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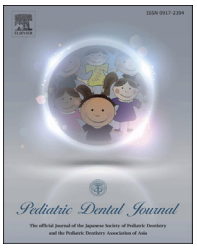

Research Paper

Clinical success of preformed steel crowns in disabled pediatric population: An 11-year retrospective study

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ABSTRACT

Objective: This retrospective study aimed to clinically evaluate the success/failure rate of Preformed Metal Crown (PMC) placed on primary teeth in children presenting any type of physical/mental disability who attended the CRIT (Aguascalientes City, Mexico) Pediatric Dentistry Service during 2004–2014.

Methods: This study was performed using the electronic database of pediatric patients with different disabilities who received dental restoration with at least one PMC in our dental department between January 2004 and December 2014. Each registry included pertinent information on the patient's health status and all dental procedures performed and additionally, the time elapsed in days since placement of the PMC to the date when the PMC failed (e.g., perforated, fractured, or missed). For the performance of each PMC, a survival (time to event) curve estimated was obtained using the Kaplan-Meier method, considering the censored observations during the follow-up period.

Results: A total of 402 registers met inclusion criteria and were included in the final analysis. With 11 failure events recorded; survival rate during briefest follow-up period (288 days) was 0.996 (95% CI [0.989, 1.00]), and for longest observation period (2078 days), this was 0.874 (95% CI [0.764, 1.00]), with very low occurrence of gingival inflammation.

Conclusions: PMC placed on primary teeth of physically/mentally disabled pediatric patients showed a highly satisfactory longevity time and experience of success.

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1. Introduction

Dental caries is a public health problem affecting up to 90% of schoolchildren in industrialized countries [1,2]. According to American Academy of Pediatric Dentistry (AAPD) guidelines, clinicians should make decisions regarding caries management and rehabilitation of primary teeth, including "*when it is necessary to treat and what the appropriate materials and techniques are for restorative dentistry in children and adolescents*" [2]. Currently, there are different dental restorative modalities available for healthy and medically compromised children, which may be performed in the operating room under general anesthesia. For these patients, it is especially important for dental practitioners to select the safest and most reliable dental procedures that require shortest possible application time in the dental chair [3]. It is also important to minimize the risk of treatment failures in time and to minimize the replacement of restorations because of new carious lesions [2,4].

Historically, Preformed Metal Crowns (PMC) for primary teeth have been described as "stainless steel crowns", "iron crowns", "metal crowns", and "faceted-metal crowns", among other terms [1,5]. PMC were first introduced by Humphrey [6] in 1950. Since then, these full-coverage materials have become in a crucial restorative strategy in clinical pediatric dentistry. PMC are strongly recommended by the AAPD [2] for children at high caries risk to protect the remaining tooth structure of primary teeth or of first permanent molars. Examples of this include PMC in cases of extensive carious cavities or multiple-surface lesions due to coronal or cusp fractures, developmental disorders (e.g., severe enamel hypoplasia/hypocalcification), cervical decalcifications, extensive wear (e.g., attrition, abrasion, or erosion), and in patients who require oral care under sedation or general anesthesia [4,7]. PMC are also employed following pulp treatments, such as abutment for fixed space maintainers or for restoring infraoccluded primary molars [8].

The *Teletón Child Rehabilitation Center System* (CRIT, its acronym in Spanish language) is a network of 13 specialist outpatient rehabilitation units throughout Mexico and that are addressed especially to physically/mentally compromised children. CRIT aims "*... to provide knowledge about physical or mental disabilities, giving a strong message to the society regarding to respect, equality and support to children with these conditions*." CRIT centers offer diverse health services, including pediatric dentistry [9]. The majority of children attending in CRIT pediatric dentistry services, suffer neuro-musculo-skeletal disabilities. This group of patients usually exhibits poor oral hygiene, high risk of caries, and lack of well-controlled oral care, thus have higher needs for dental treatment under general anesthesia.

Although different studies have shown higher success rates and longer longevity in the oral cavity of PMC on primary teeth in comparison with other rehabilitation materials (amalgam fillings, composite resins, compomers, or glass-ionomer cements), there is an absence of reports on the survival rate of metal crowns in pediatric patients with physical or mental disabilities [4,6,10,11].

The aim of the present study was to assess the survival rate of PMC placed on the primary teeth of pediatric patients with different types of disabilities, as part of an exhaustive oral rehabilitation program, and treated following the protocols established by CRIT, located in Aguascalientes City, Mexico.

2. Materials and methods

2.1. Design

This retrospective cohort study was approved by the CRIT's Internal Research Ethics Committee (Approval number: 2013-001). The study was performed using the electronic database of pediatric patients with different disabilities treated in our service between January 2004 and December 2014. Each electronic registry should include a systemic diagnosis, age, first evaluation date, medical history, birth findings, drug therapy information, general treatment, oral treatment, and dates of procedures. For this study, only the following variables were collected: patient's age and gender; clinical diagnosis, and the elapsed time (measured in days) since the placement of the preformed steel crown to the date when it fractured, was damaged, or went missing. Names or any other personal information were maintained confidentially.

2.2. Sample selection

Since 2004, a total of 613 children, has followed a meticulous oral rehabilitation protocol for medically compromised pediatric patients (e.g., children with physical/mental disabilities) at the CRIT in Aguascalientes, México. This protocol includes an initial interrogatory with parents, an exhaustive clinical history (e.g., health state, patient cooperation level), oral examination of the child, caries risk assessment based on the Caries Management By Risk Assessment (CAMBRA) system [12], complementary diagnosis studies (x-rays, tomography, or laboratory tests), and the design of a treatment plan with an objective clinical prognosis. Dental treatment may be delivered under local or general anesthesia, and the options available at the CRIT for oral rehabilitation are mainly resin-based restorations and PMC (3M ESPE, St. Paul, MN, USA). After trimming, PMC were adequately adapted onto the prepared tooth, and then cemented with a generous mix of glass-ionomer cement (Ketac™, 3M ESPE, St. Paul, MN, USA), to adequately fill the crown space prior to seating. Crowns were seated from the lingual wall and rolled over onto the buccal wall. Once placed, the crown was maintained under pressure while the cement set, and the excess cement was completely and carefully removed [13].

Inclusion criteria for this study were as follows: registers from patients approached according the protocol mentioned; any type of restored primary teeth (anterior or posterior), and crowns cemented with ionomer material. Patients with incomplete information regarding treatment evolution or loss during follow-up were excluded.

2.3. Response measures

Demographic characteristics of patients and treatments performed in all period of evaluation were recorded. The clinical failure of the treatments was determined through clinical records with respect to the presence of visual damages (e.g.,

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