CASE REPORT

A novel treatment for an 8-year-old pulpectomy patient followed by the placement of Bioflx crowns: a case report

Anindya Larasati Paham[1*]
Meirina Gartika[2]

[1]Pediatric Dentistry Residency Program, Faculty of Dentistry, Universitas Padjadjaran, Bandung, Indonesia
[2]Department Pediatric Dentistry, Faculty of Dentistry, Bandung, Indonesia

* Correspondence:
anindyalarasatip@gmail.com

Received: 06 May 2025
Revised: 12 June 2025
Accepted: 26 July 2025
Published: 31 July 2025
DOI: 10.24198/pjd.vol37no2.59315

p-ISSN 1979-0201
e-ISSN 2549-6212

Citation:
Paham, AL. Gartika, M. A novel treatment for an 8-year-old pulpectomy patient followed by the placement of Bioflx crowns: a case report. Padj J Dent, July. 2025; 37(2): 239-249.

ABSTRACT

Introduction: Pulpectomy is a common treatment for primary teeth affected by irreversible pulpitis or pulp necrosis, with the goal of preserving their function and condition until natural exfoliation occurs. Successful outcomes depend not only on effective canal debridement but also on the selection of an appropriate final restoration. Bioflx crowns are a newly introduced full-coverage restoration that offers both aesthetic and functional benefits, making them suitable for pediatric patients. This case report presents a novel treatment for an 8-year-old patient who underwent a pulpectomy, followed by the placement of Bioflx crowns. **Case Report**: An 8-year-old girl complained of persistent pain in her lower left posterior tooth for the past two weeks. Clinical and radiographic examination confirmed a diagnosis of pulp necrosis in tooth #75. The treatment plan included pulpectomy followed by Bioflx crown placement, based on parental preference for a durable and aesthetic solution. This case highlights the application of a flexible hybrid polymer crown in a post-endodontic primary molar-an approach rarely reported. The report provides a comprehensive account of the clinical procedure and short-term outcomes. At each visit, favorable healing was observed, with no discomfort or signs of reinfection. After one month of follow-up, radiographic evaluation confirmed adequate obturation and crown margin adaptation. **Conclusion**: Bioflx crowns demonstrated clinical effectiveness as a restorative option following pulpectomy in pediatric patients, with excellent marginal integrity, retention, and aesthetics observed during follow-up.

KEYWORDS

Primary teeth, pulp necrosis, pulpitis, pulpectomy, Bioflx crown.

INTRODUCTION

Advancements in dental care over the past few decades have enabled the development of more effective caries prevention programs, significantly reducing the incidence and prevalence of the disease. However, the high prevalence of caries in Indonesia requires not only effective management strategies but also the active participation of patients in understanding and recognising the importance of caries prevention. This lack of engagement may be one of the reasons why caries remains the most common chronic disease affecting children worldwide. To properly manage and prevent caries, it is essential to understand both the caries process and its progression.[1,2]

Pulp exposure due to caries occurs more frequently in primary teeth than in permanent teeth. This is because primary teeth have relatively larger pulp chambers, more prominent pulp horns, and thinner layers of enamel and dentin. Once the pulp is exposed, microorganisms can infiltrate the pulp tissue, leading to inflammation. If left untreated, this condition may progress to pulp necrosis.[3]

Root canal treatment is a procedure in which the infected or necrotic pulp tissue is removed from the root canals, which are then cleaned, shaped, and filled with a resorbable material. This treatment is appropriate for managing pulp necrosis, as it helps retain the tooth and prevent further infection.[4,5] Pulpectomy is the root canal procedure specifically performed on primary teeth with irreversibly infected or necrotic pulp tissue.[6] The selection of materials and restoration techniques for post-pulpectomy teeth largely depends on the amount of remaining tooth structure, which directly impacts the long-term prognosis of the tooth. The final restoration is expected to restore aesthetic appearance, functional, mastication, and protection of the supporting dental tissues, ensuring a favorable prognosis.[7]

Dental crowns are widely utilized in pediatric dentistry to restore extensively decayed or structurally compromised primary teeth. Pediatric crowns should be easy to adapt and possess sufficient bonding strength to withstand masticatory forces. They are available in sets containing various sizes and shapes specifically designed for primary teeth.[8] Even at a very young age, children are becoming increasingly aware of aesthetics. Contributing factors include modern lifestyle, media influence and the desire to socialize– all of which have led to aesthetic concerns in children similar to those of adults.[9] An optimal restoration should offer superior durability, ease of handling, aesthetic appeal, and cost-effectiveness. There are numerous full-coverage restoration options for primary teeth, each with its own techniques and advantages in terms of function or appearance. Esthetic full-coverage crowns recommended for restoring primary teeth include strip crowns with composite resin[10], prefabricated crowns such as stainless steel crowns (SSCs)[11], zirconia crowns[12], and the newly introduced and increasingly popular Bioflx crowns (NuSmile, Houston, TX, USA).

Among conventional choices, stainless steel crowns (SSCs) have long been considered the gold standard due to their durability, cost-effectiveness, and ease of placement. However, the metallic appearance of SSCs often falls short of meeting the growing aesthetic expectations of both patients and caregivers. This has prompted the development of more visually pleasing alternatives, such as zirconia crowns and newer materials like Bioflx.[13]

In response to these limitations, newer materials have been introduced, such as Bioflx—a prefabricated, flexible, tooth-colored crown made from a high-impact hybrid polymer resin. Bioflx crowns are designed to combine the aesthetic benefits of zirconia with the ease of handling and conservative preparation similar to SSCs. Their flexibility, self-adapting marginal fit, and resistance to staining make them particularly suitable for pediatric patients with functional and aesthetic demands.[14] These material is also used in medical devices that require high strength, flexibility, and durability.[15] Bioflx has gained popularity and is considered an excellent option for managing carious teeth in children.[16]

Clinically, Bioflx crowns are favored for their minimal preparation requirements, self-adapting fit, and time-efficient placement—attributes that are especially beneficial when managing pediatric patients with limited cooperation.[16] Unlike zirconia crowns, which require extensive tooth reduction and offer only a passive fit, Bioflx crowns provide better adaptability during placement and enhanced marginal integrity, potentially reducing chairside time and the need for post-operative adjustments.[17]

Despite these advantages, Bioflx crowns are relatively new, and evidence regarding their long-term clinical performance remains limited. As such, further clinical documentation is needed to evaluate their effectiveness, aesthetic outcome, and patient satisfaction. This report contributes to the literature by documenting a rarely reported case involving the use of Bioflx crown on a posterior primary tooth following pulpectomy, highlighting a minimally invasive restorative approach.

The novelty of this case lies in documenting the clinical application of a flexible, aesthetic, polymer-based Bioflx crown after pulpectomy in a primary molar—an approach rarely reported in pediatric dentistry. It is also clinically significant as it involves a child with limited tolerance for dental treatment, demonstrating the

practicality of Bioflx crowns as an efficient and adaptable restorative option. Moreover, the detailed procedural description—including crown selection, marginal adaptation, and radiographic evaluation—offers practical insights not commonly discussed in previous reports.

The aim of this report is to describe the clinical management and short-term restorative outcome of a primary molar treated with pulpectomy and restored using a Bioflx crown, thereby offering a practical reference for clinicians and contributing to the clinical evidence supporting this novel restorative material.

CASE REPORT

An 8-year-old girl visited the Universitas Padjadjaran Dental Hospital (RSGM Unpad) with her mother for a dental check-up. The patient reported experiencing pain in her lower left posterior tooth over the past two weeks. There was no history of swelling associated with the discomfort. Clinical examination revealed that tooth #75 exhibited approximately one-half crown destruction due to caries, with carious extension into the pulp. The patient's parents expressed a desire to proceed with immediate treatment.

Objective examination showed that tooth #75 was non-vital, with negative response to percussion and palpation tests, and no signs of mobility. Based on all the preliminary clinical examinations, a diagnosis of pulp necrosis was established of pulp necrosis for tooth #75 (Figure 1 and 2).

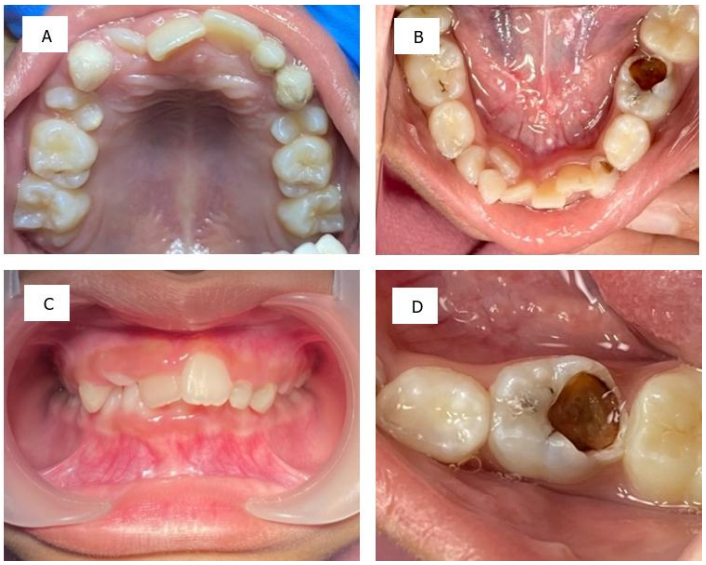

Figure 1. Intraoral condition pre-treatment. A. Upper maxillary; B. Lower mandible; C. Occlusal contact clinical appearance; D. Necrosis pulp on tooth #75

Figure 2. Radiograph periapical on tooth #75 pre-treatment

The patient underwent both subjective and objective examinations during the first visit, which took place on July 10, 2024. The subjective examination involved

anamnesis, including general health status, oral health history, and relevant social background. The objective examination included a clinical evaluation of the patient's condition, with particular emphasis on vitality testing of the affected teeth. Following a comprehensive examination, the patient was referred for radiographic imaging, specifically a periapical X-ray, to support the diagnostic process. The clinical presentation of extensive crown destruction in a primary molar requiring endodontic treatment and full-coverage restoration in a young child presented a unique clinical challenge. The application of a newly introduced, flexible aesthetic crown material under such conditions is rarely documented, underscoring the clinical value of this case.

Based on the anamnesis, clinical findings, and radiographic analysis, the diagnosis for tooth #75 was established as pulp necrosis. Given the remaining tooth structure and the absence of signs of systemic involvement, the prognosis was considered favorable with appropriate endodontic and restorative intervention. Pulpectomy was proposed as the treatment plan for tooth #75. The treatment plan was then thoroughly explained to the patient's parents, and informed consent was obtained.

Biomechanical preparation began with caries removal using a round diamond bur, followed by access cavity preparation on tooth #75 using a round diamond bur and an endo-access bur. After achieving four straight-line access orifices, each root canal was explored with a #10 K-file. The working length was determined with an apex locator, and the measurements were recorded as follows: 15 mm for the mesiobuccal, 14 mm for the mesiolingual, 15 mm for the distobuccal, and 14 mm for the distolingual canals (Figure 3).

The initial apical file size was #15. Biomechanical preparation, microbial control, and part of the cleaning and shaping process were subsequently performed (Figure 4). Following the removal of necrotic tissue, the root canals were irrigated, debrided, and disinfected. Canal shaping was completed using the crown-down technique with K-files, progressing to a master apical file size of #40 in each canal. Irrigation was performed between each K-file using sodium hypochlorite (NaOCl) and saline solution. After cleaning and shaping, the canals were dried with paper points, and calcium hydroxide ($Ca(OH)_2$) was applied as an inter-visit medication. The tooth was then sealed with a temporary restoration, the patient was scheduled for a follow-up appointment two weeks later for the second visit.

Figure 3. Root canal access opening, followed by cleaning and shaping

Due to the patient's busy school schedule, the second visit was delayed from the originally scheduled date of August 2, 2024. The patient eventually returned to continue the root canal treatment on tooth #75. Subjective and objective examinations were performed, and no complaints of pain were reported. The tooth was then cleaned and irrigated with NaOCl and saline solution, followed by additional cleaning and shaping. After removing the previous intracanal medication and thoroughly irrigating the canal, the tooth was dried using paper points. Calcium hydroxide ($Ca(OH)_2$) was reapplied for intracanal sterilisation, and the tooth was sealed with a temporary restoration (Figure 5 and 6). The patient was instructed to return for follow-up treatment the following week.

Figure 4. Extirpation of necrotic pulp

Figure 5. Application of $Ca(OH)_2$ and temporary restoration

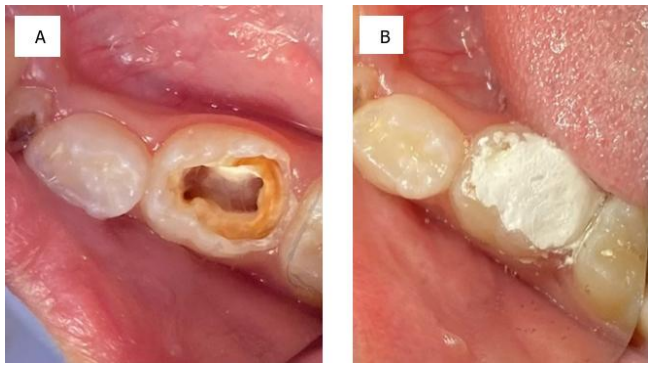

Figure 6. A. The cleaning and re-shaping process on the second visit; B. Application of $Ca(OH)_2$ as medication prior to the temporary restoration

The patient again returned later than scheduled for the third visit, delayed by one week due to her tight school schedule. Subjective and objective examinations were conducted. The subjective examination involved asking the patient about any discomfort or complaints related to the tooth undergoing root canal treatment, while the objective examination included percussion and palpation tests, tooth mobility assessment, and an evaluation of the surrounding gingival tissue. Based on the examination results, with no complaints reported, it was decided to proceed with the obturation of root canal in tooth #75.

At the fourth visit, one week after obturation, the patient returned for follow up (Figure 7-10). Subjective and objective examinations were performed, and the patient reported no complaints of pain in the treated tooth.

Figure 7. Obturation using $Ca(OH)_2$ with iodoform paste, then sealed with a temporary restoration using $ZnPO_4$ cement

Figure 8. Periapical radiograph on the treated tooth after obturation

Figure 9. One-week post-obturation A. Occlusal contact; B. Application of rubber dam for preparation

Tooth preparation was performed on the occlusal surface of tooth #75. Using a flame-shaped bur, the occlusal surface was reduced by 1–1.5 mm, following the natural cusp morphology. The mesial and distal surfaces were also prepared to have contact points with adjacent teeth removal, and sharp corners were rounded. Subsequently, the proximal mesial and distal surfaces were each reduced by 0.5 mm. The Bioflx crown size was selected based on the mesiodistal width of the tooth to ensure full coverage of the clinical crown of tooth #75. The Bioflx crown for tooth #75 was then tried to confirm proper contact with the opposing tooth (Figure 11).

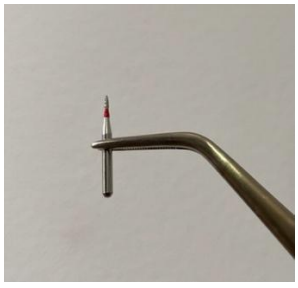

Figure 10. Flame-shape bur

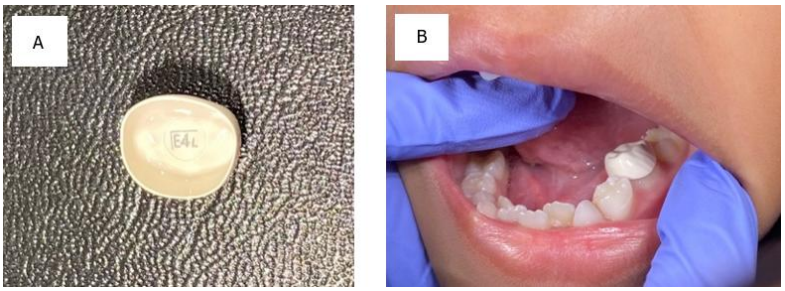

Figure 11. A. Selection of the appropriate Bioflx crown size; B. Bioflx crown fit check

After the occlusal and proximal contacts were prepared, the crown fit was evaluated from the lingual and buccal directions. Some interference was noted on the buccal side, requiring further reduction of the buccal surface. Once proper occlusal contact and fit with the opposing teeth were appropriate, the next step taken was the cementation. Glass Ionomer Cement Type I (GC Fuji I; GC Corporation, Tokyo, Japan) was used for cementation (Figure 12).

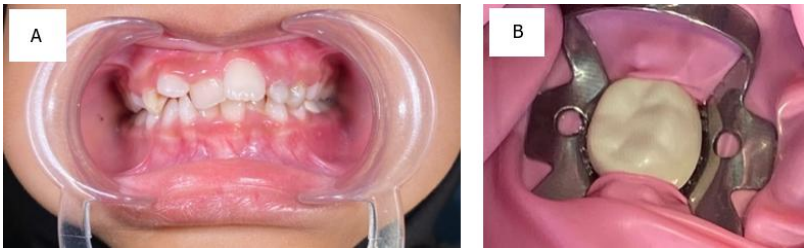

Figure 12. A. Clinical appearance following Bioflx crown placement; B. Occlusal view after Bioflx Crown placement

At the fifth visit, the patient returned for a post-restoration follow-up of the Bioflx crown. Routine subjective and objective examinations were performed, and the patient reported no pain in the treated tooth. The objective examination showed that the surrounding gingival tissues were in good condition (Figure 13). Radiographic examination showed no complications following the placement of the Bioflx crown (Figure 14).

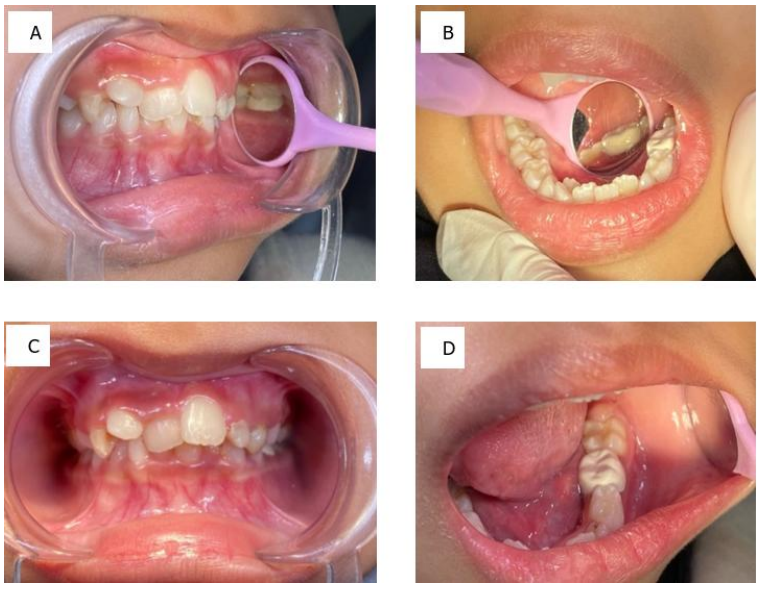

Figure 13. One-week post follow-up control of Bioflx Crown on tooth #75. A. Buccal view; B. Lingual view; C. Occlusal contact; D. Occlusal view

Figure 14. Periapical radiograph on tooth #75 in the one-week post-restoration control visit after Bioflx crown placement

At the sixth visit, the patient returned for the extraction of the anterior tooth and for a one-month follow-up of the Bioflx crown restoration. The subjective examination revealed no complaints from the patient. The objective examination showed healthy gingival tissues, with minor dimpling observed in the occlusal contact area (Figure 15).

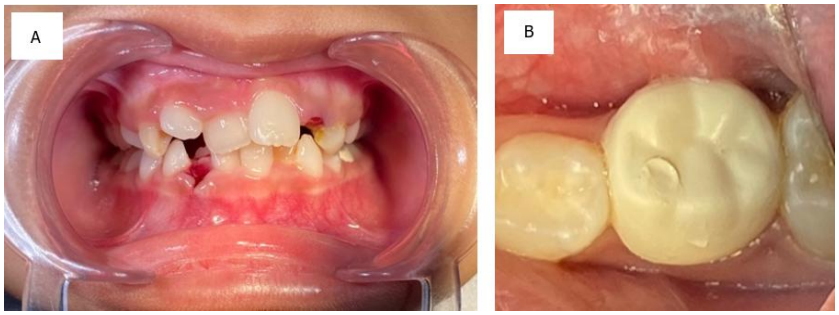

Figure 15. A. Clinical appearance after extraction anterior tooth; B. One-month post follow-up control of Bioflx crown placement

DISCUSSION

Understanding caries as a multifactorial condition is crucial for its effective management, particularly in cases involving extensive pulp involvement in primary teeth. However, the key to successful caries management lies in individual caries risk assessment. This assessment guides the selection of an appropriate treatment plan tailored to the patient's level of caries risk, thereby ensuring the best possible outcome.[18]

Several clinical studies have assessed the importance of restorative care in the prognosis of endodontic treatment, highlighting that the quality of the coronal restoration is one of the most influential factors in the survival of endodontically treated teeth – even more so than the quality of the endodontic treatment itself. [19] It is also crucial to consider the time between the completion of endodontic therapy and the placement of the final restoration, as longer intervals significantly increase the risk of bacterial leakage and fracture of the remaining tooth structure.[20]

In the present case, an 8-year-old girl presented with necrotic pulp in tooth #75 requiring pulpectomy. Given the extensive structural damage and aesthetic concerns expressed by the parent, a durable and visually pleasing full-coverage restoration was essential. The decision to use a Bioflx crown was driven by the need to preserve function, ensure aesthetic rehabilitation, and accommodate the patient's limited treatment tolerance. This aligns with recommendations from Caussin et al. (2024),

who emphasized that the long-term prognosis of endodontically treated teeth is strongly influenced by the quality of the final coronal restoration.[7]

Compared to similar published cases using zirconia or SSCs after pulpectomy, Bioflx crowns demonstrate comparable retention while offering improved patient satisfaction due to their tooth-colored appearance. Bioflx crowns are metal-free and Bis-GMA (Bisphenol A-Glycidyl Methacrylate)-free, monochromatic restorations that can effectively mask the discoloration of arrested caries.[20] As shown in Figure 10 and 11, the crown's self-adapting "flex-fit" design facilitated seating without the need for crimping and accommodated occlusal discrepancies by forming dimples in high-pressure areas, thereby reducing the need for extensive occlusal adjustment.

In this case, crown size was determined by measuring the mesiodistal width using callipers, with minor buccal reduction performed during try-in stage (Figure 11B). The crown that provided the best fit was selected in each instance. This feature was particularly useful when a high occlusal contact point was detected during crown placement. Bioflx crowns have unique design features for both anterior and posterior applications. They can be seated using a bite stick and trimmed if necessary using crown and bridge scissors. Additionally, their sandblasted intaglio surfaces enhance retention when used with self-setting resin-modified glass ionomer (RMGI) or conventional glass ionomer (GI) cements. Light-cured cements are not recommended.[16,21,22] Careful selection of luting agents is therefore essential to ensure long-term retention.

Bioflx crowns are not recommended for use with the Hall technique, in cases of bruxism, or when crimping is required. The wear resistance is comparable to, or even greater than, that of traditional SSCs. Bioflx crowns self-adapt by forming dimples in areas of high occlusion and are resistant to staining, with no visible discolouration reported even after more than one year intraorally or when placed opposing an SSC.[14,16] Clinical and radiographic assessments (Figure 13 and 14) confirmed adequate obturation and crown marginal adaptation one week after placement. Additionally, Figure 15B, taken at the one-month follow-up revealed continued crown retention and healthy gingival tissue, with no signs of reinfection or discomfort. These findings reflect a stable post-endodontic prognosis, aligning with existing evidence from Goswami et al. (2024) and Patil et al. (2022), which emphasizes the importance of coronal restoration quality. Bioflx crowns transfer less stress to the dentin and periodontal tissues. Radiographic follow-up confirmed adequate obturation and crown margin adaptation, consistent with previous reports indicating that Bioflx's radiopacity of 1 mm supports effective post-operative evaluation.[14,23]

The success of this case can be attributed, in part, to the unique material properties of Bioflx crowns, which offer a flexible, self-adapting fit and superior aesthetic outcomes. Compared to zirconia crowns, which require extensive tooth reduction and provide only a passive fit, Bioflx crowns allow for more conservative preparation and active adaptation during placement (Figures 10 and 11). This adaptability reduced chairside time and minimized post-operative occlusal adjustments– an advantage in managing pediatric patients with limited cooperation.[14]

A recent study by Abo-Elsoud et al. (2024) also confirmed Bioflx crowns' resistance to fracture and marginal wear after thermomechanical aging, supporting their clinical longevity.[15] The same study reported favorable gingival responses, which were consistent with the healthy gingival tissue observed in this case (Figure 13).

From the patient's perspective, both the clinical efficiency and aesthetic results were well received. The child reported no discomfort during or after treatment, and the parent expressed high satisfaction with the crown's natural appearance and restored masticatory function. These subjective outcomes further support Rahate et al. (2023), who reported higher parental and child satisfaction scores for Bioflx crowns compared to zirconia and SSCs.[17]

Overall, this case demonstrates that Bioflx crowns not only meet clinical expectations in terms of marginal integrity and durability but also align with patient-centered goals such as aesthetics, comfort, and reduced treatment time. Although short-term outcomes were favorable, further long-term studies are necessary to fully validate the effectiveness of Bioflx crowns in various pediatric restorative contexts, as emphasized in literature reviews reported by Almajed (2024) and Butera et al. (2022).[18,20]

However, this case report has some limitations. The follow-up period was relatively short, limited to one month post-restoration, which does not allow for comprehensive assessment of long-term performance, wear resistance, and periodontal response. Additionally, as a single case report its findings cannot be generalized. The absence of quantitative evaluation tools—such as standardized patient satisfaction survey or occlusal force measurements—also restricts the objectivity of outcome assessment.

Future studies involving larger sample sizes and extended follow-up periods are recommended to validate these findings and better establish the long-term efficacy and clinical behavior of Bioflx crowns compared to traditional restorative materials.

CONCLUSION

Pediatric dentistry treatments require significant effort to achieve an optimal final restorations. Therefore, treatment procedures in pediatric dentistry should aim to be as simple, minimally invasive, and non-traumatic as possible, while offering a favorable long-term prognosis. Bioflx crowns represent an innovative option in pediatric dental practice, offering a combination of superior fit, longevity, ease of handling, and enhanced aesthetics compared to traditional prefabricated crowns.

In this case, the use of Bioflx crown contributed to a successful clinical outcome following pulpectomy, providing both functional durability and visual appeal. These crowns help achieve a positive long-term therapeutic effect in primary tooth restorations, particularly in patients with limited treatment tolerance and high aesthetic expectations.

The findings suggest that Bioflx crowns may serve as a clinically relevant option to support evidence-based decision-making in pediatric restorative dentistry, particularly in cases where aesthetic, minimally invasive preparation, and patient cooperation are critical. Their application may also enhance treatment efficiency and align with the goals of contemporary pediatric dental protocols.

However, further long-term clinical studies with larger sample sizes are recommended to fully validate their effectiveness in comparison to conventional restorative materials in pediatric cases.

Author Contributions: Conceptualization, A.L. and M.G.; validation, A.L. and M.G.; investigation, A.L. and M.G.; resources, A.L.; writing original draft preparation,A.L.; writing review and editing, A.L. and M.G .; supervision, M.G.; project administration, A.L. and M.G.; funding acquisition, all authors. All authors have read and agreed to the published version of the manuscript.
Funding: This research received no external funding
Institutional Review Board Statement: The patient has expressed her willingness through the hospital's general consent.
Informed Consent Statement: Written informed consent has been obtained from the patient(s) to publish this paper.
Data Availability Statement: Not applicable.
Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

1. Khan IM, Mani SA, Doss JG, Danaee M, Kong LY. Pre-schoolers' tooth brushing behaviour and association with their oral health: a cross sectional study. BMC Oral Health. 2021; 21(1): 283. https://doi.org/10.1186/s12903-021-01643-8
2. Mosharrafian S, Baghalian A, Hamrah MH, Kargar M. Clinical evaluation for space maintainer after unilateral loss of primary first molar in the early mixed dentition stage. Int J Dent. 2021; 2021(1): 3967164. https://doi.org/10.1155/2021/3967164
3. Abdulwahab MA, Alqahtani MS, Alshammari AA, Jiffri SE, Alasim AM, Alsharidah FM. Etiologies, risk factors and outcomes of dental pulp necrosis. Int J Community Med Public Health. 2021; 9(1): 348. https://doi.org/10.18203/2394-6040.ijcmph20214793

4. Burns LE, Kim J, Wu Y, Alzwaideh R, McGowan R, Sigurdsson A. Outcomes of primary root canal therapy: An updated systematic review of longitudinal clinical studies published between 2003 and 2020. Int Endod J. 2022; 55(7): 714-31. https://doi.org/10.1111/iej.13736
5. Shah A, Peacock R, Eliyas S. Pulp therapy and root canal treatment techniques in immature permanent teeth: An update. Br Dent J. 2022; 232(8): 524-30. https://doi.org/10.1038/s41415-022-4139-4
6. Shalan HM, Awad SM, Wahba AH, Mohamed HB. Comparative evaluation of different obturation techniques in primary molars pulpectomy: A clinical study. Act Sci Dent Sci. 2022; 6(3). https://doi.org/10.31080/ASDS.2022.06.1313
7. Caussin E, Izart M, Ceinos R, Attal JP, Beres F, François P. Advanced material strategy for restoring damaged endodontically treated teeth: a comprehensive review. Mater (Basel). 2024; 17(15): 3736. https://doi.org/10.3390/ma17153736
8. Sztyler K, Wiglusz RJ, Dobrzynski M. Review on preformed crowns in pediatric dentistry-the composition and application. Mater (Basel). 2022; 15(6): 2081. https://doi.org/10.3390/ma15062081
9. Ali AM, Abdellatif HM, Baghdady SI, Abdelaziz WE, Elkateb MA. Child discomfort and parental acceptability of silver diamine fluoride and alternative restorative treatment: A randomized controlled clinical trial. J Dent. 2021; 114: 103811. https://doi.org/10.1016/j.jdent.2021.103811
10. Nischal M, Gupta T, Mehra M, Sadana G. Clinical comparison of three tooth-colored full-coronal restorations in primary maxillary incisors. Int J Clin Pediatr Dent. 2020; 13(6): 622–9. https://doi.org/10.5005/jp-journals-10005-1842
11. Helmy RH, Mohamed PA, Ibrahim YM, Eldokmak MM, Sedek EM, El-Naggar AI, Abdelkarim AA. A Dental materials approach to pediatric dental full coverage–a review. Alexandria Dent J. 2023; 48(3): 200-9. https://doi.org/10.21608/adjalexu.2023.249332.1446
12. Hamrah MH, Mokhtari S, Hosseini Z, Khosrozadeh M, Hosseini S, Ghafary ES, Hamrah MH. Evaluation of the clinical, child, and parental satisfaction with zirconia crowns in maxillary primary incisors: a systematic review. Int J Dent. 2021; 2021(1): 7877728. https://doi.org/10.1155/2021/7877728
13. Waggoner W. Restoring primary anterior teeth: updated for 2014. Pediatric Dent. 2015; 37(2): 163-70.
14. Goswami M, Jangra B, Chauhan N, Khokhar A. Esthetics in pediatric dentistry—bioflx crowns: case series. Int J Clin Pediatr Dent. 2024; 17(3): 357–61. https://doi.org/10.5005/jp-journals-10005-2766
15. Abo-Elsoud AA, Mohamady EM, Fathi Abdou NE. Thermomechanical aging effects on vertical marginal gap and fracture resistance: a comparative study of Bioflx and traditional pediatric crowns. BMC Oral Health. 2024; 24(1): 1334. https://doi.org/10.1186/s12903-024-05053-4
16. Madhusudhan K, Rathnashree M, Subramaniam P. Aesthetic management of multisurface caries tooth with bioflx crown – a case report. Enviro Dent J. 2023; 05(02): 54–8. https://doi.org/10.12944/EDJ.05.02.06
17. Rahate I, Fulzele P, Thosar N. Comparative evaluation of clinical performance, child and parental satisfaction of Bioflex, zirconia and stainless steel crowns in pediatric patients. F1000Research. 2023;12:756. https://doi.org/10.12688/f1000research.133464.1
18. Butera A, Maiorani C, Morandini A, Simonini M, Morittu S, Trombini J, et al. Evaluation of children caries risk factors: a narrative review of nutritional aspects, oral hygiene habits, and bacterial alterations. Children (Basel). 2022; 9(2): 262. https://doi.org/10.3390/children9020262
19. Govindaraju L, Jeevanandan G. Development of an advanced material for obturation in primary teeth based on the microbiological analysis of the antimicrobial efficacy of various concentrations: an in vitro study. Int J Clin Pediatr Dent. 2023; 16(6): 800-803. https://doi.org/10.5005/jp-journals-10005-2721
20. Viola C, Muñoz-Corcuera M, Antoranz-Pereda A, Casañas E, Navarrete N. Time assessment for final restoration of endodontically treated teeth in a university clinic setting: An observational study. Saudi Dent J. 2024; 36(4): 621–6. https://doi.org/10.1016/j.sdentj.2023.12.013
21. Almajed OS. Shaping Smiles: A narrative review of crown advancements in pediatric dentistry. Cureus. 2024; 16(1). https://doi.org/10.7759/cureus.52997
22. Kanareli C, Balazuc-Armbruster M, Tsolakis IA, Kanarelis T, Tsolakis AI. Full mouth treatment of early childhood caries with zirconia dental crowns: a case report. Children (Basel). 2023; 10(3): 1–11. https://doi.org/10.3390/children10030488
23. Patil AT, Surath S, Sandhyarani, Nikam PP, Kulkarni TR, Pursnani V. A study on stress distribution of different preformed crowns in deciduous mandibular second molar using finite element analysis. J Coast Life Med. 2022; 11(1): 2289-300.