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Survival and Performance of Tooth-Supported Single Crowns Relative to Material: A Retrospective Study

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ABSTRACT

Background: This retrospective study examines the longevity and clinical performance of tooth-supported single crowns, with particular emphasis on how different restorative materials affect their long-term outcomes.

Objective: To assess the clinical results of tooth-supported single crowns in relation to various influencing factors.

Methods: Dental records of 400 patients treated at the institution were reviewed. Individuals who had received tooth-supported single crowns were identified, and data were categorized according to predefined study parameters to derive the final results.

Results: Among the 400 patients evaluated, a greater proportion were female. Most patients were under 50 years of age. Molars were the most frequently restored teeth, and metal crowns were the most commonly selected restorative material.

Conclusion: Tooth-supported single crowns remain a widely utilized fixed prosthodontic option for restoring tooth form, function, and aesthetics. This study highlights the primary factors associated with successful clinical outcomes in patients receiving such restorations.

Keywords: Tooth-supported single crowns, Restorative materials, Retrospective study, Clinical outcomes, Prosthodontics

INTRODUCTION

The survival of single crowns is influenced by multiple factors, including the site of placement, tooth vitality, bruxism, and several other contributing variables[1]. Loss of the coronal portion of a tooth—commonly resulting from caries or trauma—can be managed using various restorative techniques[2]. The quantity of remaining tooth structure is the principal determinant for selecting the type of coronal restoration. Based on this assessment, clinicians choose between full- or partial-coverage restorations and determine the appropriate restorative material, such as metal, ceramic, glass, amalgam, or composite[3].

Reported short-term (5-year) survival rates of single crowns range from 93.3% to 96.6%[45], whereas long-term survival over 25 years is approximately 85.4%[6]. Numerous factors may influence survival and complication rates, with tooth vitality recognized as a critical determinant[7]. Additionally, endodontic and restorative procedures can reduce tooth stiffness and structural strength, thereby increasing the risk of fracture[89]. Biting force is another significant factor affecting survival, and its magnitude varies according to parameters such as age, gender, tooth position, and the presence of bruxism[10–17].

Single crowns are commonly fabricated from metal, ceramic, or metal-ceramic combinations. The choice of restorative material plays a substantial role in clinical outcomes; for example, metal-ceramic crowns with porcelain veneering have demonstrated a tendency for veneer chipping, a frequently reported complication[418].

Comprehensive treatment planning must consider both local and systemic clinical factors. Incorporating these variables is essential for accurately predicting the prognosis of tooth-supported single crowns. Consequently, the primary aim of this study is to evaluate the factors that contribute to the long-term success of these restorations.

MATERIALS AND METHODS

Study Design

Dental records of approximately 400 patients who had received tooth-supported single crowns in the Department of Prosthodontics, School of Dental Sciences, Krishna Vishwa Vidyapeeth, Karad, were retrospectively examined. Ethical clearance for the study was granted by the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth, Karad.

The survival of a prosthesis was defined as its ability to remain functional, even if complications were present. Conversely, any prosthesis that required replacement or removal was classified as a failure. For the purposes of analysis, single crowns placed on incisors and canines were designated as anterior restorations, whereas those placed on premolars and molars were categorized as posterior restorations.

Inclusion and Exclusion Criteria

Patients who received tooth-supported single crowns at the institution were included in this study. Those treated with fixed dental prostheses, cantilever prostheses, or lacking complete patient records were excluded from the study.

Data Collection

Patient data was obtained from existing dental records of individuals treated at the institution. The parameters evaluated included patient age, gender, crown location (maxillary or mandibular), crown position (anterior or posterior), specific tooth type (incisor, canine, premolar, or molar), material used for the crown, and any history of bruxism.

Data Analysis

All patient-related information was recorded and categorized based on parameters such as name, gender, age, tooth number, and material used. The data was summarized using percentages and organized into tables. Statistical analysis was performed manually.

RESULTS

Table 1: Survival and Performance of Tooth-Supported Single Crowns Relative to Material

FACTOR	NO. OF SINGLE CROWNS
GENDER	
MALE	193(48.25%)
FEMALE	207(51.75%)
AGE	
LESS THAN 50YEARS	300(75%)
MORE THAN 50 YEARS	100(25%)
JAW	
MAXILLARY	198(49.5%)
MANDIBULAR	202(50.5%)
CROWN REGION	
ANTERIOR	55(38.5%)
POSTERIOR	246(61.5%)
TOOTH TYPE	
INCISOR	35(8.75%)
CANINE	19(4.75%)
PREMOLAR	101(25.25%)
MOLAR	245(61.25%)
MATERIAL	
METAL	245(60.75%)
METAL-CERAMIC	93(23.75%)
CERAMIC	61(15.5%)
BRUXISM	
PRESENT	10(2.5%)
ABSENT	390(97.5%)

Of the 400 patients included in this study, the majority were younger than 50 years of age, representing 300 individuals (75%). The remaining 100 patients (25%) were over the age of 50. This distribution indicates that tooth-supported single crowns were more frequently provided to a comparatively younger population. With respect to gender, the sample was nearly balanced, comprising 193 males (48.25%) and 207 females (51.75%), showing a slightly higher proportion of female patients receiving crown therapy.

Analysis of crown location within the dental arches revealed an almost equal distribution: 198 crowns (49.5%) were placed in the maxillary arch, while 202 crowns (50.5%) were positioned in the mandibular arch, suggesting no notable positional preference. When categorized by tooth region, most crowns were placed on posterior teeth, accounting for 345 restorations (86.25%), whereas only 55 crowns (13.75%) were placed on anterior teeth. This trend reflects the greater functional demands placed on premolars and molars, which are more susceptible to structural damage and thus more likely to require full-coverage restorations.

A further breakdown by tooth type showed that 35 crowns (8.75%) were placed on incisors, 19 (4.75%) on canines, 101 (25.25%) on premolars, and a predominant 245 crowns (61.25%) on molars. Regarding the materials used, metal crowns were the most frequently selected, comprising 245 cases (60.75%), followed by metal-ceramic crowns at 93 cases (23.75%) and ceramic crowns at 61 cases (15.5%). Additionally, only 10 patients (2.5%) reported a history of bruxism, while the remaining 390 patients (97.5%) reported no such habit.

DISCUSSION

Based on the results of this study, it can be concluded that tooth-supported single crowns are predominantly used for rehabilitation in younger patients, with females receiving treatment more frequently than males. The posterior tooth region was the most commonly restored area, with molars being the teeth most often rehabilitated. Metal was the preferred material for crown fabrication. Previous studies indicate that the survival rate of single crowns can be positively influenced by regular follow-up visits, professional oral prophylaxis, and maintaining good oral hygiene[20]. The final parameter assessed was the habit of bruxism, which is typically diagnosed through self-reported questionnaires and clinical examinations[19]. Bruxism is characterized by repetitive jaw muscle activity involving clenching and grinding of teeth. It has been observed that older males are more commonly affected by bruxism, which over time can lead to the failure of single crowns, primarily due to loss of retention[4]. Furthermore, it was noted that the type of crown material, as well as the patient's age and gender, did not have a significant impact on the survival of tooth-supported single crowns[4,14].

Considering this information, it can be summarized that patients under 50 years of age, especially females, are more frequently rehabilitated with single crowns, with molars being the most commonly restored teeth and metal being the most preferred restorative material.

CONCLUSION

This retrospective study highlights the clinical patterns and contributing factors associated with the use and performance of tooth-supported single crowns. The findings demonstrate that such restorations are more frequently provided to patients under the age of 50, with a slightly higher prevalence among females. Posterior teeth—particularly molars—were the most commonly restored, reflecting their greater functional demands and higher susceptibility to structural damage. Metal crowns remained the material of choice, indicating continued reliance on their durability and cost-effectiveness in clinical practice.

The overall distribution of crown placement across maxillary and mandibular arches was nearly equal, suggesting no inherent arch-related preference in treatment planning. Bruxism, although present in a small percentage of patients, continues to represent an important clinical factor that may influence crown longevity and complication rates.

Collectively, these findings emphasize the importance of individualized treatment planning based on patient-specific and tooth-related factors. Understanding the prevalence patterns, restorative material selection, and risk indicators can aid clinicians in improving prognostic assessments and optimizing the long-term success of tooth-supported single crowns.

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Author and Contribution:
Ruchika Dalvi was responsible for the overall conception and design of the study. She developed the questionnaire, carried out the data analysis and interpretation, and subsequently prepared the manuscript.

Dr. Ajay Gaikwad provided academic guidance throughout the research process, including assistance with study design, ethical approval, and constructive feedback on the data analysis and final manuscript draft.

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