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Original Article

Clinical Analysis of Physiological Drifting of Adjacent Teeth Following Full Crown Preparation

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ABSTRACT

Objective: To compare the physiological drifting of adjacent teeth between young adults versus middle aged patients following full crown preparation.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Prosthodontics, Armed Forces Institute of Dentistry, Rawalpindi, Pakistan from Jun-Dec 2023.

Methodology: A total of 140 patients were assessed for inclusion in the study and divided into two groups: Group A (young adult group) and Group B (middle-aged group). Once preparation of tooth to be crowned was completed, inter-space between two teeth adjacent for crowning was measured using a standard digital Vernier caliper by a consultant. Patients were counselled to follow-up for subsequent setting of the crown after 10 days and drifting was checked and measured again before crown placement by digital vernier caliper and endorsed accordingly. Primary variables observed were mesial drifting following pre-crown preparation reviewed after 10 days between both age groups and number of patients requiring re-adjustment for crowning due to change in space.

Results: Mean mesial drift post-preparation for crown when assessed at 10 days was 0.04±0.008 mm in the young adult groups versus 0.01±0.006 mm in the middle-aged patient group (p<0.001). Subsequently, patients that required re-adjustment due to drift because of crowning were 31(44.3%) patients in the young adult group versus 19(27.1%) patients in the middle-aged patient group (p=0.034)

Conclusion: Mesial drift affects the crowning process more in the young adult age group than the middle age group with more re-adjustment before crowning required in younger age patients.

Keywords: Crown, Mesial drift, Physiological, Teeth.

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INTRODUCTION

Crowning of teeth is one of the most common procedure done in the field of dentistry.[1] It is estimated that in the US alone, the frequency of dental crowning is 15 million procedures annually.[2] The primary indication for crowning is to cover an existing worn out tooth for increasing tooth longevity and strength.[3] The procedure involves careful tooth assessment followed by tooth preparation which includes removing the worn out tooth and enamel and making space for the crown to be placed over.[4] Dental impressions are then taken, and patient is followed up within 7-10 days for cementation to secure the new crown.[5] The procedure requires meticulous care and even with all precautions, the phenomenon of physiological drift is seen which may affect crown implantation as it is the natural passive movement of teeth to maintain a new equilibrium once one or more teeth are removed.[6] As proposed by literature, the equilibrium of teeth in the cavity is maintained by intrinsic and extrinsic forces counterbalancing each other.[7,8] so any extraction or adjustment results in a new equilibrium with the remaining teeth moving to stabilize each other. Mesial drifting (movement of the teeth post disequilibrium towards the central part of the arch of the mouth) after crowning is a common phenomenon, often within 10 days post-procedure in young patients.[8] Physiological drift is proposed to affect the final crowning procedure with many patients requiring re-adjustment and tooth impression if considerable drift is seen.[9] Methods to reduce mesial drift post-preparation for subsequent crowning include temporary crowns,[10] but the chair time and cost-effectiveness of these for every patient is limited in our resource constrained areas and setups. Our study aims to compare physiological drifting and need for re-assessment and readjustment in young adults versus middle aged patients.

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METHODOLOGY

This quasi-experimental study was carried out at the Department of Prosthodontics, Armed Forces

Institute of Dentistry (AFID), Rawalpindi, Pakistan, from June to December 2023, after gaining approval from the Ethical Review Board vide letter no. 918/Trg We conducted a pilot including 30 patients each in the young adult and middle aged group for our study to assess the proportion of patients presenting for re-assessment and re-impression of teeth following preparation for crowning. The proportion of patients requiring re-intervention due to drifting was 57% in the young adult versus 33% in the middle aged group.[11] The sample size was calculated keeping the confidence interval at 95%, power of test at 80% with the two population proportions mentioned and sample size came out to be 64 patients. We included 70 patients in each group after taking consent.

Inclusion Criteria: Young adults (aged 15-30 years) and middle aged adults (31-45 years) with non-contributory medical history presenting for crowning of single affected tooth for any indication.

Exclusion Criteria: Patients with a severe tooth infection or periodontal condition, previous or undergoing orthodontic treatment, loss of proximal contact with adjacent tooth prior to crowning procedure were excluded.

On the day of the preparation procedure, detailed medical and dental history was recorded. The procedure was done under strict aseptic measures including steps of preparation. Once the procedure was done and adequate clearance for crown was prepared, inter-space between landmarks (most prominent cusp tips of adjacent teeth) of the two teeth to be crowned was measured using a standard digital Vernier caliper by a consultant at the end of the procedure. The measurement was endorsed by the resident on duty in the procedure suite unaware of the study protocol to prevent bias. Patients were counselled to follow-up for subsequent cementation of the crown after 10 days and space variation due to drifting was checked and measured again before crown placement by digital vernier caliper and endorsed accordingly. Patients who required re-adjustment of crowns due to drifting were also noted. Primary variables observed were drifting of adjacent teeth following pre-crown cementation reviewed after 10 days between both age groups and number of patients requiring re-adjustment for crowning due to change in space. All statistical calculations were performed using Statistical Package for Social Sciences ver 26.0. Demographic data were statistically described in terms of Mean±SD, frequencies, and percentages. Independent samples t-test was used to compare statistically significant means. Chi-square test was used to compare frequency variables. A *p*-value of ≤0.05 was considered statistically significant.

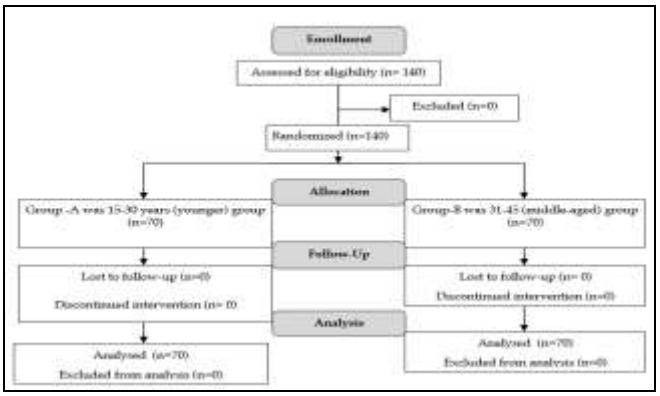

Figure: Patient Flow Diagram (n=140)

RESULTS

A total of 140 patients were assessed in the final study protocol, divided into the young adult group (Group A, n=70) and the middle-aged group (Group B, n=70). Mean age of patients was 22.89±3.26 years in the young adult groups versus 38.80±4.24 years in the middle-aged group (p<0.001). Gender distribution revealed 50(71.4%) males and 20(28.6%) females in the young adult patient group and 51(72.9%) males and 19(27.1%) females in the middle-aged patient group (p=0.850) as listed in Table-I along with other demographic details. When assessing for the primary variables between both groups, mean mesial drift post-preparation for crown when assessed at 10 days was 0.04±0.008 mm in the young adult groups versus 0.01±0.006 mm in the middle aged patient group (p<0.001). Subsequently, patients that required re-adjustment due to drift because of crowning were 31(44.3%) patients in the young adult group versus 19(27.1%) patients in the middle-aged patient group (p=0.034) as shown in Table-II.

Table-I: Demographic Characteristics (n=140)

Variables	Group A (n=70)	Group B (n=70)	*p*-value (≤0.05)
Mean Age (Years)	22.89±3.26	38.80±4.24	<0.001
Gender			
Male	50(71.4%)	51(72.9%)	0.850
Female	20(28.6%)	19(27.1%)	
Indication For Crowning			
Tooth Decay	14(20%)	10(14.3%)	0.643
Cracked Tooth	28(40%)	24(34.3%)	
Root Canal Treatment	20(28.6%)	25(35.7%)	
Cosmetic Enhancement	08(11.4%)	11(15.7%)	

Table-II: Primary Variables Compared Between Both Groups (n=140)

Variable	Group A (n=70)	Group B (n=70)	*p*-value (≤0.05)
Mean Mesial Drift Post-Preparation (mm)	0.04±0.008	0.01±0.006	<0.001
Patients Requiring Re-Adjustment Due To Drift Before Crowning	31 (44.3%)	19 (27.1%)	0.034

DISCUSSION

This study corroborates literature which indicates the importance of physiological drifting of the teeth when space becomes available post-preparation for subsequent crowning of tooth,[12] since change in the amount of drifting is associated with increasing age.[13] The mesial drifting of teeth is a physiological compensatory mechanism when teeth are provided with available space to move and realign themselves.[14] It can be after bone modelling, dental resorption, or procedural restructuring of the teeth and is thought to be a mechanism in which the remaining teeth move towards the center of the arch to realign themselves.[15] Literature suggests that mesial drift is more in the younger age groups and tends to slow down with increasing age,[16] with the mean ages for presentation for crowning being 17-20 years of age,[17] similar to our demographics with a pre-dominantly male pre-disposition in both age groups and poor dental hygiene with more frequency than that in females leading to more males presenting for root canal treatments along with non-compliance for regular dental visits or no access to good dental facilities in our resource constrained middle income families, resulting in poor dental hygiene.[18] Our study also found, similar to another study, that temporary crown where affordable and available should be advised in the especially in the younger age demographic due to accelerated mesial drift for better results once crowning stage is reached to avoid subsequent re-adjustment visits.[19] According to our knowledge, this is the first study of its kind in our local demographic area highlighting the importance of space variation due to physiological drifting.

LIMITATIONS OF STUDY

The short follow-up period of only 10 days was insufficient to understand the long-term pattern and stability of physiological drifting, which may continue or change over time. The single-center, quasi-experimental design increased the potential for selection bias and limits the generalizability of the findings. Furthermore, while precise, the use of a digital Vernier caliper for measurement is highly sensitive to operator positioning and pressure, introducing a risk of measurement bias, a concern that is compounded by the lack of reported blinding of the consultant taking the measurements.

CONCLUSION

Physiological drifting affects the crowning process more in the young adult age group than the middle age group with more re-adjustment before crowning required in younger age patients.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AUR & MS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SK & AA: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

SJHB & AA: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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