

**Stainless Steel Crowns Versus Composite Restoration in The Primary Dentition and Decision-Making in Clinical Practice**<sup>1</sup>Dr Wasepha Shaikh, BDS, Goregaon Dental Centre, India<sup>2</sup>Dr Anagha Vinayak Naik, BDS, Goregaon Dental Centre, India<sup>3</sup>Dr Hiralben Rushiraj Solanki, B.D.S, Samir Patel DDS, LLC, New Jersey, USA<sup>4</sup>Dr Anoli Agrawal, MDS, Public Health Dentistry, Assistant Professor, Department of Public Health Dentistry, ACPM Dental College, Dhule, Goregaon Dental Centre, India<sup>5</sup>Dr Naval Ghule, BDS, Goregaon Dental Centre, India**Corresponding Author:** Dr Wasepha Shaikh, BDS, Goregaon Dental centre, India**Citation of this Article:** Dr Wasepha Shaikh, Dr Anagha Vinayak Naik, Dr Hiralben Rushiraj Solanki, Dr Anoli Agrawal, Dr Naval Ghule, “Stainless Steel Crowns Versus Composite Restoration in The Primary Dentition and Decision-Making in Clinical Practice”, IJDSIR- February – 2025, Volume – 8, Issue – 1, P. No. 137 – 144.**Copyright:** © 2025, Dr Wasepha Shaikh, et al. This is an open access journal and article distributed under the terms of the creative common's attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract**

Dental caries remains the most prevalent chronic disease affecting the paediatric population worldwide affecting 621 million children with primary teeth. Acid-producing bacteria cause it in the presence of fermentable carbohydrates. If left untreated dental caries in children can severely impact the oral health as well as the general well-being of the child. Impaired speech and Difficulty in eating due to pain and infection are among the immediate consequences. It may also cause long-term effects such as compromised growth and development, increased risk of dental caries in permanent teeth and even poor academic performance. It is important to treat and restore severely damaged teeth for the preservation of healthy primary dentition.

The American Academy of Pediatric Dentistry recommends the use of prefabricated full-coverage restorations on large or multi-surface cavitated lesions for primary teeth. Various restorative materials are used to treat various primary teeth after a pulpectomy procedure. Stainless steel crowns have been commonly used in paediatric dentistry since their introduction in 1950 and continue to be a feasible choice to restore primary teeth with extensive caries after pulpectomy. Stainless steel crowns have been reported to be highly durable and cost-effective. However, the metallic colour is of concern for many parents and children.

Composite resin restoration (CRRs) is another popular choice and is preferred over traditional stainless-steel crowns due to their superior aesthetics. However, they

are technique-sensitive and require a longer time for placements. This narrative review aims to focus on the restoration done using stainless steel crown and composite resin restoration and their comparison in terms of durability aesthetics and functional success.

**Keywords:** Stainless Steel Crowns, Crowns, Paediatric Dentistry, Composite Resin Restoration, SSC

## Introduction

In spite of the decrease in caries cases, untreated carious primary teeth remain a global health problem [1]. Water fluoridation, patient education, fluoridated dentifrices, oral rinses and professionally applied topical fluorides have significantly reduced tooth decay; however, the occlusal surface of the teeth remain the most susceptible to caries. Data indicates that more than 80 percent of Treatment provided in a contemporary dental practice is attributed to pit and fissure caries[2].

The prevalence of dental caries among Indian school-going children in primary dentition ranges from 64 to 78%, and in permanent dentition, the value ranges from 18 to 67%. Female had higher caries incidence than male. Prevalence of 61.8% noticed in low-socioeconomic group and 49.1% in high-socioeconomic status people [3].The prevalence of dental caries among Indian school-going children was high in primary dentition, when compared with permanent dentition and Also, there is no statistical significant difference in the rate of caries prevalence among rural and urban areas[3]. Research shows that untreated cavities cause pain in children and contribute to dental fear. Pain and fear affect children's oral health behaviour, which is crucial as habits formed in childhood can last a lifetime. Neglecting to treat the decayed primary teeth can have lasting negative effects, highlighting the importance of restoration [4].The Treatment options range from minimally invasive to restorative approaches.

Conservative strategies for managing caries focus mainly on maintaining healthy tooth structure and extending the lifespan of dental restorations, leading to improved long term tooth preservation in the mouth [5]. Nevertheless it is advised to treat Cavitated lesions to prevent further caries activity and preserve the dental hard tissue. A key factor for the success and longevity of any endodontic treatment is the complete sealing of the cavity after treatment is completed [5].

Dr. William Humphrey of Denver, Colorado popularised stainless steel crowns in paediatric dentistry in 1950. Although they were first described by Engel in 1947.since their introduction they have been indicated for extensive caries, developmental defects, high caries risk children and after pulpal treatments of primary molars. SSCs are particularly useful in restoring the endodontically treated teeth as it reduces the risk of tooth fracture due to weakened dentin [6]. They can be trimmed and crimped for a good fit due to their flexible structure [7]. Placement of ssc is the most commonly recommended restoration following endodontic treatment of a primary molar as it provides good coronal seal preventing microbial infiltration or restoration failure over time [5]. They are highly durable and affordable. However their metallic appearance is of concern for both parents and children. Open faced and preveneered SSCS were developed for aesthetics but had certain drawbacks like poor gingival health, longer chair side time, limited contouring ability and veneer chipping or fracture issues [7].

The acid etch technique advocated by buonocore increases retention for esthetic restoration in primary and permanent teeth [2].Composite resins are widely used for anterior or posterior restorations of primary teeth. Mechanical or physical improvements in composite resin properties such as filler content, amount and morphology

have enabled for usage in different types of restorations such as preventive resin restorations , moderate class 2 restorations, class 3 ,4 and 5 restorations [8].The improvements in resin based composites over time have led to better durability, colour stability and longevity of restorations [2]. While dealing with paediatric patients a collaborative behaviour is needed to carry out a restoration in a short period of time. Composite resin restoration however are more technique sensitive and time consuming procedure and are seldom substituted by a conveniently less technique sensitive restorations [9].However due to their tooth coloured nature they impart a more naturally looking cavity and is thus aesthetically superior although it draws certain disadvantages.

The aim of this paper was to identify as many articles in the last decade focusing on the comparison and contrast between the stainless steel crowns and composite resin restoration in paediatric patients. It also explores the specific advantages and limitations of each material. The goal is to make a thorough understanding of both the restorative options to make an optimal decision.

### Methods

This narrative review involved a comprehensive literature search across databases including pubmed and google scholar. Key search terms used were "Stainless steel crown AND composite restoration in paediatric" and" Stainless steel crown OR composite restoration in paediatric" which yielded three and 152 results respectively.

The inclusion criteria were strictly designed to ensure relevancy. Selected articles were required to be published in English and concentrated on the paediatric population. Articles focusing on durability, esthetics and functional success of either material were included. Studies older than 2014 were excluded. The data was

carefully extracted and analysed primarily focusing on stainless steel crown and composite resin restoration and their indications, advantages, disadvantages, aesthetics, durability and patient satisfaction among others.

### Composite Resin Restoration

Composite resins are widely used for anterior or posterior restorations in primary teeth. Mechanical or physical improvement in composite resin properties such as filler content, amount and morphology have allowed for usage in different restoration types [7]. Composite Resin Restoration has superior aesthetic properties. Another significant advantage of Composite resin restoration is their ability to bond to tooth structure. This bonding strengthens the restoration, seals the margins and thereby prevents micro leakages and secondary caries. The conservative nature of composite resin restoration allows for the preservation of more natural tooth structure which is particularly beneficial in paediatric patients [1].Recent advances have improved its both mechanical properties and wear resistance making it more suitable for the paediatric population [2].Composite resin restorations are versatile and can be used for restorations including fillings and small to medium sized cavities. They can also be used for both anterior or posterior teeth providing flexibility in treatment options [8].

However CRRS have certain drawbacks when used primarily for deciduous molars. As posterior teeth have high occlusal stress, durability is a major concern. Composite resin restoration has high polymerization shrinkage that results in marginal deficiencies, cracked cusps and material fracture, especially in multi-surface restorations after pulp treatment. The fracture of restoration may cause microbial infiltration leading to endodontic treatment failure [5]. CRRS are also highly technique sensitive therefore dentist's technique and

quality of the materials used also plays a major role. Moisture control and proper isolation is very important to achieve high bond strength as contamination with saliva can compromise the restoration's longevity. It's also a time consuming process which may be uncomfortable to many patients [9].

Composite resin restoration is often more expensive than alternatives such as stainless steel crowns or amalgam. composite may not be the ideal restorative material for primary posterior teeth requiring large multi surface restorations or high-risk patients with poor oral hygiene, numerous carious teeth, and demineralization [10].

Composite resin restoration also gets stained as generally, all staining agents stained all composite resin materials; tea produced the most severe stain and multivitamin syrup the least [11].

#### **Indications in primary teeth**

1. Small pit and fissure caries
2. Occlusal surface caries extending into dentin.
3. Class 2 restorations in primary teeth that do not extend beyond the proximal lone angles [2].
4. Class 3, 4, and 5 restorations [2].

#### **Contraindications**

1. Teeth cannot be isolated
2. Individuals needing large multiple surface restorations in the posterior primary dentition
3. High risk patients with multiple caries or tooth demineralization [2].
4. Patient with poor oral hygiene.

#### **Stainless Steel Crowns**

Stainless steel crowns are widely regarded as the standard choice for restoring extensively decayed or damaged primary molars [12]. Placement of a stainless steel crown is the most commonly recommended restoration following endodontic treatment of primary

molars as it provides a coronal seal, preventing microbial infiltration or restoration failure over time [5].

The primary advantage of SSCs is their exceptional resistance to wear i.e they are durable also provide longevity, efficiency, cost effectiveness and reliability making them a suitable choice for the paediatric population [12]. Apart from SSC's no restorative material available offers the advantages of affordability, low cost and durability when interim full coronal coverage is needed [12]. They are particularly indicated in patients with conditions like hypophosphatemia, heritable dental defects (e.g. amelogenesis imperfecta, dentinogenesis imperfecta) and enamel hypoplasia. SSCs should be carefully placed, especially in patients where gingival inflammation is a risk factor. Proper adaptation of crown margins can minimise irritation and periodontal problems [6].

SSCs are extremely helpful in regaining lost tooth structure. At present, the primary purpose of using SSCs is to facilitate ideal chewing activity and vertical size continuity for a child. SSCs provide satisfactory adhesion and chewing function. They are durable i.e they have high survival rates. In addition, no technical precision is required. Therefore SSCs are commonly used for restorations in the posterior primary teeth [13].

The crown is fitted and cemented quickly reducing the chair time and patient discomfort. This ease of application is advantageous in the paediatric population as reducing treatment time can improve patient compliance and comfort [5]. Although SSCs are less adaptable to specific aesthetic and individual needs compared to tooth coloured restorations like CRRs their effectiveness in preventing further caries and their long term durability often can lead to a patient and parent satisfaction[5].

## Indications

1. Following pulp therapy.
2. Multi Surface caries restorations.
3. Patients at high risk of caries.
4. Deciduous teeth with developmental defects, such as amelogenesis imperfecta, dentinogenesis imperfecta, enamel hypoplasia.
5. Teeth with extensive wear.
6. Where it is likely that the restoration will fail, e.g., the proximal box formed is extended beyond the anatomic line angles.
7. Fractured teeth.
8. Abutment for space maintainer [12]
9. Patients who are unlikely to attend follow up appointments.

## Contraindications

1. Primary teeth that exhibit more than a half of root resorption.
2. Primary tooth approaching exfoliation (6 to 12 months).
3. The tooth is with excessive mobility.
4. Patients with nickel allergies and sensitivity.
5. Inability to fit the crown due to lack of cooperation by the patient [12].

## Composite Resin Restoration VS Stainless Steel Crowns

Various factors should be considered while choosing between stainless steel crowns and composite resin restorations including caries prevention, indications, aesthetics, allergic reactions, failure rate and cost among others.

Below is a detailed comparison between the two in a tabloid form,

| Feature  | Composite resin restoration  | Stainless steel crowns  |
|--|--|---|
| Aesthetics                                       | They provide superior aesthetics as they are tooth coloured making them an ideal choice for patients concerned with aesthetics.  | Ssc are less aesthetically pleasing due to their metallic nature but they can be modified with white facings for improved aesthetics to be used in the anterior region [7]. |
| Durability                                       | They are less durable compared to ssc and are prone to fracture [5]. In such cases there might be a need for frequent replacements [14].   | Ssc provides superior durability [12]   |
| Failure rate and preservation of tooth structure | Low failure rate and less invasive [1].  | Very low failure rates however they are much more invasive [1][9].  |
| Allergic reaction                                | According to data from NIH-NIDR Risk assessment consensus conference on restorative materials CCRs do not raise the risk of toxicity or hypersensitivity.<br>There is little degradation of RBCs, indicating | SSCs may cause delayed hypersensitivity reactions, due to nickel content, which can cause perioral skin eruptions. These typically heal after crown removal [6].            |

|                       |   |  |
|-----------------------|---|--|
|                       | no issues with using them as restorative materials [2]  |  |
| Cost                  | They are expensive compared to SSC [10].  | Cost effective [6][7].(Cureus 0016) s15  |
| Procedure time        | Significantly longer placement time [2].<br>Uncooperative child may determine that it is not a material of choice [2][9]                                | Requires less time as they are preformed.  |
| Caries prevention     | High risk of secondary caries [3].  | SSCs offer reliable full crown coverage and are effective in caries prevention [6].  |
| Technique sensitivity | Highly sensitive to the lack of moisture control especially if the patient is uncooperative it can jeopardise the good performance of the material [1]. | Ssc is less technique sensitive and the outcome would not be as detrimental if by chance the field is contaminated with saliva [14]. |

**Decision making in clinical practice involves several critical factors such as:**

- 1) Extent of decay: Teeth with minimal to moderate decay are often treated with composite resin restoration especially anterior teeth for aesthetic advantages. however, teeth with extensive caries or teeth where pulpotomy has been performed, SSCs are generally recommended due to their superior durability and its ability to protect remaining tooth structure [6].
- 2) Patient Behaviour: If a child is well behaved and compliant then restorations with CRRs is easier as it takes longer time compared to SSCs. Stainless steel crowns are usually preferred in young children or with behavioural problems because they are quicker and easier to place compared to CRRs which are technique and time-sensitive[9] for example , a three year old child with a large carious lesions on a primary first molar will receive a SSC , while ten year old child with the same lesion may receive a multi-surface composite resin restoration since ssc

are less technique sensitive compared to multi surface composite restoration [14].

- 3) Aesthetic concerns: CRRs are more aesthetically superior due to their tooth coloured nature and thus suitable for patients for whom aesthetics is a primary concern.
- 4) Long term prognosis: SSCs offer longevity, durability and lower failure rates. They are an excellent choice in patients with recurrent decay providing long term protection without a need of frequent replacements [14]. There are a number of risk factors which lead to reduced durability of the composite resin restoration including patient factors (eg. Caries risk, parafunctional habits such as bruxism, frequency of follow ups, socioeconomic status), Dentist factors (different operators, technique, experience) and tooth / restorations factors (endodontic treatment, type of tooth, number of restored surfaces) . Patient gender and type of composite used generally does not influence durability [15].



The decision making process should also involve a discussion with the parent or a guardian explaining to them about the advantages and disadvantages of both the restorations considering their preferences. When dealing with paediatric patients, age and behaviour are factors to be observed. A collaborative approach is required for carrying out the restoration in a short span of time [9]. All these factors should be considered before placing an appropriate restoration.

### Conclusion

In conclusion, both composite resin restorations and stainless steel crowns have specific roles in the management of primary dentition that are discussed above. Both the types of restorative material have their own specific advantages and disadvantages. The American academy of paediatric dentistry recommends the use of SSCS for primary molars with extensive caries, require pulp therapy or are at high risk if future caries while CRRS are recommended for teeth with less extensive caries particularly in aesthetically sensitive areas. Deciding on which of these restorative options is most appropriate depending upon the amount of tooth decay present, patient habits, aesthetics, patient behaviour and long-term prognosis. The American academy of paediatric dentistry recommends the use of SSCS for primary molars with extensive caries, require pulp therapy or are at high risk if future caries while CRRS are recommended for teeth with less extensive caries particularly in aesthetically sensitive areas.

By adhering to these clinical guidelines and involving parents in the decision making process, dental practitioners can offer treatment that is personalised to each individual patient keeping in mind their specific needs. This approach ensures both functional efficacy and aesthetic satisfaction in primary dentition. Educating parents and making informed decisions based on the

condition of the tooth and patient factors contribute to achieving optimal outcomes for paediatric patients.

### References

1. Amend S, Seremidi K, Kloukos D, Bekes K, Frankenberger R, Gizani S, Kraemer N. Clinical effectiveness of restorative materials for the restoration of carious primary teeth: an umbrella review. *Journal of clinical medicine*. 2022 Jun 17;11(12):3490.
2. Donly KJ, García-Godoy F. The use of resin-based composite in children: an update. *Pediatric dentistry*. 2015 Apr 15;37(2):136-43. S8
3. Ebinezer J, Nagaraj V. Prevalence of dental caries among children in Indian population. *Journal of Scientific Dentistry*. 2021 Jul 1;11(1):29-30.
4. Pinto GD, Oliveira LJ, Romano AR, Schardosim LR, Bonow ML, Pacce M, Correa MB, Demarco FF, Torriani DD. Longevity of posterior restorations in primary teeth: results from a paediatric dental clinic. *Journal of dentistry*. 2014 Oct 1;42(10):1248-54
5. Olegário IC, Bresolin CR, Pássaro AL, de Araujo MP, Hesse D, Mendes FM, Raggio DP. Stainless steel crown vs bulk fill composites for the restoration of primary molars post-pulpectomy: 1-year survival and acceptance results of a randomized clinical trial. *International Journal of Paediatric Dentistry*. 2022 Jan;32(1):11-21.
6. Almajed OS. Shaping Smiles: A Narrative Review of Crown Advancements in Pediatric Dentistry. *Cureus*. 2024 Jan;16(1). Cureus
7. Taran PK, Şahinbaş A, Bayraktar GA. Effect of different restorative materials on primary tooth wear: A quantitative evaluation using microcomputed tomography. *Pediatric Dentistry*. 2021 Sep 15;43(5):395-402. S15

8. Donly KJ, García-Godoy F. The use of resin-based composite in children: an update. *Pediatric dentistry*. 2015 Apr 15;37(2):136-43. Number
9. Chisini LA, Collares K, Cademartori MG, de Oliveira LJ, Conde MC, Demarco FF, Correa MB. Restorations in primary teeth: a systematic review on survival and reasons for failures. *International journal of paediatric dentistry*. 2018 Mar;28(2):123-39.
10. American Academy of Pediatric Dentistry. *Pediatric restorative dentistry. The Reference Manual of Pediatric Dentistry*. Chicago, Ill.:American Academy of Pediatric Dentistry; 2023:443-56.
11. Afzali BM, Ghasemi A, Mirani A, Abdolazimi Z, Baghban AA, Kharazifard MJ. Effect of ingested liquids on color change of composite resins. *Journal of Dentistry (Tehran, Iran)*. 2015 Aug;12(8):577.
12. Amlani DV, Brizuela M. Stainless Steel Crowns in Primary Dentition. [Updated 2023 Mar 19]. In: StatPearls [Internet]
13. Guler MS, Guler C, Belduz Kara N, Odabasi D, Bekci ML. The stress distribution of a primary molar tooth restored with stainless steel crown using different luting cements. *BMC Oral Health*. 2024 Feb 23;24(1):269.
14. Zahdan BA, Szabo A, Gonzalez CD, Okunseri EM, Okunseri CE. Survival rates of stainless steel crowns and multi-surface composite restorations placed by dental students in a pediatric clinic. *Journal of Clinical Pediatric Dentistry*. 2018 Jan 1;42(3):167-72.
15. Demarco FF, Cenci MS, Montagner AF, de Lima VP, Correa MB, Moraes RR, Opdam NJ. Longevity of composite restorations is definitely not only about materials. *Dental Materials*. 2023 Jan 1;39(1):1-2