RESEARCH ARTICLE

Success Rate of Stainless-steel Crowns Placed on Permanent Molars among Adolescents

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ABSTRACT

Aim and objective: To evaluate the success rate of stainless-steel crowns (SSCs) placed on permanent molars among adolescents in King Abdulaziz University Dental Hospital (KAUDH).

Materials and methods: Electronic records of KAUDH patients aged 10 to 15 years who had an SSC placed on a permanent molar from 2013 to 2018 were reviewed. The patients were contacted by telephone and were invited to participate in the study. The patients were examined clinically and radiographically.

Results: The response rate was 42.6%. The total number of SSCs included in the study was 36 crowns. The mean age was 11.75 ± 1.95. Males represented 75.76% of the subjects. The success rate of SSCs placed on permanent molars was 86.10%.

Conclusion: Placement of SSCs on permanent molars is a highly successful long-term temporary restoration that preserves badly destructed molars in adolescents until definitive prosthetic treatment can be done.

Clinical significance: To provide updated knowledge to healthcare providers and researchers about the success rate of SSCs when placed on permanent molars.

Keywords: Adolescents, Permanent molars, Stainless-steel crowns.

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INTRODUCTION

Preformed metal crowns, also known as stainless-steel crowns “SSCs”, are usually used to restore primary molars and badly broken-down permanent molars. Primary SSCs are indicated in teeth with developmental defects, large carious lesions involving multiple surfaces, and after pulpotomy/pulpectomy procedures.¹,²

Stainless-steel crowns that are performed on permanent teeth are used as an interim restoration to restore badly broken-down molars until the final restoration is to be placed.³ The SSCs placed on the first permanent molars have similarities compared with the SSCs on primary molars such as adapting these crowns, cementation, and acting as an interim restoration.³ However, they differ in the anatomical variation, the extent of preparation, degree of eruption, time of the procedure, and the longevity of the restoration.³ There are some situations where placing SSCs on permanent first molars is indicated such as restoring a badly broken-down endodontically treated tooth, extensive multisurface caries, financial consideration until permanent restorations are affordable, and in disorders in the tooth development such as molar-incisor hypomineralization (MIH), amelogenesis imperfecta, and dentinogenesis imperfecta.³

Stainless-steel crowns used to treat permanent first molars are inexpensive compared with other types of restorations, highly durable, provide the tooth with the benefits of the full coverage restorations and the minimal technique sensitivity during crown placement. On the other hand, there is one main disadvantage for these SSCs is the esthetics and the appearance during smiling, especially if the patients were highly concerned about their appearance.⁴

Only a few studies assessed the success rate of SSCs covering permanent teeth in adolescents. Therefore, the present study aimed to evaluate the success rate of SSCs placed on permanent molars among adolescents in King Abdulaziz University Dental Hospital (KAUDH).

MATERIALS AND METHODS

Study Design

This study was designed as a cross-sectional study.

Ethical Approval

Ethical approval was acquired from the Research Ethics Committee, Faculty of Dentistry, King Abdulaziz University “KAU”, Jeddah, Saudi Arabia.

Study Subjects

Electronic records of KAUDH patients aged 10 to 15 years who had an SSC “3M ESPE, St. Paul, Minn” placed on a permanent
SSCs Placed on Permanent Molars among Adolescents

The students who placed the crown
Undergraduate students 8 (22.2)
Postgraduate students 28 (77.8)
Year of crown placement
2015 4 (11.1)
2016 4 (11.1)
2017 7 (19.4)
2018 21 (58.3)
Was the tooth endodontically treated before placing the crown?
Yes 15 (41.7)

Table 2: Criteria of radiographic examination
Periapical radiolucency 1 (2.8%)
Widened PDL space 1 (2.8%)
Furcation involvement 0 (0.0%)
Vertical or horizontal bone loss 2 (5.6%)
Large-sized crown 5 (13.9%)
Marginal gap 0 (0.0%)
Interference with the eruption of an adjacent tooth 4 (11.1%)

Fig. 1: Overall success of permanent stainless-steel crowns

Reasons for failure included deep pockets, bone loss, and widening of the PDL space. None of the permanent SSCs showed any sign of failure of the following clinical features: gingival inflammation around the margins of the crown, gingival abscess, fistula or sinus tract, pain on percussion, increased mobility, crown perforation, traumatic occlusion, and extraction (Figs 1 to 3). Radiographs showing a successful and a failed SSC on a permanent first molar are presented in Figure 4.

Results
Twenty-three out of 54 patients agreed to participate. The response rate was 42.6%. The total number of SSCs included in the study was 36 crowns. The mean age was 11.75 ± 1.95. Males represented 75.76% of the subjects. The success rate of SSCs placed on permanent molars was 86.10% (Tables 1 and 2).
DISCUSSION

Stainless-steel crowns have many features that make them preferable to use compared with other filling materials such as durability, full coverage, and low cost. On the other hand, several studies reported problems with using SSCs in primary teeth owing to plaque accumulation and marginal poor adaptation leading to periodontal diseases such as gingivitis. Therefore, it is important to adjust the crown carefully before cementation. Another disadvantage is the esthetics concerns. Many parents/children do not like to restore the teeth with SSCs especially the anterior teeth because of the metal color of the crown.

Many studies evaluated the longevity and durability of primary SSC. The first study was published by Dawson et al. in 1981, who compared class I and class II amalgam restorations with SSCs in primary molar teeth. He concluded that the majority of amalgam restorations ended up by replacing a new one, unlike SSCs which have a high survival rate. Einwag and Dünninger
also reached the same result as Dawson et al., by evaluating SSCs and 2-surface amalgam restorations in 66 patients over 8 years. The survival rate of SSCs was about 92, 90, and 83% in 3, 4.5, and 8 years, respectively. However, the survival rate of amalgam restorations was 66 and 36% at 3 and 4.5 years, respectively. Additionally, Gruythuysen and Weerheijm assessed the survival rate of 106 pulpotomized primary molars restored with SSCs or amalgam in 57 pediatric patients. They concluded that the survival rate for pulpotomies was significantly higher in teeth restored by SSCs (85%) than with an amalgam (68%) over 2 years.

Several studies were conducted to evaluate the success rate of SSCs placed on permanent molars. Discepolo and Sultan evaluated permanent tooth SSC longevity as an interim restoration for teeth requiring full coverage restoration in pediatric patients. They assessed 155 SSCs as temporary restorations on permanent molars in pediatric patients. Of 155 SSCs, 137 were considered successfully functioning. Total failures were 18. The overall combined success rate for the study group was observed to be 88% with an average service period of 45.18 months. Significant success was noted in patients <9 years of age, and significant failure was observed in patients 12 years and older.

Another study evaluated the long-term success rates based on clinical and radiographic findings of the SSC as a posterior restoration placed on permanent tooth compared with other restorations. This study included a total of 271 patients (2,621 posterior restorations were reported). Among these, 766 SSCs were assessed and documented with a 10-year survival rate (79.2%) in comparison with other different restorative modalities.

**CONCLUSION**

Placement of SSCs on permanent molars is a highly successful long-term temporary restoration that preserves badly destructed molars in adolescents until definitive prosthetic treatment can be done.

**CLINICAL SIGNIFICANCE**

To provide updated knowledge to healthcare providers and researchers about the success rate of SSCs when placed on permanent molars.