



Assessment of children requiring stainless steel crowns in permanent mandibular first molars - A retrospective study

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ABSTRACT

This study aimed to investigate the prevalence of children requiring a stainless steel crown (SSC) in mandibular permanent first molars. A retrospective study was carried out using digital records of 1,768 children who reported to the Department of Paediatric and Preventive Dentistry from June 2019 to March 2020. A total of 117 records of children were finally included in the study evaluation. Children requiring SSC in mandibular permanent first molars were observed from the digital records and were tabulated on a spreadsheet. The collected data were analysed by using computer software SPSS version 21.0. Out of 1,768 children, 117 children required SSC in mandibular permanent first molars. Out of 117 children screened, 67 were males and 50 were females. The prevalence of children requiring SSC in mandibular permanent first molars is higher in tooth 46 (57.2%) compared to tooth 36 (42.7%). The use of PMCs in the paediatric population should not simply be limited to primary teeth. PMC placement in permanent molars for a pediatric population should be a part of the skillset in order to best manage clinical scenarios without the need for referral to a specialist.

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malformation and preserve a healthy periodontium, vertical dimension and arch length (Croll, 1999). Since 1950, several layout modifications to the SSC have been made to facilitate the fitting procedure and advance the morphological appearance of the crown. Placement of a SSC has since been perceived as a comparably simple restorative treatment procedure to employ requiring minimal tooth preparation and crown adaptation (Fieldman and Cohen, 1979). In addition, SSCs have proven to be overly durable, almost inexpensive and accessible for the restoration of both primary and permanent dentitions (Randall, 2002; Seale and Randall, 2015; Seale, 2002).

INTRODUCTION

The preformed metal crown (PMC), more frequently acknowledged in North America as the SSC, was first outlined in 1950 by Engel and Humphrey. The objective of the restoration is to restore the coronal tooth structure lost due to caries, fracture, or

In reality, their diverse uses and simple placement have generally been confirmed to be clinically and statistically preferable to more mainstream methods of restoration. Routinely, PMCs have been used for the restoration of primary molar teeth ensur-

ing multi-surface caries removal and pulp treatments and require tooth preparation. PMCs are also overly useful for intermediate-term management of hypomineralized or hypoplastic first permanent molars damaged by enamel breakdown, caries and sensitivity.

In permanent posterior teeth, the main lead for the use of SSC's is to administer full-coronal interim coverage that is efficient, stable, and reliable while circumstances preclude potential additional treatment (i.e. lab fabricated crowns, endodontic management, etc.) (Croll, 1999). With regard to the use of the term, 'interim' above, this attributes to any time period ranging from a few months, to a decade and beyond (Croll, 1999). Indications for the use of SSCs as restorations for permanent molars that have been proposed in the literature include:

1. Grossly decayed or traumatized teeth (Croll, 1999; Seale and Randall, 2015; Croll and Castaldi, 1978).
2. Teeth being considered for orthodontic extraction (Brook and King, 1982; Kimmelman and Riesner, 1977; Mink and Bennett, 1968).
3. Economical restoration of permanent teeth (Murray and Madden, 1997).
4. Teeth with developmental enamel or dentin defects (Seale and Randall, 2015; Croll and Castaldi, 1978; Kimmelman and Riesner, 1977).
5. Restoration of a partially erupted permanent molar (Croll, 1999; Brook and King, 1982).
6. Restoration of teeth in persons with special needs who desire the use of general anesthesia for dental care (Burtner and Dicks, 1994; Melville, 1981; Nunn *et al.*, 1995).
7. Patients who are uncooperative and/or from isolated areas without regular approach to dental care.

Despite the slew of instructions and applications, for the use of SSC's as a restorative treatment option for the permanent dentition, there is an insufficiency of literature covering the prevalence of SSC usage. Hence, the aim of the current study was to evaluate the prevalence of children requiring SSC in mandibular permanent first molars.

MATERIALS AND METHODS

Study Design

This retrospective study was conducted in the Department of Pediatric and Preventive Dentistry in

a Dental College in Chennai. The principal investigator (SS) conducted a comprehensive search of all the dental records registered within the college. Administrative DIAS Software from the college was used to conduct a search of all patients from June 2019 till March 2020. Data from 1,768 children were collected from the dental records. At data extraction, all the information was anonymized and tabulated onto a spreadsheet. The study was commenced after approval from the Institutional Scientific Review Board, Saveetha Dental College and Hospitals.

The records of the patients were categorized into five groups based on their age as 7-9 years, 9-11 years, 11-13 years, 13-15 years and 15-17 years. Patients with at least placement of one SSC on mandibular permanent first molar were included in the study. Any patient record without a history of SSC restoration within the university was excluded from the present study.

Out of 1,768 records that were retrieved, 117 results were the records of SSC placed in permanent mandibular molars (36,46) that were taken into consideration for the present study evaluation. The following data were retrieved from the dental records: Age, Sex, tooth number (36,46). The dental records were examined and noted on a spreadsheet.

The primary investigator (SS) conducted a comprehensive search of all the dental records registered within the college. Administrative Software from the college was used to conduct a search of all patients from June 2019 till March 2020.

RESULTS AND DISCUSSION

Figure 1 represents that there was a higher need for SSC's placement in the 15-17 years of age group. Figure 2 represents an unequal distribution of males and females requiring SSC's. In Figure 3, the prevalence was observed to be 42.7 % (36) and 57.2% (46) in children requiring SSC in permanent mandibular first molars.

Oral health plays a crucial role in the general well-being of individuals (Gurunathan and Shanmugaavel, 2016). Dental caries is a complex process that has been shown to have a multifactorial etiology which leads to the initiation and progression of the lesion (Subramanyam, 2018). It is a global oral health problem with peculiar variations in its distribution and remains to be the most common infectious disease (Govindaraju and Gurunathan, 2017). In young children, the frenum is generally wide and thick which becomes thin and small during growth. Thick frenum makes cleaning in that area difficult

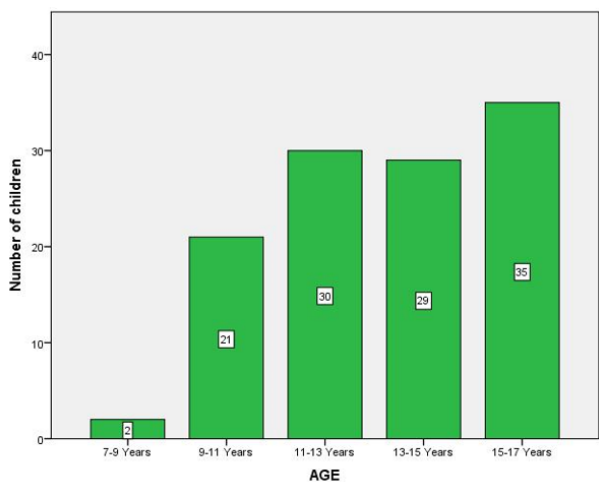


Figure 1: Bar chart representing distribution of age of the children requiring SSC in mandibular permanent first molars

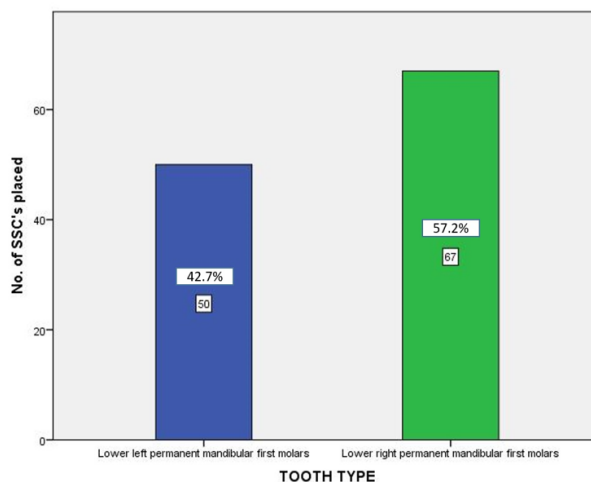


Figure 3: Bar chart representing distribution of SSC placement with respect to tooth type in mandibular permanent first molars where blue colour denotes left permanent first mandibular molars and green denotes right permanent first mandibular first molars

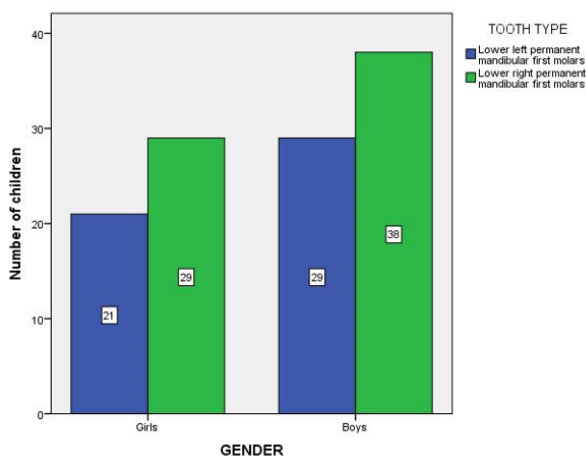


Figure 2: Bar chart representing an association of gender of children and tooth type that requires placement of SSC wherein blue colour denotes lower left permanent first mandibular molars and green denotes lower right permanent first mandibular molars

causing plaque accumulation which in turn may lead to caries in primary teeth (Christabel, 2015). Fluoride is one of the direct ways in decreasing the prevalence of caries and its progression. It has been recommended for more than 50 years to prevent and control dental caries and it is a naturally occurring substance which is present in water (Ramakrishnan and Shukri, 2018; Somasundaram, 2015). A cystic lesion that arises in the floor of the mouth is ranula. It can interfere with the endodontic management and placement of SSC in mandibular molars (Packiri, 2017). Hence it should be surgically removed to gain proper access.

Early loss of permanent molars is a deliberate issue

of interest in pediatric dentistry. Root canal treatment should be the treatment choice to preserve the integrity of facial tissue (Govindaraju et al., 2017b; Nair et al., 2018). During chemo-mechanical preparation, the primary objective is to remove the soft and hard bacteria-containing tissue (Jeevanandan, 2017; Panchal et al., 2019; Govindaraju et al., 2017c). Traumatic injuries to the permanent dentition present with a special challenge to the dentist, as it constitutes panic among the parents and the dentist and creates anxiety and fear in the young child (Ravikumar et al., 2017; Jeevanandan and Govindaraju, 2018; Govindaraju et al., 2017a).

SSC restorations for the permanent dentition serve as an important treatment preference for several populations. These include: Individuals with special needs, individuals requiring the use of general anesthetic and geriatric populations (Seale and Randall, 2015; Nunn et al., 1995). SSC restorations for the permanent posterior dentition are endorsed for the subgroup of individuals who are incapable to maintain good oral hygiene and who have extensive dental caries (Chohayeb, 1985). The full coronal coverage that SSCs supply virtually assure that recurrent decay will not occur and, their smooth surfaces give the tooth accessible to cleaning using routine oral hygiene procedures compared to that of other restorative treatments (Seale and Randall, 2015; Chohayeb, 1985). The adjunctive use of general anesthetic for dental care has been mostly accepted and reported. The published indications include (Melville, 1981; Nunn et al., 1995).

1. Non-cooperation, anxiety and fearfulness of the child.
2. Individuals with medical conditions who require significant dental care.
3. Individuals with special needs.
4. Individuals with comprehensive dental treatment needs but who are from isolated areas and therefore have poor or no approach to regular dental care.
5. Individuals with known allergy to local anesthetics.
6. Very young children with extensive caries.

The results of this study revealed the prevalence to be 42.7 % in tooth 36 and 57.2% in tooth 46 requiring SSC in permanent mandibular first molars. SSC's are effective, durable and should be endorsed as a treatment option for full coronal restoration of the posterior permanent dentition. Despite not being a lab fabricated restoration, the SSC had a negligible effect on the surrounding periodontium, while maintaining the vitality of the corresponding tooth. Limitations of the study are, there is no comparison between the clinical performance of SSC vs gold standard definitive restorations, i.e. gold crowns. There is no quantification of how long these restorations can last. Only 3M ESPE PMC's were used. This is a potential source of bias. In the future, longevity and prognosis of SSC in permanent teeth should be noted along with clinical and radiographic success.

CONCLUSION

In the Chennai population, the prevalence of children requiring SSC in mandibular permanent first molars is higher in lower right permanent mandibular first molars (57.2%) compared to lower left permanent mandibular first molars (42.7 %). The use of PMCs in the paediatric population should not simply be finite to primary teeth. PMC placement in permanent molars for a pediatric population should be a part of the skill in order to best manage clinical scenarios without the need for referral to specialists.

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Conflict of Interest

The authors declare that there is no conflict of interest for this study.

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