and 0 in others participants as shown in Figure 4.4. Malays and Indians have relatively close OHL scores (69.71±18.42) and (69.31± 24.57) respectively according to data in Table 4.1. Chinese participants scored the lowest OHL score, with the mean score of (66.85 ± 16.58), SD values are as shown in Table 4.1. Highest OHL score was from the Native category recorded at 78.96 but the value is obtained from only 1 participant in the category as shown in Figure 4.4 below.

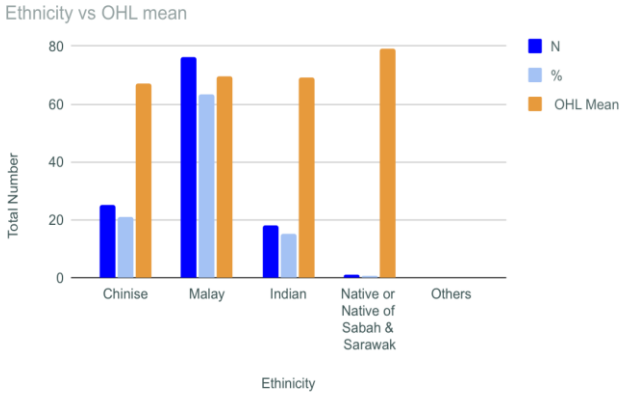

Figure 4.4 OHL mean score according to ethnicity. N, number; % total percentage of participants.

In our study the economic status was segregated based on income value. The value categories are from RM 30000 and below, RM 3000 to RM 6000, RM 6000 to RM 9000 and lastly RM 9000 and above category. As the salary or income value increases, we observed the upward trend in the mean OHL score until the range of RM 6000-RM9000 and drops

of mean OHL score to 59.71, which is an inadequate score at RM 9000-RM 15,000 monthly income value. No participants from RM 15,000 and above were recorded. The p-value for this category is more than 0.05 indicated in Table 4.1.

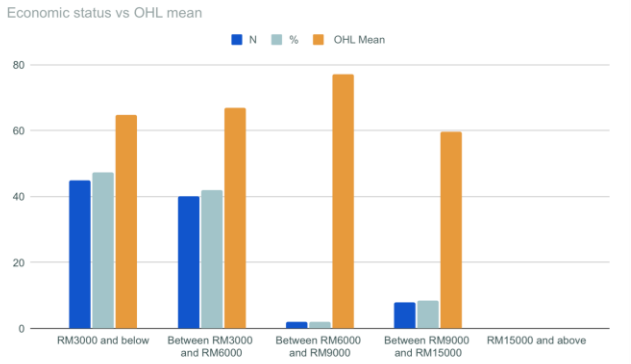

Figure 4.5 OHL mean score according to economic status N, number; % total percentage of participants.

Lastly, we study the OHL relationship based on the age group of participants. The mean age for our study is 41.28 years with the range of age of 18 years to 65 years as shown in Table 4.1 and Figure 4.6 below. Participants are categorised into 4 main groups, early adulthood, adulthood, middle age and elderly. As expected, early adulthood participants have the highest OHL score at an average of 79.52. Lower scores were observed in middle age and elderly groups at 66.21 and 62.84 respectively as shown in Figure 4.6 below.

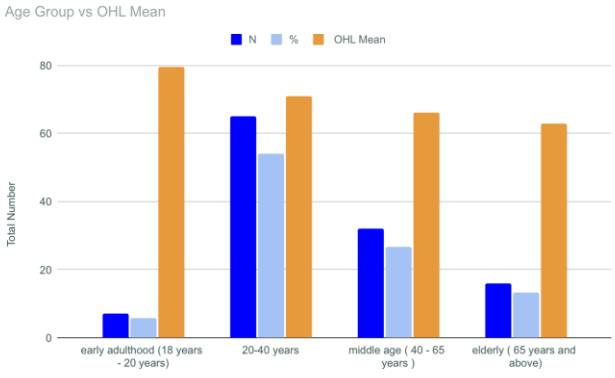

Figure 4.6 OHL mean score according to age group. N, number; % total percentage of participants.

Table 1. Descriptive data of OHL

Characteristics	N	%	OHL Mean	(SD)
Female	75	62.5	71.45	19.19
Male	45	37.5	65.27	17.99
Education status				
No formal education	1	0.8	78.96	-
Primary school	0	-	-	-
Middle school (PMR or Equivalent)	0	-	-	-
High school (SPM or Equivalent)	6	5.0	61.63	21.60
Pre-University	7	5.8	67.89	10.95
Vocational school or Polytechnique	21	17.5	60.66	14.30
College	28	23.3	69.00	17.49
University	57	47.5	73.10	20.99
Ethnicity				
Chinese	25	20.8	66.85	16.58
Malay	76	63.3	69.71	18.42
Indian	18	15.0	69.31	24.57
Native or Native of Sabah & Sarawak	1	0.8	78.96	-
Others	0	-		-
Economic status				
RM3000 and below	45	47.4	64.66	17.83
Between RM3000 and RM6000	40	42.1	66.98	17.61
Between RM6000 and RM9000	2	2.1	76.99	28.85
Between RM9000 and RM15000	8	8.4	59.71	22.54
RM15000 and above	0	-	-	-
Age group				
Early adulthood (18 years - 20 years)	7	5.8	79.52	
Adulthood 20-40 years	65	54.2	71.00	
Middle age (40 - 65 years)	32	26.7	66.21	
Elderly (65 years and above)	16	13.3	62.84	

Discussion

Because it affects a person's capacity to access, comprehend, and apply oral health information to make educated health decisions, oral health literacy (OHL) is acknowledged as a significant predictor of oral health. Better oral health

outcomes, increased use of preventive dental care, and improved oral health habits are all linked to enough OHL. Improving OHL may help promote oral and overall health since many chronic systemic diseases share risk factors with dental problems.[7] In this study, the degree of oral health literacy among adult Malaysians who visited the Lincoln University College (LUC) Dental Clinic was evaluated, and its association with particular sociodemographic traits was investigated. Overall, the findings indicated variability in OHL across gender, education, ethnicity, income, and age, demonstrating that oral health literacy is influenced by numerous social variables.

In line with other research showing that women typically have better oral health knowledge, more positive attitudes about oral health, and greater engagement in preventive oral health activities, female participants showed a higher mean OHL score than male participants.[8] Despite the small reported difference, women may use healthcare more frequently and are more interested in health-related information. The most obvious correlation with OHL was seen in education. The greatest mean OHL score was attained by participants with a university education, whereas those with a secondary or vocational education scored much lower. These results are consistent with other research showing that educational achievement enhances a person's capacity to comprehend health information and adopt healthy behaviours. It's interesting to note that one participant without formal schooling received a high OHL score; nevertheless, as this is an isolated discovery and does not represent the general trend, it should be evaluated cautiously. However, it implies that oral health literacy may also be influenced by personal experiences and lifelong learning.

The main ethnic groupings had comparatively little variation in OHL. However, as only one participant was from the Native group and none were chosen from the "Others" category, the study sample did not accurately represent the ethnic distribution of Malaysians. As a result, it is not appropriate to extrapolate these results to the entire Malaysian population. To more accurately assess the impact of ethnicity and cultural diversity on oral health literacy, future research should enlist a more representative sample. There was no consistent correlation found between household income and OHL. Although middle-class participants had comparatively higher OHL scores, the higher-income categories had only few participants, making meaningful interpretation difficult. This implies that oral health literacy may be influenced by factors other than wealth, such as education, access to health information, and health-seeking behaviou

Younger participants had higher mean scores than older persons, indicating a falling trend in OHL with increasing age. Differences in educational exposure, accessibility to health information, and familiarity with digital resources may be reflected in this finding. Tailored communication tactics are crucial since older persons can still learn new things through suitable educational approaches. All things considered, this study shows that oral health literacy differs among the many demographic groups that visit the LUC Dental Clinic. The results highlight the importance of patient-centered oral health education, especially for older folks and those with less education. Incorporating digital platforms, visual teaching materials, clear communication, and individualised counselling into regular dental treatment may improve oral health results by increasing patients' comprehension. It is advised that larger, more representative populations be included in future multicenter studies to confirm these results and direct Malaysian oral health promotion initiatives.

Conclusion

This study evaluated the oral health literacy (OHL) of adult Malaysians who visited the Lincoln University College (LUC) Dental Clinic and looked at how it related to certain sociodemographic traits. The results imply that OHL differs among various demographic groups, with females, younger individuals, and those with higher levels of education typically exhibiting higher mean scores. These findings corroborate earlier research showing that socioeconomic status and education have an impact on a person's capacity to comprehend and implement oral health information. Due to the low representation in certain participant categories, these results should be interpreted cautiously even if variations were noted based on household income and ethnicity. Overall, the study emphasises how crucial it is to advance oral health literacy in dental practices through patient-centered instruction and efficient communication techniques. It is advised that larger, more representative groups be included in future research to confirm these results and delve deeper into the variables affecting oral health literacy. Enhancing OHL may improve the Malaysian population's overall oral health outcomes, informed decision-making, and preventative oral health practices.

Ethical Approval: The study was conducted in accordance with the ethical approval obtained by ethical committee Lincoln University College, Malaysia (LUCFD2024RPA27).

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ORIGINAL ARTICLE

Effects of taper in vital and non-vital teeth for fixed partial denture

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Abstract

The degree of taper created during tooth preparation has a direct bearing on the retention of a fixed restoration. In particular, the convergence angle influences the extent to which a prepared tooth can withstand axial and lateral forces without compromising the stability of the crown. This study evaluated the taper of preparations made on vital and non-vital teeth in relation to the age and sex of the patients. Information regarding age, sex, and the clinical status of the teeth was obtained through a patient questionnaire. The convergence angle was assessed by projecting the buccolingual and mesiodistal aspects of the dies produced from impressions using an overhead projector. Fifty patients were recruited from the Department of Prosthodontics, Military Dental Centre, Dhaka, irrespective of sex and age, according to predefined inclusion and exclusion criteria. Among vital teeth in males, the mean cone angle ranged from 18.20° ± 0.88° to 22.00° ± 1.00°, while the corresponding bevel angles ranged from 23.2° ± 1.06° to 26.1° ± 1.06°. In females with vital teeth, cone angles ranged from 19.2° ± 0.78° to 21.0° ± 1.10°, and bevel angles from 22.2° ± 1.00° to 25.1° ± 1.00°. For non-vital teeth, male participants showed cone angles of 11.8° ± 0.72° to 21.5° ± 1.05° and bevel angles of 34.8° ± 1.46° to 36.1° ± 1.10°, whereas female participants demonstrated cone angles of 10.8° ± 0.82° to 22.5° ± 1.07° and bevel angles of 32.8° ± 1.26° to 35.1° ± 1.00°. Appropriate taper of the abutment is essential for maintaining the stability and clinical performance of a fixed dental prosthesis. Excessive or inadequate taper may compromise the abutment and increase the risk of fracture or eventual tooth loss.

Keywords: *Taper; Retention; Convergence angle; Axial walls*

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Introduction

The retention of a fixed restoration is governed by several factors, including the diameter and height of the prepared tooth, the properties of the luting cement, and, importantly, the convergence angle, which is largely under the clinician's control. Convergence angle refers to the angle formed by two opposing axial walls and corresponds to the combined taper of those walls relative to the long axis of the preparation. The anatomical characteristics of the tooth frequently place practical limits on the achievable height and diameter of a preparation. The contribution of luting cement to retention is related to factors such as mechanical interlocking, the area available for cement coverage, cement durability, and its resistance to mechanical deterioration and dissolution.[1]

Because of this relationship, preparation taper is regarded as an important determinant of restoration retention. Conventional teaching in fixed prosthodontics commonly recommends a wall taper of approximately 2° to 5° on each side. This range has also been incorporated into laboratory investigations using standardized tooth preparations or dies for assessment of restorative materials and clinical techniques. Experimental evidence has demonstrated a relationship between the force required to dislodge cemented cast restorations and the convergence angle of the prepared dies. Since the total convergence angle represents the combined taper of the two opposing walls, a taper of 2° to 5° on each wall produces an overall convergence angle of approximately 4° to 10°.[2]

Previous investigations have generally indicated that preparations with a smaller degree of taper or convergence provide greater resistance to dislodgement of complete-coverage restorations. Various studies have therefore proposed taper values between 2° and 7°, corresponding to convergence angles of approximately 4° to 14°, as favorable ranges for achieving adequate retention.

During preparation of teeth intended to receive single crowns or serve as abutments for fixed dental prostheses, an important objective is to establish a definite and unobstructed path of insertion for the restoration. At the same time, the preparation should maintain a clinically appropriate convergence angle. A convergence angle in the range of approximately 2.5° to 6.5° has been proposed to help limit stress concentration within the restoration and supporting tooth structure.[3,4] The present study was therefore undertaken to assess taper and convergence characteristics with the objective of optimizing retention and contributing to the long-term clinical performance of fixed partial dentures.

Method

A cross-sectional study was conducted in the Department of Prosthodontics, Military Dental Centre, Dhaka. Fifty patients were included regardless of age and sex, with both vital and non-vital teeth represented. Participants were selected according to predetermined inclusion and exclusion criteria.

Patients aged 18 to 57 years of either sex who had vital or non-vital teeth, carious lesions of varying duration, an adequate clinical crown, and an acceptable crown-to-root ratio were eligible for inclusion. Teeth with fractures, extensive structural destruction, inadequate clinical crown height, or periodontal weakness were excluded. Patients presenting with poor oral hygiene were also excluded. The instruments and materials used during the study included a dental mirror, handpiece, diamond burs, finishing and polishing burs, periodontal probe, vector scale, dental periscope, and projector.

Taper measurements were obtained from vital and non-vital teeth and evaluated according to sex and age. Participants provided information concerning their age, sex, and the clinical condition of the tooth through a questionnaire. Not all teeth included in the assessment were constructed at the study site.

For measurement of the convergence angle, impressions were used to produce dies, and the buccolingual and mesiodistal aspects of each die were projected with an overhead projector. The die was securely positioned over the projector lens using clay so that the outline of the selected surface could be reproduced accurately. After obtaining a sharply focused projection on paper, the image was traced. Reference lines were subsequently drawn parallel to the traced axial walls in the cervical or gingival third of the preparation. These lines were extended until they intersected, and the resulting angle was used to determine the convergence angle.[2]

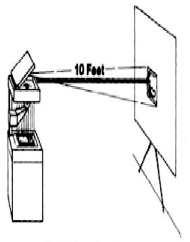

Fig. 1. Projection of preparation taper.

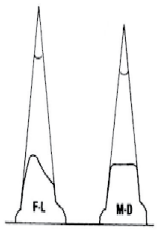

Fig. 2. Example of convergence angle worksheet. F-L = facioli

Result

Table I: Distribution of patients according to age. (n=50)

Age (Years)	Number of patients	Percentage (%)
18-27	10	20%
28-37	11	22%
38-47	18	36%
48-57	11	22%

Table-I showed that among 50 patients, majority 18 (36%) patients were in age group of 38-47 & 10 (20%) patients were in the age group of 18-27.

Table II: Distribution of patients according to sex (n=50)

Gender	Vital teeth (n=25)		Non-vital teeth (n=25)	
	n	%	n	%
Male	13	52.0%	12	48.0%
Female	12	48.0%	13	52.0%

Table-II showed that among 50 patients, equal 25 (50%) patients were in male with vital and non-vital teeth and 25 (50%) patients were female with vital and non-vital teeth group.

Table III: Mean cone angle for vital and non-vital teeth according to sex (n=50)

Gender	Vital teeth (bucco-lingually) (n=25)		Non-Vital teeth (bucco-lingually) (n=25)		Vital teeth (mesio-distally) (n=25)		Non-Vital teeth (mesio-distally) (n=25)	
	Mean	SD	SD	Mean	SD	Mean	SD	Mean
Male	22.0º	1.00º	21.5º	1.05º	18.2º	0.88º	11.8º	0.72º
Female	21.0º	1.10º	22.5º	1.07º	19.2º	0.78º	10.8º	0.82º

Table-III showed that, in vital teeth group, cone angle bucco-lingually 22.0°±1.00° for male and 21.0°±1.10° for female, cone angle mesio-distally 18.2°±0.88° for male and 19.2°±0.78° for female. In non-vital teeth group, cone angle bucco-lingually 21.5°±1.05° for male and 22.5°±1.07° for female, cone angle mesio-distally 11.8°±0.72° for male and 10.8°±0.82° for female.

Table IV: Mean bevel angle for vital and non-vital teeth according to sex (n=50)

Gender	Vital teeth (bucco-lingually) (n=25)		Non-Vital teeth (bucco-lingually) (n=25)		Vital teeth (mesio-distally) (n=25)		Non-Vital teeth (mesio-distally) (n=25)	
	Mean	SD	SD	Mean	SD	Mean	SD	Mean
Male	26.1º	1.06º	36.1º	1.10º	23.2º	1.06º	34.8º	1.46º
Female	25.1º	1.00º	35.1º	1.00º	22.2º	1.00º	32.8º	1.26º

Table-IV showed that, in vital teeth group, bevel angle bucco-lingually 26.1°±1.06° for male and 25.1°±1.00° for female, bevel angle mesio-distally 23.2°±1.06° for male and 22.2°±1.00° for female. In non-vital teeth group, bevel angle bucco-lingually 36.1°±1.10° for male and 35.1°±1.00° for

female, bevel angle mesio-distally 34.8°±1.46° for male and 32.8°±1.26° for female.

Discussion

When a tooth is prepared to receive an artificial crown, the opposing axial surfaces do not remain completely parallel and consequently form an angle known as the convergence angle. This angle has clinical importance because it influences the ability of the prepared tooth and restoration to resist both axial and lateral forces without loss of retention. It also affects the relationship between the cervical margin of the restoration and the finishing line of the preparation, including the amount of exposed luting cement that may remain between the restoration and the prepared tooth after seating.[5]

A cast metal or ceramic restoration must be accurately seated onto the prepared tooth after fabrication. For this reason, the axial walls require a small degree of convergence to facilitate insertion of the restoration along its intended path. From a purely mechanical perspective, retention tends to increase as opposing preparation walls become more closely parallel.

Although a preparation with parallel walls would theoretically provide the highest degree of retention, achieving true parallelism intraorally is impractical because it increases the possibility of creating undercuts. Such undercuts can interfere with complete seating of the restoration. A controlled degree of taper is therefore introduced to improve visualization of the preparation, eliminate undesirable undercuts, accommodate minor inaccuracies arising during laboratory fabrication, and facilitate more complete seating of the restoration during cementation.[6]

A previous investigation reported a mean buccolingual cone angle of 23.0° ± 1.01° and a mesiodistal cone angle of 19.2° ± 1.07° for vital teeth. In non-vital teeth, the corresponding mean values were 22.5° ± 1.06° buccolingually and 12.8° ± 0.73° mesiodistally.[5]

In the present study, the vital-tooth group showed a mean buccolingual cone angle of 22.0° ± 1.00° in males and 21.0° ± 1.10° in females. The corresponding mesiodistal measurements were 18.2° ± 0.88° for males and 19.2° ± 0.78° for females. Among non-vital teeth, the mean buccolingual cone angle was 21.5° ± 1.05° in males and 22.5° ± 1.07° in females, while the mesiodistal cone angle measured 11.8° ± 0.72° and 10.8° ± 0.82°, respectively.

With respect to bevel angle, an earlier study found mean buccolingual and mesiodistal values of 27.1° ± 1.07° and 24.2° ± 1.07°, respectively, in vital teeth. For non-vital teeth, the reported mean buccolingual bevel angle was 37.1° ± 1.11°, while the mesiodistal value was 35.8° ± 1.47°.[5]

The present findings showed that the mean buccolingual bevel angle among vital teeth was 26.1° ± 1.06° in males and 25.1° ± 1.00° in females. The mesiodistal bevel angle measured 23.2° ± 1.06° in males and 22.2° ± 1.00° in females. For non-vital teeth, the corresponding buccolingual measurements were 36.1° ± 1.10° in males and 35.1° ± 1.00° in females. The mesiodistal bevel angle was 34.8° ± 1.46° in males and 32.8° ± 1.26° in females.

Clinical observations indicate that tooth preparations are often made with a greater degree of taper than intended. Excessive taper should be avoided because increasing the convergence angle is associated with a reduction in the retentive capacity of the preparation. Accordingly, preparation should be as conservative as clinically feasible while still eliminating undercuts and allowing proper seating of the restoration. Previous work has suggested that a minimum taper of approximately 12° may be required to avoid undercuts under certain clinical conditions.[7]

Conclusion

Accurate assessment of preparation taper and the resulting convergence angle is an important component of fixed partial denture treatment. Appropriate control of these parameters can help the clinician balance the need for adequate retention with the requirements for proper visualization, restoration seating, and conservation of tooth structure. The findings of this study provide comparative information on taper and bevel angles in vital and non-vital teeth and may assist prosthodontists in planning abutment preparations according to accepted clinical principles. Maintaining an appropriate degree of taper may contribute to the stability and long-term serviceability of fixed dental prostheses.

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ORIGINAL ARTICLE

Determination of distance between incisive papilla to maxillary central incisors in patients with square and ovoid face form

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Abstract

Backgrounds: Accurate positioning of the maxillary central incisors is essential for achieving satisfactory aesthetics and function in complete dentures. The relationship of these teeth to the incisive papilla may provide a useful reference for reproducing the position of the natural dentition.

Methods: A total of 48 dentate individuals aged 20–40 years with intact maxillary arches were included. Facial form was assessed using two imaginary lines extending bilaterally approximately 2.5 cm anterior to the tragus and passing through the angle of the mandible. A relatively parallel orientation of the lines was considered indicative of a square facial form, whereas divergence toward the chin indicated an ovoid form. Results: The mean distance from the incisive papilla to the maxillary central incisors was 10.19 ± 0.51 mm and 9.67 ± 0.57 mm among males and females with a square facial form, respectively. Corresponding values for the ovoid group were 11.50 ± 0.79 mm and 11.25 ± 0.65 mm.

Conclusions: The distance between the maxillary central incisors and the incisive papilla showed a statistically significant variation between individuals with square and ovoid facial forms.

Keywords: *Maxillary central incisors, Incisive papilla, square face form, Ovoid face form.*

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Introduction

For satisfactory aesthetic and functional rehabilitation, the maxillary central incisors in a complete denture should be positioned in a manner that approximates their location in the natural dentition. The incisive papilla can serve as an anatomical reference when establishing this relationship.[1]

Maxillary arch forms have traditionally been categorized into three principal patterns: square, tapered and ovoid.[2] These basic configurations may also occur in various combinations and are commonly considered during prosthodontic tooth arrangement.[5] Arch morphology can be evaluated through geometric characteristics and several investigations have examined these forms in relation to dental anatomy.[2,4,5,6,7,8] A relationship between facial morphology and the corresponding maxillary arch form has also been described, particularly in relation to the upper dental arch.[9]

When pre-extraction records are unavailable, anatomical landmarks become particularly valuable for determining the appropriate position of the anterior teeth. Among these landmarks, the incisive papilla is frequently used as a reference point.[1] Because it is relatively fixed and undergoes limited positional alteration during adult life, it may provide a dependable guide for anterior tooth placement.[10,11] The distance between the maxillary central incisors and the incisive papilla has consequently been investigated as a biometric reference for establishing anterior tooth position.[11,12,13]

Following extraction, progressive resorption of the buccal cortical plate can alter the apparent position of the incisive papilla in relation to the residual ridge. With substantial ridge

resorption, the papilla may appear close to or directly over the crest, while more advanced resorption may cause it to appear anterior to the ridge. Although the center of the incisive papilla is frequently selected as the reference point, its posterior portion is considered relatively more stable because it is subjected to less positional change following tooth loss.[1,10]

The present investigation was undertaken to determine whether the distance between the maxillary central incisors and the incisive papilla in dentate individuals could provide a useful reference for anterior tooth arrangement in complete denture patients with comparable facial forms.

Objective

To determine the distance between the incisive papilla and the maxillary central incisors in individuals with square and ovoid facial forms and to assess its potential usefulness as a reference for anterior tooth arrangement in complete dentures.

Materials and methods

The study was designed as cross sectional and observational. The study was done in department of prosthodontics, Bangladesh Medical University (BMU) From March' 2014 to August' 2014. Patients attended in the department of prosthodontics in BMU for the treatment of the lower arch. It was a nonprobability convenience sampling method. 20-40 years age, 48 males and females' patients were selected with dentate maxillae. Intact maxillary dental arch., periodontally sound maxillary anterior teeth, class I arch relationship, angle's class I occlusal relationship were in inclusion criteria. Patients with supernumerary tooth erupted in maxillary arch, maxillary midline diastema, any degree of crowding in maxillary dentition, visible attrition involving incisal edge, rotation of maxillary anterior teeth, history of previous orthodontic treatment, any soft tissue lesion involving incisive papilla, no history of surgical procedure in maxillary arch were in exclusion criteria. Digital Vernier scale, calibrated transparent protector, Surveyor-Marathon-103, base former, lead pencil, rubber bowl, spatula and impression tray were the equipment's. Alginate, die stone and sticky wax were used as materials. Data are expressed as mean, ± standard deviation. Statistical analysis was done by ANOVA. $P<0.05$ level of significance was selected for all analyses.

Procedures:

Following a detailed medical and dental history, participants were screened according to the predetermined selection criteria. Each participant was seated comfortably in the dental chair with the head maintained in a natural, unrestricted position. Facial form was then evaluated. The face was categorized into three general forms: square, tapering and ovoid. For classification, two imaginary lines were considered, one on each side of the face, extending approximately 2.5 cm anterior to the tragus and passing through the angle of the mandible. Divergence of these lines toward the chin was considered characteristic of an ovoid facial form, whereas convergence toward the chin indicated a tapering form.

An impression of the maxillary arch was subsequently obtained using high-viscosity alginate. The manufacturer's recommended powder-to-liquid ratio and mixing procedure were followed to ensure consistency. The impression was washed under running water after removal and subsequently subjected to sterilization.

The impression was poured in die stone within 15 minutes of impression making. To standardize the casts, a base was formed using a cast base former. The completed cast was removed from the former after approximately 45 minutes. The dental arch form was then evaluated on the resulting cast. In the square arch configuration, the anterior teeth are positioned relatively close to an imaginary line extending through the canines, producing a broad anterior arrangement that corresponds with a square facial form. In contrast, the central incisors in an ovoid arch are positioned anterior to the canines, occupying an intermediate position between the square and tapered configurations and producing a broader, rounded anterior appearance compatible with an ovoid facial form.

The incisive papilla was identified on each cast and its boundaries were outlined with a hard lead pencil to establish the anatomical reference area.

Each cast was firmly positioned on a dental surveyor. The horizontal measurement between the surveyor's vertical pin and the embrasure between the maxillary central incisors was obtained with the aid of a calibrated transparent protector. The protector was positioned so that its 90° marking was approximately aligned with the surveyor's vertical pin, while the pin contacted the posterior border of the incisive papilla. Once the appropriate position had been established, sticky wax was used to secure the protector to the vertical pin and prevent displacement during measurement.

The horizontal distance was then determined using a caliper on the calibrated transparent protector. One end of the measurement corresponded to the position of the surveyor's vertical pin, while the opposite end was aligned with the incisal edge of the maxillary central incisors.

The same standardized procedure was followed for measurement involving the maxillary central incisors. The transparent protector was aligned with the surveyor's vertical pin, which was positioned at the posterior border of the incisive papilla. Sticky wax was applied to maintain the established orientation and minimize movement during recording. The horizontal distance was subsequently read from the calibrated protector using the caliper, with one reference point corresponding to the vertical pin and the other to the incisal edge.

Fig 1: Armamentarium for study

Fig 2: Prepared cast

Fig 3: Some samples

Fig 4: Cast secured on the surveyor

Fig 5: A protector is placed on the cast to maintain parallelism

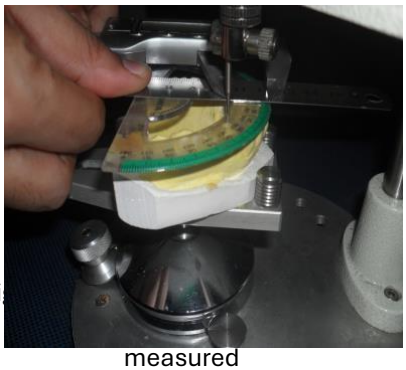

Fig 6: Distance from incisive papilla to central incisor is measured

Fig 7: Distance is measured by digital Vernier calipers

Result:

Total 48 males and females with 20-40 years old patients were observed for the result of square and ovoid face form.

Face Form	Gender	Range	Mean ±SD
Ovoid	Male	10.50-12.50	11.50±0.79
	Female	10.50-12.00	11.25±0.65

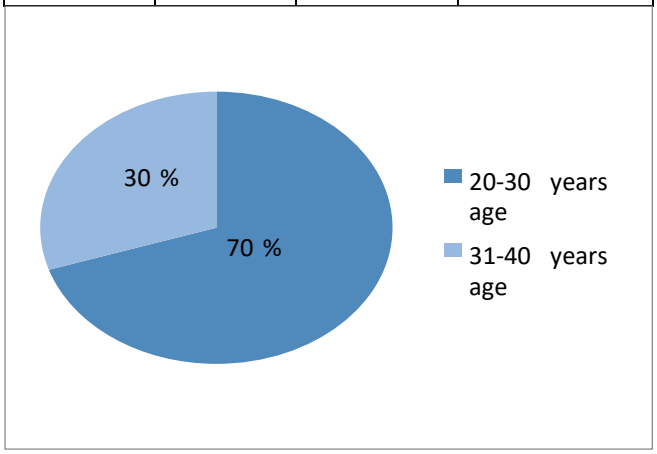

Fig-1: Distribution of patients by age

Fig-1 showed, 70% patients were in the age group of 20-30 years and 30% were in the age group of 31-40 years.

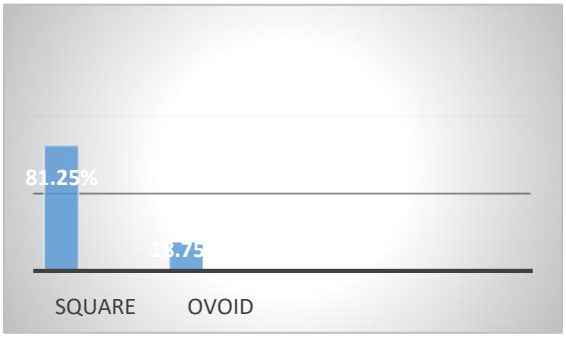

Fig-2: Distribution of patient in percentage

In figure-2 showed that, 81.25% in square group and 18.75% in ovoid group

Table 1: Measurement of distance between the central incisor and the incisive papilla in patients of square face form

Face Form	Gender	Range	Mean ±SD
Square	Male	9.50-11.00	10.19±0.51
	Female	9.00-10.50	9.67±0.57

Table-1 showed, the distance between the central incisor and the incisive papilla in patients of square face form, where in case of male mean ±SD were (10.19±0.51) and in case of female it was (9.67 ±0.57).

Table 2: Measurement of distance from central incisor to incisive papilla in patients of square face form

Table-2 showed the distance from central incisor to incisive papilla in patients of ovoid face form, where in case of male mean ±SD (11.50±0.79) and in case of female it was (11.25±0.6).

Table 3: Comparison of distance from incisive papilla to maxillary central incisors in patients of different face form.

Distance from Central Incisor to Incisive Papilla (mm)				
Face Form	Range	Mean	SD	P-value
Square	9.50-11.00	9.99	.58	0.001
Ovoid	10.50-12.50	11.39	.69	

In table-3 showed, central incisor to incisive papilla distance of all patients (n=48) was shown in mean. Among the patients' square face form patients had mean distance of incisive papilla to central incisor 9.99 mm with SD 0.58, ovoid face form patients had mean distance of incisive papilla to maxillary central incisor 11.39 with SD 0.69.

Discussion

The present investigation included 48 dentate individuals representing square and ovoid facial forms. Following participant selection, maxillary impressions were obtained and the resulting casts were standardized before measurements were recorded. The distance between the posterior border of the incisive papilla and the embrasure between the maxillary central incisors was determined after positioning each cast on the dental surveyor.

A broadly comparable approach was reported by Majid et al.,[15] although their measurement was taken from the posterior border of the incisive papilla to the mesial edge of the maxillary central incisors. In contrast, Lau et al.[14] used photographic analysis to determine the distance between the labial surface of the central incisors and the posterior margin of the incisive papilla. Therefore, direct comparison of measurements among these investigations should take into account the differences in the anatomical reference points used on the central incisors.

In the present sample, the square facial form was more frequently observed than the ovoid form, accounting for 81.25% of the participants. This distribution differs from findings reported in some previous investigations, including those of Majid et al., Kook et al. and Nakatsuka et al. Majid et al.[15] reported ovoid arches as the most frequently observed arch configuration, whereas the present study identified a greater proportion of individuals with the square facial form. The participants were between 20 and 40 years of age. Of the study population, 70% belonged to the 20–30-year age group and the remaining 30% were aged 31–40 years. Previous investigations examining the relationship between the incisive papilla and maxillary central incisors have also frequently included individuals within a comparable age range.[5,14,15] This age restriction is relevant because natural dentition and the associated anatomical relationships are expected to remain comparatively stable during early and middle adulthood.[15]

The present measurements demonstrated differences between the two facial-form groups. Among participants with a square facial form, the mean distance was 10.19 ± 0.51 mm in males and 9.67 ± 0.57 mm in females. In the ovoid group, the corresponding mean values were 11.50 ± 0.79 mm and 11.25 ± 0.65 mm, respectively. Majid et al. reported mean distances of approximately 11.2 mm in males and 10.5 mm in females with an ovoid arch form.[11] Lau et al. reported distances from the posterior border of the incisive papilla to the labial surface of the maxillary central incisor of 12.65 mm, 12.45 mm and 13.18 mm among individuals with Class I, Class II and Class III incisal relationships, respectively.[14] Differences between these values and those observed in the present investigation may partly reflect differences in measurement methodology and the anatomical reference points selected.

A statistically significant difference was identified in the distance between the maxillary central incisors and the incisive papilla when square and ovoid facial forms were

compared ($p < 0.05$). Majid et al.[15] also reported a significant difference in the corresponding measurements when different arch forms were compared, although their findings did not demonstrate a significant difference within the square arch group. In another investigation, Lau et al.[14] found that differences in the distance between the incisive papilla and central incisors among individuals with Class I, Class II and Class III malocclusions did not reach statistical significance. The variation among studies should therefore be interpreted in light of the fact that the measurements were not obtained from precisely identical reference points on the central incisors.

Conclusion

The mean distance from the incisive papilla to the maxillary central incisors was 10.19 mm in males and 9.67 mm in females with a square facial form. In participants with an ovoid facial form, the corresponding mean values were 11.50 mm for males and 11.25 mm for females. The study demonstrated a statistically significant difference in the incisive papilla-to-central incisor distance between the square and ovoid facial-form groups. These findings suggest that facial form may be considered when using the incisive papilla as an anatomical reference for positioning the maxillary anterior teeth during complete denture fabrication.

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CASE REPORT

Injudicious extraction causing dilemma to retreatment in orthodontics: Two case reports

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Abstract

Now-a-day mostly commonly two-piece implant systems are used in dental implantology Two orthodontic cases have been described which have been treated by general dental practitioner or visiting orthodontic specialists. Extractions have been carried out in all these cases. But due to the lack of planning, the outcome has not been as expected. When these patients finally came for retreatment, the problems faced by the orthodontist in dealing such cases have been described the common iatrogenic in orthodontics are mentioned side by side. Thus, avoidable iatrogenic could be identified and dealt with by care. A message is wished to be sent to the general practitioner to be careful in orthodontic case selection. The need to quantify the severity of orthodontic problem is also stressed.

Keywords: *Malocclusion, Injudicious extraction, retreatment, iatrogenic*

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Introduction

With the increase of awareness and enhancement of need of self-esteem people for a high standard of life people are seeking orthodontic treatment in greater number than any other time. Increase in the financial capability is another factor influencing this. The number of orthodontists is lower in our country than required. Many general dental practitioners also perform orthodontic treatment irrespective of severity of malocclusion. In such cases injudicious extraction complicates such cases up to such an extent that correction and establishing a aesthetic and functional occlusion becomes really difficult. Orthodontist being a specialty of Dentistry has undergone through much modification and modernization like other brunches. One vision of this development is towards reducing chair side time.

Thus, reducing the needs of excessive wire bending. Anchorage management has also become simpler by use of TAD (Temporary anchorage device). Perfect bracket placement has become mandatory to keep track with different prescriptions of bracket system. Introduction of Invisalign and marketing of CAD CAM Orthodontics spread the news to the general dentist, even to the specialists of other branches of Dentistry that now orthodontic practice has turned into rather a robotic work. As a common perception that Orthodontics is good money so they are taking up cases in their personal practice and in some cases wrong treatment planning makes the case very difficult to establish an ideal, balanced and functional occlusion.

The hands-on courses have gained popularity in the field of dentistry for a decade or so. Which was introduced as a means to improve skill has turned into a primary course with attractive certificates. As repeating orthodontic treatment is expansive, extra taxing the patient and sometimes deleterious for the pulp and periodontal tissue so it becomes a headache for the Orthodontist community.

Case report: 1

A beautiful girl of 17 years came with an anxious look. She visited to a dental surgeon with the complaints of pain. She used to travel to some other place for her treatment with brace but this time changed to go there as it was an emergency. The dental surgeon looks into her mouth. He found a few brackets attached, a few were loose and floating with the arch-wire. To his astonishment he found her left canine extracted. She became suspicious and referred the patient after removing the loose brackets and bands.

Her intraoral examination showed anterior crossbite. Right canine is slightly buccally placed and right canine was absent which the patient stated was extracted due to Orthodontic treatment.

According to her statement her both upper canines were prominent though her upper anterior teeth were locked inside lower incisors.

Strangely her upper incisors were proximally stripped. Her treatment provider was perhaps thinking of aligning the upper right canine without paying attention towards correcting reverse bite. Photographs of her model

Her OPG Shows all her 3rd molars are impacted. Lower 3rd molars are horizontally placed. An overhanging filling in the lower left 1st molar may be the reason of her pain. Root resorption at some extent was seen. Root parallelism is absent in left side.

In her Lateral cephalogram:

SNA: 82 degrees

SNB: 87 degrees

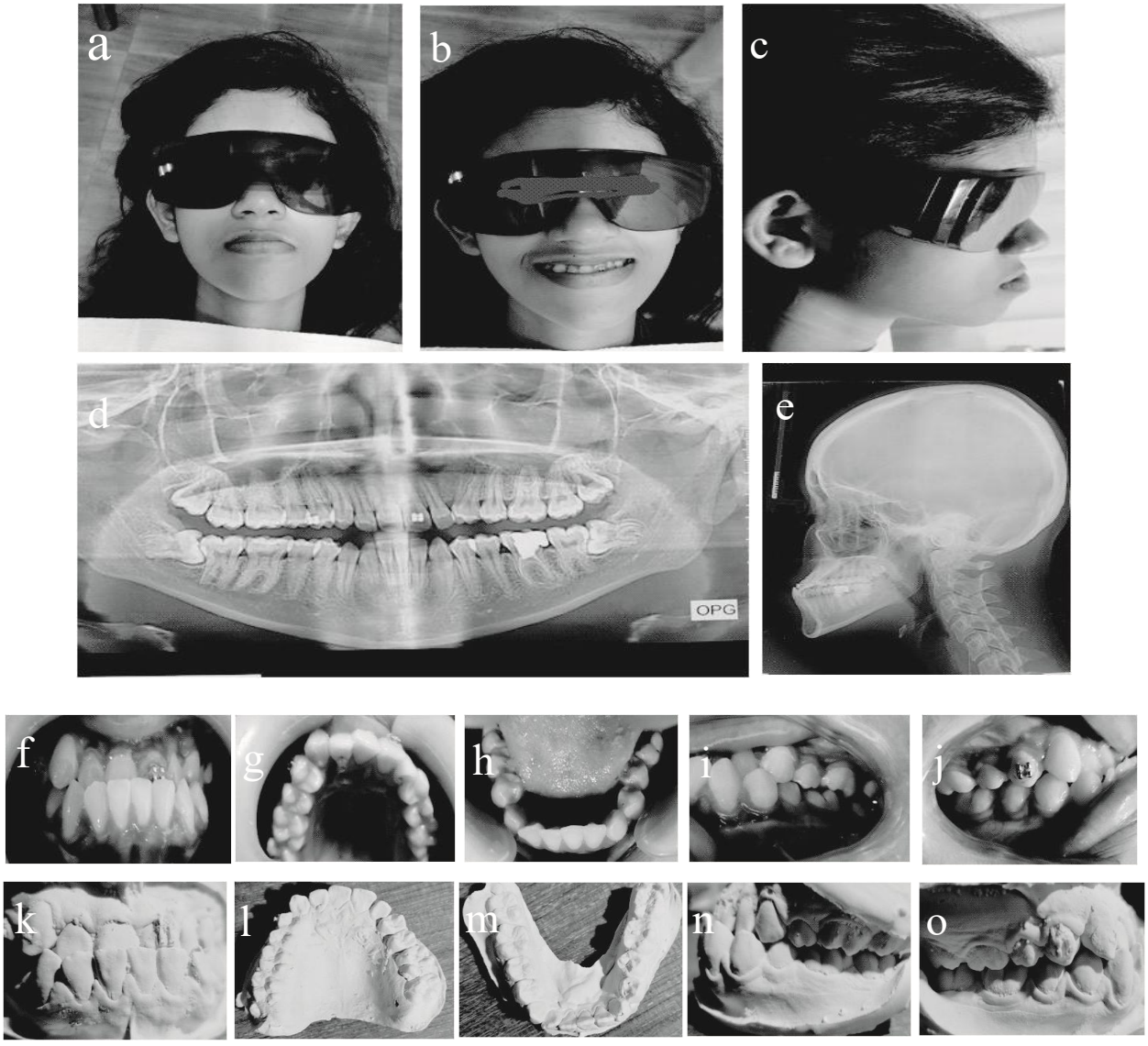
Upper incisor to Maxillary plane: 125 degrees

Gonial angle: 123 degrees

Lower incisor to mandibular plane: 85degree

Maxilomandibularangle:22 degree Her Study Model shows:

Molar relation is class I. Canine relation is class I in right side. Left canine relation is not establish due to extraction of upper canine. Crowding is present in both upper and lower anterior segment.



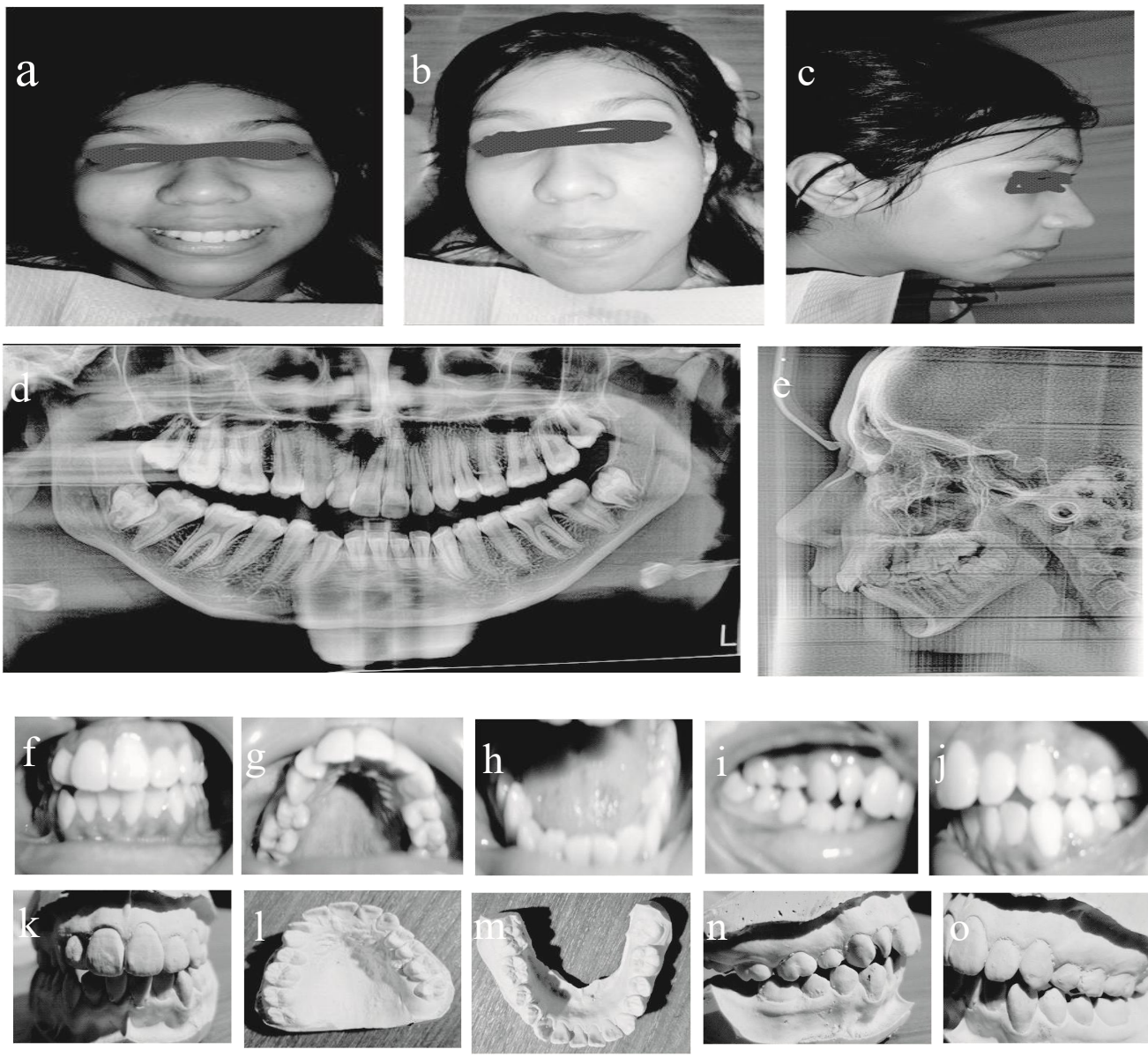
Case report 2

A girl of 15 years came after completion of treatment as she was not happy with the outcome. Upon discussion it was known that she went to a dental chamber with the complaint of too much teeth showing during smiling. The dentist brings an orthodontist to consult with the patient and gave a treatment plan of extraction of right premolar only. She received two years treatment and spent a handsome amount of money. Then she was supplied with a retainer. But she was not convinced with the end result.

OPG of the patient Orthopantomography shows all third molars are impacted. Blunting of roots of lower incisors root crowding in upper anterior segment with righty sided tilt of upper central incisors.

Lateral cephalogram:
SNA: 84 degrees
SNB: 77 degrees
Upper incisor to Maxillary plane: 121 degrees
Gonial: 125 degrees
Lower incisor to mandibular plane:101-degree Maxillo mandibular angle: 30 degrees

Study model:
Molar relation is class II in both sides. Canine relation is class I in right side and class II in left dide. Right upper arch is collapsed. Crowding present in upper right side and lower anterior segment. Upper incisors are tilted towards right side with severe mid line discrepancy.



Discussion

A well-balanced smile is an important contributor to facial attractiveness and the appearance and arrangement of the teeth have a substantial influence on how a smile is perceived. In contemporary society, increasing emphasis is placed on physical appearance and self-confidence. Consequently, the desire to improve dental aesthetics is an important factor that motivates many individuals to seek orthodontic treatment.[1,2]
Although orthodontic therapy can improve facial aesthetics, oral hygiene and masticatory efficiency, treatment is not entirely free from adverse effects. Even when appropriate diagnostic and therapeutic procedures are followed, complications may occasionally develop. Patients should therefore receive adequate information about the possible risks and limitations before treatment begins. This enables them to understand their responsibilities, participate appropriately in treatment and develop realistic expectations regarding the achievable outcome.[3] Effective communication at the outset also facilitates cooperation between the patient and the treating clinician.
Treatment objectives should remain consistent with what can realistically be achieved within the biological and clinical limitations of the individual case. Several adverse effects have been reported in association with orthodontic therapy. Commonly described complications include the following[2,3,5]:

a. Enamel Decalcification due to extra cementation material, poor oral hygiene

b. Enamel fractures and chipping during de-bonding procedure

c. Adverse involvement of the periodontal tissues - gingival inflammation, attachment Loss, gum recession and black triangle due to faulty bracket placement and poor hygiene

d. Root resorption to some extent is a regular phenomenon in orthodontic treatment and may turn irreversible if excessive or against natural forces

e. Pulpal damage and loss of tooth vitality is a rare complication unless done without care.

f. Dentin hypersensitivity and increase in caries incidence is common after interproximal enamel reduction.

g. Damage to the intra-oral tissues may occur during work due to accidental prick or in the process by gradual extension of wire through molar tube, bracket dislodgement et.

h. Accidental swallowing of appliance components may also occur.

i. Enamel abrasion during removal of cement after debonding may occur

j. Allergic reaction to nickel may lead to adverse consequences.

k. Long duration of treatment often burns patient cooperation

l. Relapse is the common night mare for orthodontist

m. The problem may occur or exaggerate after or during orthodontic treatment

Iatrogenic effects in orthodontics may arise from several interacting factors. These include inaccurate assessment of facial growth, inappropriate selection of appliances, technical shortcomings during treatment, inadequate patient cooperation and ineffective management of space or anchorage. The risk may become particularly important when extractions are incorporated into treatment without adequate diagnostic and biomechanical planning.[1] In general terms, an iatrogenic effect refers to unintended harm that develops as a consequence of a therapeutic intervention. Behrents described iatrogenics in orthodontics as an unintended consequence arising from treatment.[1]
Orthodontic treatment is influenced by numerous patient- and treatment-related variables. These include the individual's pattern of facial growth and development, the biomechanical relationship among the dentition, supporting tissues and orthodontic appliances, the interaction between the clinician, patient and family, the treatment philosophy selected for the case and the quality and continuity of follow-up, particularly during the retention period.[1] Because these factors interact throughout treatment, failure to recognise one or more of them may adversely influence the final result.
Treatment-related problems may also develop when the diagnostic procedure or treatment indication is inappropriate, an unsuitable therapeutic strategy is selected, or the planned mechanics are not executed correctly. Additional difficulties may arise when treatment duration is poorly estimated, necessary modifications to the original plan are not made, the malocclusion is not adequately resolved, retention is insufficiently monitored, or communication with the patient is inadequate.[6] Such shortcomings can compromise the quality, functional adequacy and long-term stability of the orthodontic result.
Inadequate treatment may produce undesirable dental, gingival and facial outcomes, while the correction of the original malocclusion may remain incomplete or unstable[2,5,6]. An unnecessarily prolonged treatment period may further increase the risk of adverse effects involving the teeth, pulp, periodontal tissues and facial structures and may place an additional burden on the patient's overall well-being[3,8]. These considerations demonstrate that orthodontic treatment is a multifactorial clinical process in which apparently minor errors in diagnosis, planning or execution can interact and ultimately produce significant iatrogenic consequences.
Not every adverse event can be eliminated completely; however, careful diagnosis, appropriate treatment planning and sound clinical technique can substantially reduce preventable errors. Recognizing the limitations of one's own treatment approach is an important component of responsible clinical practice. When an unexpected problem becomes evident, the clinician should address it promptly and openly rather than allowing reluctance to acknowledge the error to contribute to further deterioration. Early recognition and appropriate management may prevent a manageable problem from becoming substantially more difficult to correct.
At the same time, post-treatment relapse should be distinguished from true iatrogenic damage. Relapse is a

recognised biological and clinical phenomenon that may occur even after carefully planned and competently performed orthodontic treatment. Therefore, recurrent tooth movement or loss of alignment should be assessed systematically before being attributed to treatment-related error.[6,7,9]

The 1st patient visited to the dentist with crooked teeth who claimed to have a foreign degree. He called a visiting orthodontist who actually has no authentic orthodontic degree but claims to have learn orthodontist by self-education. He gave a plan to extract her left upper canine and later proximally stripped upper incisor to push inside the right upper canine. For lower jaw he gave him a lower removable appliance with labial bow to retro cline lower incisor. The cephalometric values clearly show, this is a surgical case. Excessive growth of mandible and horizontal growth pattern surely makes it a case for surgery. As surgery is still not well accepted, at least if camoplege treatment should have been considered taking the advantage of buccally placed upper canines and by extraction of lower 1st premolars it could have been an acceptable finish. The complexity of retreatment in this case is extraction of a canine means a proper canine guided occlusion is not possible any more. Proximal slicing makes it critical to maintain anterior ratio. The mid line shift is very difficult. lower anterior segment was still present. In case of the second case which looks to be a bimaxillary proclination case where by extracting a right premolar and retraction of the adjacent canine the midline has been badly shifted to right. Irrational use of power chain caused rotation and crowding of right incisor and canine. There is anchorage loss on the right side and crowding.

Conclusion

These two cases clearly shows how a wrong extraction and wrong line of treatment cases adverse change to the occlusion and take patient to such a difficult level that correction becomes quite impossible, using different index procedures if mal occlusion could be quantified and certain limits could be drawn for the general dental practitioner it may help the patient from becoming the prey of orthodontic mal treatment.

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CASE REPORT

Aesthetic problem solved prosthetically in ocular prosthetic rehabilitation: A case report

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Abstract

A lot of ophthalmic disorders are there which require surgery. Most of the times, they involve the eyeball. An ocular prosthesis is a device designed to reduce the deficiency after surgery. It is also termed as An Artificial Eye. There are many procedures to fabricate an ocular prosthesis. In this clinical report, we are going to find how such a prosthesis can be made with less effort and time. The concerned patient was referred by an ophthalmologist after her surgery. Firstly, an impression was taken using regular body elastomer. After that, the impression was adjusted and sent to fabricate the conformer. Then a formal procedure was followed when fabricating the prosthesis. Iris position, size, shade was selected. The shade of the sclera was also picked

Keywords: *Regular body elastomer, Conformer, Cast, sclera and iris.*

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Introduction

A defect of the eye is a psychologically devastating condition to a patient. Both functional and aesthetic purpose, it creates a mental pressure to a patient. The aesthetic part can restore externally; the function cannot reestablish. Loss of eye due to trauma, tumor, and infection. Restoration of ocular defect is critical because it heals the social and mental trauma[1]. A systematic sequence of clinical and laboratory procedures enables the fabrication and accurate fitting of a customized resin ocular prosthesis. When appropriately designed and characterized, the prosthesis can reproduce the appearance of the natural eye while providing satisfactory stability and durability during long-term use.[2] Custom fabrication also offers an important advantage over prefabricated ocular replacements because the dimensions, contour, and visual characteristics of the unaffected eye can be reproduced with greater precision.[3]

For the present patient, an acrylic resin prosthesis was selected for ocular rehabilitation. Compared with conventional glass eyes, acrylic resin prostheses offer favorable aesthetic reproduction together with greater resistance to breakage and satisfactory clinical longevity.[2] In addition, the relatively low cost, tissue compatibility, and ease of customization of an individually fabricated acrylic ocular prosthesis make it a practical option, particularly when financial considerations influence the choice of treatment.[4]

Case Report

After careful examination, the impression was taken with regular body elastomer. The stock tray was selected to take the impression. After setting, adjust the impression by cutting the irregularities and add some wax if there any deficiency. Sent the impression for cast pore. A Split cast pore technique used for the fabrication of the cast.

After that clear acrylic resin conformer fabricated, then the conformer inserted into the patient eye for adaptation. An opaque variety of acrylic resin used to make the conformer. The intrinsic color of the sclera is incorporate there according to the patient'sremaining natural eyes hade. Iris position and size were selected in the conformer and create a space for positioning the iris. The remaining area of the conformer is scrapping 2 mm to create space for extrinsic coloration and characterization. The size and shade of the iris were also selected. Iris painted according to the shade of the patient. The painting of capillary and characterization was done. Extrinsic coloration was done accordingly. Laminate the paint with clear acrylic resin. Polishing was done. Finally, insert the eye prosthesis to the patient eye globe.

Discussion

Kenneth et al., fabricate a custom ocular prosthesis by taking an impression with a dental tray with irreversible hydrocolloid impression material[3]. He applied here almost the same process used in this case except the wax conformer try in the process. A perforated acrylic resin tray was reinforced and connected to a disposable syringe before impression making. This arrangement was used to record the enucleated socket and its surrounding soft tissues. The impression therefore captured the internal configuration of the socket together with the contours of the tissues overlying and surrounding the defect, allowing a more individualized prosthesis to be developed.[5] Whereas the stock acrylic tray used hereafter tray tried in and checked al detailed either it fits or not.

Prefabricated conformers may require repeated modifications before an acceptable adaptation to the socket is obtained. In contrast, a conformer fabricated specifically for the individual socket can achieve closer contact with the surrounding tissues. Such adaptation may assist the functional interaction of the eyelids with the prosthesis and help maintain tissue activity, whereas an inadequately fitting stock conformer provides less opportunity for this effect.[5] In the present case, a customized conformer was therefore fabricated and used glass prostheses.[6] The same material was used for the present rehabilitation.

For impression making, medium-body elastomeric material was loaded into a dispensing gun. With the eyelids gently retracted, the material was introduced into the palpebral opening and allowed to spread throughout the socket. This technique facilitated the displacement of trapped air and lacrimal fluid and permitted the impression material to reproduce the internal socket contours. Material extending beyond the eyelid margins was removed or allowed to extrude externally, while a prefabricated flat tray was positioned over the orbital region to support the impression during setting. The overall approach was comparable to the impression procedure described previously.[7] A conventional wax try-in was not performed in this case. Following evaluation of the impression, the pattern was modified directly, and wax was incorporated only where additional correction was considered necessary.

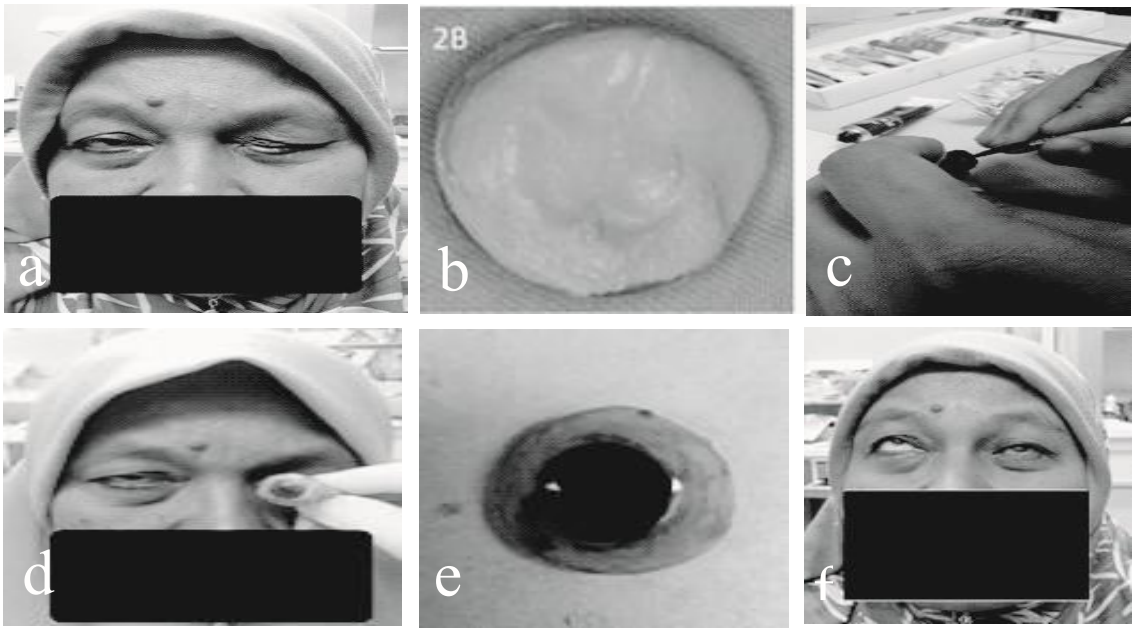

Figure 1: a) Initial condition of the patient, b) Impression taking, c) Painting of irish, d) Shade trying, e) Prothesis after polishing, f) After insertion

Polymethyl methacrylate (PMMA) was selected as the prosthetic material because of its favorable tissue compatibility, convenient handling characteristics, comparatively low cost, and ability to undergo color modification. Its optical and aesthetic characteristics can also be adjusted during fabrication to obtain a more natural appearance than that generally associated with conventional

Conclusion

The Eye holds immense importance in maintaining anatomical, structural, functional and aesthetics purposes. Any deficiency involving it can be devastating for anyone regarding his or her social conditions. So, it is very important for this kind of patients to re-establish those functions fully as soon as possible. The time and cost must be effective for every patient. For many reasons, this is a standard procedure to fabricate an ocular prosthesis. In this process, the prosthesis forms easily and less time-consuming because after taking the impression it was possible to adjust the wax. So further adjustment was not required in conformer. This prosthesis is also very cost effective. Thus, every patient with ocular deficiency must be evaluated for using this device as it can benefit them immensely by cutting the deficiencies in a very short period of time.

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REVIEW ARTICLE

Corrosion and wear of titanium based dental implant connections: A review

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Abstract

Two-piece implant systems are widely used in contemporary dental implantology, in which an osseointegrated implant fixture is connected to an abutment that supports the definitive prosthetic restoration. The implant-abutment interface is susceptible to mechanical and biological complications because microgaps may permit the entry of oral fluids, microorganisms and biofilm. This review examined the degradation processes occurring at titanium-based implant-abutment interfaces, with particular emphasis on the combined effects of wear and corrosion within the oral environment. Most of the available investigations evaluated titanium-based implant and abutment materials under simulated oral conditions, particularly artificial saliva, using electrochemical and wear testing in combination with microscopic surface analyses. Relatively few investigations have focused on degradation of the internal connection surfaces following cyclic fatigue or repeated abutment removal. Available evidence indicates that micromovement between contacting components can increase internal surface wear. Although glycoproteins and biofilms may reduce friction by acting as boundary lubricants, they may simultaneously contribute to corrosion-related degradation. Repeated loading during mastication may consequently compromise the stability of the implant-abutment junction. Furthermore, the release of metallic ions and micro- or nanoscale particles generated through wear and corrosion may influence peri-implant inflammatory responses and contribute to pathological bone loss.

Keywords: *dental implant, corrosion, wear, titanium, peri-implantitis.*

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Introduction

The oral cavity provides a particularly demanding setting for biomaterials because implant components are continuously exposed to mechanical loading, saliva, microorganisms, dietary substances and fluctuations in the local chemical environment. The clinical performance of implant-supported prostheses is therefore influenced not only by the properties of the constituent materials but also by implant design, manufacturing processes and conditions within the oral cavity.[1–3] Titanium and titanium alloys remain among the principal materials used for biomedical implants because of their favourable biocompatibility, capacity to support osseointegration, adequate mechanical performance during function and resistance to corrosion in physiological fluids.[4–8] Nevertheless, the corrosion resistance of titanium is not absolute. Exposure to acidic products generated by microbial metabolism and to fluoride-containing products, including some toothpastes and mouth rinses, may adversely affect the surface. Mechanical wear can also develop at the implant-abutment interface and the presence of acidic or fluoride-containing substances may intensify this degradation.[9,10]

Most dental implant assemblies comprise an implant fixture and an abutment that are joined by an abutment screw tightened to a predetermined torque. The appropriate torque depends on both the structural materials and the configuration of the implant-abutment connection. Because the abutment and implant are mechanically engaged rather than formed as a single continuous structure, a microscopic gap may develop at their interface. Such spaces can permit oral fluids, glycoproteins and microorganisms to enter the connection. At the same time, repeated contact between the opposing surfaces may produce both wear and corrosion.[11,12] Functional loading can induce small movements

of the abutment, producing friction between the contacting surfaces and progressively increasing mechanical wear.[13] With continued use, these processes may reduce the mechanical stability of the connection and promote the release of metallic ions and particulate debris into adjacent peri-implant tissues.[14,15]

The present review aimed to synthesize recent in vitro and in vivo evidence concerning the concurrent occurrence of wear and corrosion at titanium-based implant-abutment interfaces under simulated oral conditions and in the clinical environment. Particular attention was given to the influence of oral fluids, biofilms and mechanical micromovement on degradation processes. Understanding these interactions is relevant to oral rehabilitation, periodontology, implant dentistry and biomaterials engineering because degradation at the implant-abutment junction may have both mechanical and biological consequences.

Dental implant connections:

A range of implant-abutment connection configurations is currently available for implant-supported prosthetic treatment. Following osseointegration, the implant fixture and abutment are secured by an abutment screw tightened according to the torque recommended for the particular implant design and material combination. In broad terms, implant connections may be classified as external or internal hexagonal designs and Morse taper (MT) configurations. A precise interface between the implant and abutment is important for maintaining mechanical stability and ensuring appropriate transmission of functional forces. The accuracy of this fit is influenced by machining precision, component geometry and the mechanical characteristics of the materials involved.

An inadequate fit may increase the size of the interfacial microgap and allow greater movement of the prosthetic components during mastication. Imperfect seating or premature occlusal contacts may further increase the mechanical demand placed on the connection.[10–12,14] The external hexagon represented one of the earliest implant connection designs; however, clinical and laboratory investigations have identified abutment screw loosening as an important mechanical complication associated with this configuration.[6,13,16,17] Internal connection systems subsequently developed in several forms, including Morse taper, internal hexagon, octagonal and trilobed configurations.[18,19]

Morse taper connections have become widely used because the conical geometry allows close engagement between the implant and abutment. The intimate contact produced by this configuration has sometimes been likened to a cold-welding effect.[20] Comparative evidence has indicated greater mechanical instability with external hexagonal connections than with internal configurations.[6,21] The long-term mechanical condition of an implant-abutment joint can also be assessed clinically by determining removal torque at specified follow-up intervals.[22]

Despite the close fit achieved with conical connections, the interface may still permit the ingress of water, glycoproteins, acidic compounds and microorganisms when a microgap is present.[12,23] Glycoproteins, water and biofilm components can influence frictional behaviour at the titanium interface and may facilitate micromovement between the implant and abutment.[24] Bacterial leakage has been demonstrated across different implant connection designs, although Morse taper configurations generally provide a more effective fit than external hexagonal systems.[18,27,28,29]

Commercially pure titanium grade IV is widely regarded as a standard material for implant fixtures, whereas Ti-6Al-4V is frequently used for abutments and prosthetic components because of its favourable strength characteristics, including a reported tensile strength of approximately 940 MPa.[5,7] Despite these advantages, degradation of titanium-based components remains a concern because corrosion and wear may generate ions and particulate material that enter the peri-implant environment. Ceramic abutments, particularly yttria-stabilized tetragonal zirconia, have therefore been introduced as alternatives to metallic components. However, differences in mechanical behaviour between zirconia and titanium may increase stresses at the interface and contribute to mechanical complications.[8,19,22,29,30]

Condition of peri-implant environment:

The tissues surrounding an osseointegrated implant include the gingival sulcus, junctional epithelium and connective tissue, broadly corresponding to the soft-tissue components found around natural teeth.[30,31,32] The biological width around dental implants has been reported to comprise approximately 0.16 mm of gingival sulcus, 1.88 mm of junctional epithelium and 1.05 mm of connective tissue.[20,33] Collectively, these tissues provide a biological barrier that can limit the penetration of bacteria, microbial products, corrosive substances and externally derived particulate material.[29]

Despite these similarities, peri-implant tissues differ from periodontal tissues in the arrangement and attachment of collagen fibres.[26,30] Around natural teeth, connective tissue fibres insert into the root surface, whereas peri-implant collagen fibres generally run parallel to the implant surface. Obliquely oriented fibres have, however, been identified in association with Morse taper connections.[26] These anatomical differences may influence the biological response to microorganisms and foreign materials introduced around an implant.

Dental biofilm consists of a structured microbial community embedded within an extracellular matrix that incorporates components originating from food, saliva and microbial metabolism. Its composition and development are consequently affected by local nutritional and oral conditions.[2] Although implant surfaces and natural tooth surfaces differ in their chemical and physical characteristics, the fundamental processes involved in biofilm development appear to share several common features.[34,35] Surface roughness and chemical composition are important determinants of microbial attachment and subsequent biofilm formation.[2,37]

Biofilm can also modify the tribological behaviour of implant components by acting as a lubricating layer between contacting prosthetic surfaces and thereby reducing friction.[26] Saliva contributes to protection of oral structures through its

buffering capacity and its complex mixture of inorganic and organic constituents.[38] Nevertheless, salivary chemistry is dynamic and both intrinsic and external factors can alter its pH.[2] Under normal conditions, salivary pH generally ranges from approximately 6 to 7.7, although local variations may occur in response to biofilm accumulation, food intake and dietary or therapeutic agents.[39] The buffering capacity of saliva may become insufficient in localized areas with high microbial activity or reduced salivary flow. Consequently, acidic microenvironments with pH values of approximately 3 to 4 may develop around dense microbial populations or poorly irrigated implant-abutment interfaces, potentially creating conditions favourable for corrosion at the contacting surfaces.[1,2,37]

Degradation of titanium-based implant abutment connections:

Titanium and its alloys are extensively used in biomedical applications because they combine favourable mechanical, physicochemical and biological characteristics.[4,5] Their biological compatibility is closely related to the surface condition of the metal and, in particular, to the spontaneous development of a protective oxide film. A thin, amorphous and relatively low-crystalline titanium oxide layer forms naturally on the metal surface. This passive film is generally non-stoichiometric, has a reported thickness of approximately 1 to 20 nm and provides substantial protection against continued oxidation.[10,40,41]

Under simulated oral conditions, titanium-based materials generally demonstrate considerable resistance to corrosion.[42,43] However, this protection can be challenged by environmental factors such as low pH, fluoride-containing compounds, extracellular fluids and lactic acid produced during bacterial metabolism. These substances may alter or disrupt the protective surface film and consequently increase the susceptibility of titanium to corrosion.[3,10,37,44,45]

Various surface modification procedures are intentionally used to alter titanium surfaces in laboratory and clinical applications. These treatments are primarily designed to improve biological interaction with bone and promote faster or stronger osseointegration, thereby potentially reducing the period required for functional loading. The resulting biological behaviour depends substantially on the characteristics of the modified surface layer.[41] Anodization in acidic electrolytes, including sulfuric, nitric, phosphoric or hydrofluoric acid-containing solutions, can generate relatively thick and porous titanium oxide layers. Similarly, anodization in electrolytes containing calcium and phosphate may produce porous calcium-phosphate-containing oxide coatings.

The internal surfaces of implant and abutment connections are not necessarily smooth at the microscopic level. When two contacting surfaces undergo relative movement, disruption of the protective oxide film may occur. Direct interaction between the exposed surfaces can then produce adhesive wear. During mastication, cyclic loading generates repeated vibration and micromovement within two-piece implant assemblies, creating conditions conducive to fretting wear. The extent of material transfer and subsequent material loss depends on the hardness, strength and surface roughness of the materials forming the connection.[18,46]

Peri-implantitis caused by corrosion and wear:

Peri-implantitis is an inflammatory disease affecting tissues surrounding dental implants and is characterized by progressive loss of supporting crestal bone beyond the initial adaptive phase.[35,47,48] Epidemiological analyses have reported substantial prevalence of both peri-implant mucositis and peri-implantitis.[47] Evidence further suggests that degradation products generated at implant-abutment interfaces may contribute to biological disturbances in peri-implant tissues. Metallic ions and particles released through corrosion and wear have been associated with cytotoxic and inflammatory responses and may increase the susceptibility of gingival epithelial cells to microbial stimulation.[15,48]

Once released into the surrounding tissues, metallic particles and ions may be recognized as foreign material by the host immune system. Their presence can promote recruitment of polymorphonuclear leukocytes and macrophages and stimulate biochemical pathways associated with inflammation and bone resorption.[3,49,50] Metal ions such as titanium, cobalt, chromium, aluminum and vanadium may also interact with serum proteins, potentially forming metal-protein complexes capable of modifying immune responses.[48,52] Although the long-term systemic and local biological consequences of circulating metallic species remain incompletely established, characterization of these metal-protein interactions may help clarify their clinical relevance.

Experimental evidence has provided further support for a possible relationship between titanium release and cellular injury. One in vitro investigation reported cytotoxic effects, including necrotic changes, when gingival epithelial-like cells were exposed to titanium concentrations exceeding 11 ppm.[51] Increased titanium release has also been detected in peri-implant tissues following exposure to acidic fluoride conditions, such as sodium fluoride at pH 4.2, suggesting that fluoride can compromise the titanium surface when the protective capacity of salivary buffering is exceeded.[51] In approximately 75% of the evaluated samples, greater titanium accumulation was identified in particular tissue regions. Variation in host susceptibility may partly account for differences in the extent of tissue injury and disease progression.[46]

These observations are relevant to ongoing discussions concerning implant treatment in individuals with systemic or local inflammatory conditions, including diabetes. Management of peri-implantitis may involve either nonsurgical or surgical interventions, although no single treatment strategy has demonstrated consistent effectiveness across all clinical situations. Implantoplasty is one surgical approach in which exposed implant threads that are no longer surrounded by bone are mechanically smoothed.[49,52] Although this procedure may reduce surface irregularities and thereby limit biofilm retention, it can also generate or leave metallic particles on the surgical flap and surrounding tissues despite irrigation and chemical decontamination. Clinical observations have indicated reduced biofilm

accumulation and subsequent adaptation of peri-implant tissues following treatment, but the long-term biological implications of residual metallic debris require further investigation.[49,52]

Conclusion

A substantial body of in vitro research has investigated the mechanical and biological behaviour of implant-abutment connections, whereas comparatively few in vivo investigations have examined their performance under the complex and repetitive loading conditions encountered clinically and evaluated the corresponding response of the surrounding tissues. Laboratory models cannot fully reproduce the multifactorial environment of the oral cavity; nevertheless, controlled experimental systems allow individual variables to be isolated and their potential contribution to long-term degradation to be examined.

The mechanical behaviour of implant-abutment connections may initiate a sequence of interacting events in which microgap enlargement, micromovement, surface wear, corrosion and the subsequent release of metallic ions and particulate debris occur together. These processes may contribute to inflammatory changes in peri-implant tissues and, in susceptible circumstances, to peri-implantitis. Their severity is likely to depend on several interrelated factors, including implant design, material composition, the accuracy of the implant-abutment fit, manufacturing quality and patient-specific biological conditions.

The continuing development of new implant materials and connection geometries highlights the importance of understanding how these variables influence long-term clinical performance. At present, management of peri-implantitis remains challenging and neither nonsurgical nor surgical treatment has demonstrated uniformly predictable outcomes. Progressive mechanical and chemical degradation may ultimately compromise the integrity and function of an implant assembly. Therefore, the biological consequences of wear particles and the potential effects of corrosion occurring at micro- and nanoscale levels should receive greater attention in future investigations. Such research may support the development of improved materials, surface treatments and connection designs for more durable implant-supported prosthetic rehabilitation.

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