

Single-Visit Pulpectomy in Primary Teeth: A Comprehensive Review, Clinical Case Report and Novel Evaluation Criteria

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Abstract: *Title: Single-Visit Pulpectomy in Primary Teeth: A Comprehensive Review, Clinical Case Report, and Novel Evaluation Criteria. Background:* Pulpectomy is an established endodontic procedure for the management of irreversibly inflamed or necrotic pulp in primary teeth, with the primary objective of eliminating infection, relieving pain, and preserving the tooth until its natural exfoliation. Single-visit pulpectomy has gained increasing acceptance in pediatric dentistry due to advancements in instrumentation, irrigation protocols, obturating materials, and behavior management strategies, although concerns regarding disinfection, postoperative pain, and obturation quality remain. **Aim:** To highlight the rationale, clinical effectiveness, and outcomes of single-sitting pulpectomy in a primary molar through a detailed case report, supported by a review of current evidence and introducing a novel evaluation criteria. **Case Report:** An 8-year-old male child presented with continuous pain in the lower right posterior region. Clinical and radiographic examination revealed deep dentinal caries involving the pulp with features suggestive of chronic irreversible pulpitis with apical periodontitis in tooth 85. Based on favorable clinical conditions and patient cooperation, a single-visit pulpectomy was performed using a calcium hydroxide-iodoform paste (Metapex), followed by full coronal coverage with a stainless steel crown. The procedure was completed without intraoperative or postoperative complications, and follow-up revealed satisfactory clinical outcomes. **Discussion:** Single-visit pulpectomy offers advantages such as reduced chair time, elimination of interappointment contamination, improved child compliance, and comparable success rates to multiple-visit protocols when strict case selection criteria are followed. Adequate chemo-mechanical preparation, effective irrigation, use of resorbable obturating materials, and immediate coronal seal are critical for success. The biological healing potential of pediatric periapical tissues further supports the feasibility of this approach. **Conclusion:** Single-sitting pulpectomy can be a predictable, efficient, and child-friendly treatment option for selected primary teeth with irreversible pulp pathology. When performed under proper clinical guidelines, it provides outcomes comparable to multi-visit procedures while enhancing patient comfort and treatment efficiency.

Keywords: Single-visit pulpectomy; Primary teeth; Pediatric endodontics; Behavior management; SS criteria; Novel evaluation criteria

1. Introduction

The primary objective of performing pulpectomy in an infected primary tooth is to eliminate microorganisms and prevent reinfection, thereby creating a favorable environment for healing of peri-radicular tissues and reducing the pain and discomfort to the child.

Mathewson defined pulpectomy as the complete removal of necrotic pulp from the root canals of primary teeth and filling them with an inert resorbable material to maintain the tooth in dental arch.

Pulpectomy is described as the root canal procedure for pulp tissue that is irreversibly infected or necrotic because of caries or traumatic injury. The process involves debriding and shaping the root canals to eliminate infection and retain the tooth in a functional state until it is naturally exfoliated (McDonald and Avery's Dentistry for the Child and Adolescent)

The definition emphasizes pulpectomy as the total removal of necrotic or irreversibly infected pulp from the root canals and the coronal portion of the primary tooth, with the aim of maintaining the tooth in the dental arch. (Pinkham)

Single visit pulpectomy (SVP) involves removal (extirpation) of the entire pulp tissue followed by cleaning and filing of the canals up to a resistance point short of the apex. After

thorough irrigation and drying, the canals are obturated with filling material in the same clinical visit.

In contrast, multiple visit pulpectomy (MVP) involves pulp extirpation and placement of an intra-canal medicament in the first visit to disinfect the canals. The obturation is delayed until a subsequent visit, allowing time for healing or resolution of any persistent pathology; additional visits may be required if the underlying infection or pathology continues.

Essentially, SVP is completed in one appointment, reducing treatment time, anesthesia requirements, and trauma to the child, while MVP requires multiple visits but may be chosen in complex or severe cases with periapical involvement to ensure thorough canal disinfection and healing before obturation.

Both procedures aim to preserve the primary tooth by removing infection and restoring function, with evidence showing no significant difference in clinical success rates between the two, although SVP offers benefits in terms of convenience and reduced patient stress

2. Background and Rationale for Single-Sitting Pulpectomy

Primary root canal infections in primary teeth are polymicrobial in nature, predominantly consisting of obligate and facultative anaerobic microorganisms such as

Porphyromonas, Prevotella, Fusobacterium, Streptococcus, and Enterococcus species.^{1,2} The complex anatomy of primary teeth, characterized by accessory canals, thin dentinal walls, and close proximity to the developing permanent tooth germ, favors rapid spread of infection.¹ In the context of single-visit pulpectomy, the objective is not complete sterilization of the root canal system but a substantial reduction in microbial load through effective chemo-mechanical preparation.^{1,3} Studies have shown that copious irrigation using antimicrobial solutions such as sodium hypochlorite and chlorhexidine, combined with adequate canal instrumentation, can sufficiently reduce bacterial counts to levels compatible with periapical healing.⁸ The concept of bacterial entombment further supports this approach, suggesting that residual microorganisms become inactive once nutrients are eliminated and canals are well obturated, making single-visit pulpectomy biologically acceptable in selected cases of primary teeth.^{3,7} Postoperative pain and flare-ups are important concerns when considering endodontic procedures in children. These complications are generally attributed to mechanical irritation, extrusion of debris, or microbial and chemical injury to periapical tissues.^{3,7} Evidence from both pediatric and adult endodontic literature indicates that single-visit endodontic therapy does not result in a higher incidence of postoperative pain or flare-ups when compared to multiple-visit procedures, provided that appropriate case selection is followed.^{3,4} In fact, the absence of interappointment leakage and repeated canal instrumentation may reduce inflammatory responses.³ In pediatric patients, pain perception is strongly influenced by anxiety and fear, and multiple visits may reinforce negative dental experiences.⁶ Several studies have reported comparable or reduced postoperative discomfort following single-visit pulpectomy, particularly in asymptomatic non-vital primary teeth where a dry canal can be achieved prior to obturation.^{3,4}

The need for simplified pediatric endodontic appointments arises from the limited attention span, reduced coping ability, and behavioral variability commonly observed in children.⁶ Prolonged or repeated dental visits may compromise cooperation and increase treatment refusal. Single-visit pulpectomy addresses these challenges by reducing overall chairside time and eliminating the need for temporary restorations between visits, thereby decreasing the risk of canal reinfection.⁵ Technological advancements such as rotary instrumentation specifically designed for primary teeth, improved irrigation protocols, and the availability of resorbable obturating materials like iodoform-based pastes have further streamlined the procedure.^{5,6} Simplification of treatment not only enhances efficiency but also improves clinical outcomes by ensuring that definitive treatment is completed in one appointment.⁵

Behavioral management plays a pivotal role in the success of pediatric dental treatment. Many children exhibit fear, anxiety, or limited ability to cooperate, particularly during invasive procedures such as pulpectomy.⁶ Single-visit endodontic treatment aligns well with pediatric behavior guidance principles by minimizing repeated exposure to stressful stimuli. Completing treatment in one appointment reduces the likelihood of behavioral deterioration in subsequent visits and limits the need for pharmacological

interventions such as sedation or general anesthesia.⁶ In children with special health care needs or those requiring advanced behavior management techniques, single-visit pulpectomy is especially advantageous as it allows comprehensive care to be delivered efficiently and safely.^{5,6}

From a biological perspective, single-visit pulpectomy in primary teeth is supported by the favorable healing potential of pediatric periapical tissues. Primary teeth exhibit rich vascularity and high cellular activity, which contribute to rapid healing following adequate infection control.^{6,7} Additionally, the physiological process of root resorption in primary teeth does not adversely affect the outcome of pulpectomy when biocompatible and resorbable obturating materials are used.⁵ Studies have demonstrated that periapical healing can occur even in the presence of minimal residual bacteria, provided there is an adequate apical and coronal seal.^{1,3} Therefore, in carefully selected cases- such as asymptomatic non-vital primary teeth without acute infection, swelling, or persistent exudation- single-visit pulpectomy is both biologically feasible and clinically effective.^{3,5}

3. Indications

- Non-vital primary teeth with necrotic pulp, without active swelling, pus discharge, or draining sinus, and where dry canals can be achieved.
- Teeth with irreversible pulpitis where complete cleaning, shaping, and obturation can be completed in one visit.
- Vital/ Non-vital teeth with minimal or asymptomatic periapical changes (no acute infection).
- Teeth with good access, clear canal anatomy, and working length easily established.
- Cases where rubber dam isolation is possible and adequate disinfection can be maintained.
- Situations where appropriate obturation materials are available and the clinician is experienced in single-visit protocols.
- Cooperative children, or children manageable with behavior guidance or sedation, allowing a short, efficient appointment.
- Medically or physically compromised patients where reducing the number of dental visits is beneficial.
- Fractured anterior teeth requiring early esthetic and functional restoration.
- When parent/patient preference favors fewer appointments and the clinical case meets all safety criteria.

4. Contraindications

- Acute spreading infection or facial cellulitis
- Active pus discharge or uncontrollable canal exudate
- Extensive periapical pathology in non-vital teeth
- Medically unstable child unable to tolerate lengthy procedures
- Uncooperative child preventing proper debridement/obturation as in children with Special health care needs like ADHD
- TMJ problems or breathing difficulties limiting mouth opening
- Complex or calcified canal anatomy
- Inability to achieve adequate isolation (no proper rubber dam placement)

- Teeth with severe acute apical periodontitis and intense percussion pain
- Teeth with limited access making complete instrumentation unreliable
- Cases with previous flare-ups indicating unresolved infection

5. Advantages

- Fewer appointments → improved patient/parent satisfaction and compliance (important in children).
- Eliminates risk of inter-appointment contamination or reinfection.
- Faster overall treatment time and potentially lower cost.
- Immediate obturation reduces chance of microbial recolonization between visits.
- Less psychological trauma; beneficial in pediatric patients with anxiety or limited cooperation.
- Early restoration and coronal seal can be placed sooner, protecting obturation.

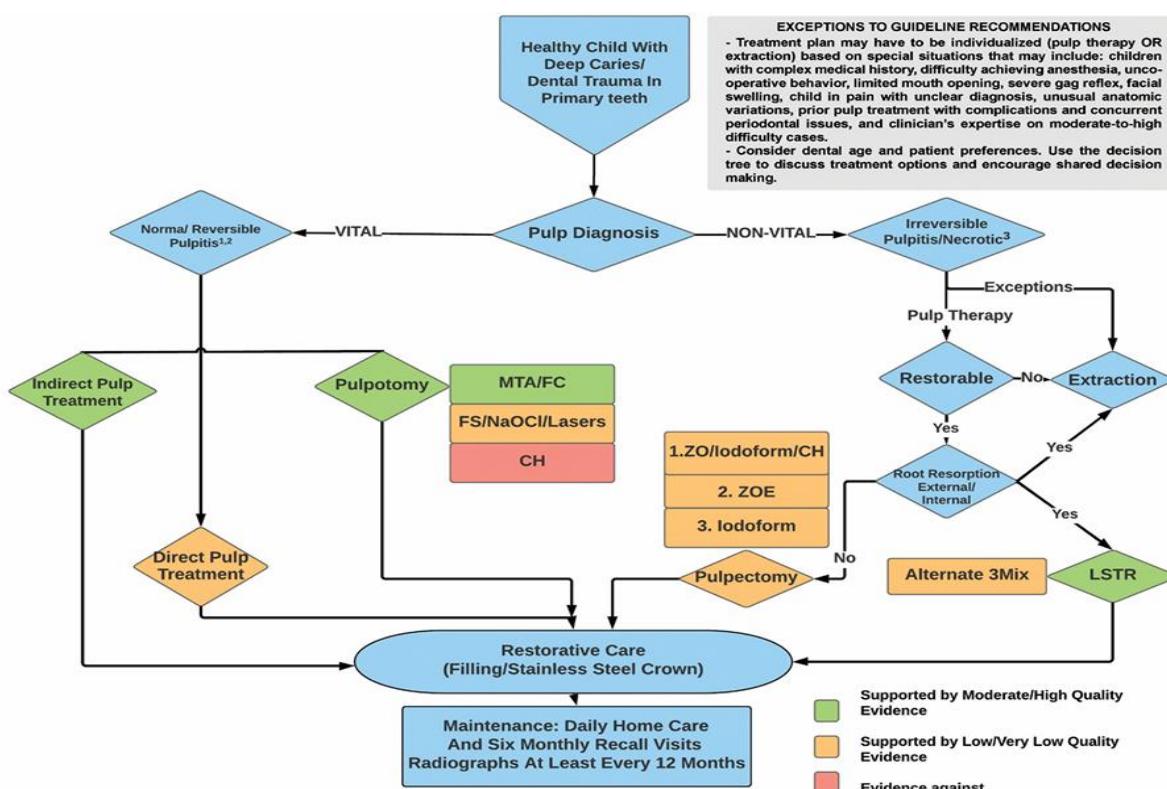
6. Disadvantages

- Active infection or purulence may increase the risk of postoperative pain or flare-ups.
- Longer appointment duration can cause fatigue for both the child and the clinician.
- Not suitable for some patients, such as those with limited ability to keep their mouth open (e.g., TMD, physical impairments).
- Flare-ups are harder to manage, since reopening the tooth for drainage is not possible during the same visit.

- Persistent hemorrhage or exudation may be difficult to control, making completion in one visit challenging.
- Complex canal anatomy (fine, calcified, multiple canals) may increase stress and reduce the likelihood of successful single-visit completion.
- No opportunity for intracanal medicament placement, relying solely on irrigation (e.g., NaOCl) for disinfection.
- Risk of overfilling in primary teeth with resorbing roots if technique is not carefully controlled.
- Clinician fatigue during extended treatment may compromise quality, increasing risks of failure or flare-ups.

7. AAPD Recommendations

Pulpectomy should be considered only in teeth that are clinically and radiographically restorable, as long-term success depends on the ability to achieve an adequate coronal seal. A single-visit pulpectomy may be performed when the clinical situation permits complete cleaning and shaping of the root canals in one appointment with effective bacterial control and the absence of persistent exudation. Rubber dam isolation is regarded as the gold standard during the procedure, as it significantly minimizes salivary contamination and enhances the aseptic field. Following obturation, a post-treatment radiograph is essential to confirm the quality of the fill, ensuring that the canals are neither overfilled nor underfilled. Regular clinical and radiographic follow-up evaluations, preferably at least on an annual basis, are crucial to assess healing, monitor physiological root resorption, and identify any potential complications at an early stage.⁵



1. Normal pulp: Tooth without reversible or irreversible pulpitis

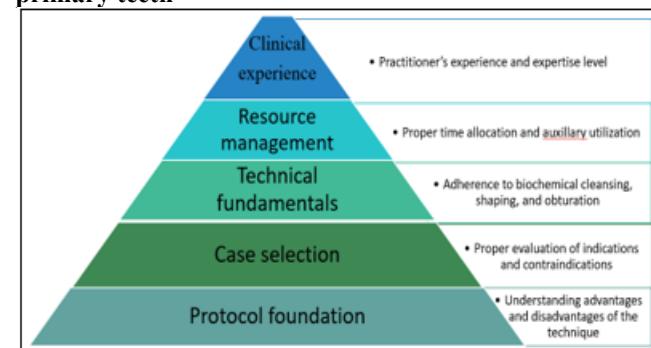
2. Reversible Pulpitis: No signs and symptoms of irreversible pulpitis but has provoked pain from eating for a short duration (5-10 minutes)

3. Irreversible Pulpitis/necrosis: A tooth with any of the following: history of spontaneous unprovoked tooth ache, sinus tract, soft tissue pathology and gingival swelling (not associated with periodontal disease), abnormal tooth mobility not associated with exfoliation, furcation/apical radiolucency, internal/external root resorption. Diagnosis of irreversible pulpitis cannot be based solely on bleeding that cannot be controlled within five minutes.

Clinical protocol involves Oliet's Criteria for case selection:

- Positive patient acceptance
- Sufficient available time to complete the procedure properly.
- Absence of acute symptoms requiring drainage via the canal and of persistent continuous flow of exudate or blood and
- Absence of anatomical obstacles (calcified canals, fine tortuous canals, bifurcated or accessory canals) and procedural difficulties (ledge formation, blockage, perforations, inadequate fills).

Preliminary considerations for single visit endodontics in primary teeth



Materials Used in Single-Sitting Pulpectomy

Material (composition)	Pros (why used in single-visit pulpectomy)	Cons / concerns	Key references
Zinc oxide-eugenol (ZOE) (zinc oxide powder + eugenol liquid)	Long history of clinical use; good handling and seal; radiopaque; inexpensive and widely available — good for definitive obturation in one appointment.	Slow resorption if extruded beyond apex → may interfere with physiologic root resorption or eruption path of successor; potential periapical irritation when overfilled; not antimicrobial by itself.	9,10
Calcium hydroxide + iodoform pastes (commercial: Metapex, Vitapex) (Ca(OH) ₂ vehicle + iodoform)	Antimicrobial activity of Ca(OH) ₂ and resorbable/biocompatible iodoform carrier; tends to resorb more in harmony with primary root resorption → useful in teeth near exfoliation; easy to apply with syringe (fast for single visit).	Over-resorption of material inside canal reported (radiographic disappearance) complicating radiographic follow-up; some studies report variable clinical success vs ZOE depending on case selection. May be less radiographically stable long-term.	12,13,14
Endoflas (ZOE + iodoform + Ca(OH) ₂ formulation)	Combines advantages: antimicrobial (iodoform), alkalinity (Ca(OH) ₂), sealing (zinc oxide base); reported high clinical / radiographic success in several studies and good resorption characteristics. Suited for infected primary teeth.	Composition variability between manufacturers; limited long-term high-quality RCT data vs ZOE/Metapex in all scenarios; possible staining or tissue reaction if extruded.	15,16,17
Calcium hydroxide paste (non-iodoform)	Strong antimicrobial effect via high pH; biological stimulation of hard tissue; used where tissue compatibility is prioritized. Can be placed in one visit.	Fast resorption from canals (may not provide long-term seal); poorer obturation density vs other pastes; not radiopaque unless mixed with radiopacifier.	18,19
MTA / Biodentine (bioactive cements) (tricalcium silicate based)	Excellent biocompatibility, sealing ability, stimulates healing; increasingly used in vital pulp therapy and investigated for obturation/retrofill roles. Good biologic profile if considered for single-visit applications.	Costly; difficult to deliver as full canal obturation for long primary canals (designed as repair/capping materials); limited and mixed evidence as primary-tooth obturation material—mostly experimental/short-term.	20,21
Triple antibiotic / LSTR paste (metronidazole + ciprofloxacin + minocycline or substitutes)	Strong antimicrobial sterilization strategy (lesion sterilization & tissue repair approach); useful for cases where disinfection is priority and minimal instrumentation is done — can be applied in single session in some protocols.	Antibiotic stewardship concerns (resistance); staining (minocycline); variable obturation/sealing property — typically not a definitive obturating material, but rather a medicament/alternative protocol. Not standard as permanent obturation.	22,11
ZOE modified formulations (with additives or different vehicles)	Improved handling or radiopacity depending on formulation; some aim to improve resorption profile or antibacterial properties while retaining ZOE's sealing.	Heterogeneity between products; evidence variable — requires specific product studies. Same general ZOE concerns if non-resorbable.	9,23
Experimental/niche materials (nano-hydroxyapatite + ZOE blends; zinc oxide + nano additives)	Proposed to improve seal, biocompatibility, and possibly resorption behaviour; some recent prospective studies report promising early results.	Early evidence only; limited RCTs and long-term follow up; not yet standard of care.	23

Success Rates and Outcomes

The success of single-sitting pulpectomy in primary teeth can be evaluated in terms of both short-term and long-term outcomes, each reflecting different biological and clinical parameters. Short-term success primarily relates to the immediate resolution of symptoms and early tissue response following treatment. Clinically, this includes relief from pain, absence of tenderness on percussion, reduction or elimination

of swelling, and lack of sinus tract formation. Radiographically, early success is indicated by the absence of progression of periapical or furcal radiolucency. Studies by **Sathorn et al.** and **Figini et al.** have demonstrated that when appropriate case selection is followed, single-visit endodontic procedures do not result in higher postoperative pain or flare-ups compared to multi-visit treatments. In pediatric patients, short-term success is particularly significant because

completing treatment in one visit reduces anxiety, improves cooperation, and eliminates the risk of interappointment contamination. **Ochoa-Romero and Mendez-Gonzalez** reported minimal postoperative discomfort following single-visit pulpectomy in asymptomatic primary teeth, supporting its short-term clinical acceptability.

Long-term success of single-sitting pulpectomy is assessed over extended follow-up periods and depends on sustained clinical asymptomatic status and favorable radiographic findings. Clinically, the treated tooth should remain free of pain, infection, mobility, or premature exfoliation. Radiographically, long-term success is indicated by healing or reduction of periapical or furcal radiolucency, absence of pathological root resorption, and normal development of the succedaneous permanent tooth. **American Academy of Pediatric Dentistry (AAPD)** guidelines emphasize that long-term success is closely linked to adequate canal disinfection, proper obturation with a resorbable and biocompatible material, and maintenance of an effective coronal seal. The concept of bacterial entombment, as discussed by **Siqueira and Rôças**, provides a biological explanation for long-term healing despite the possible presence of residual microorganisms, as these bacteria become inactive once deprived of nutrients.

Comparative studies have shown that the long-term success rates of single-sitting pulpectomy in primary teeth are comparable to those of multiple-visit procedures when cases with acute infection, persistent exudation, or systemic involvement are excluded. **Reddy and Ramakrishna** highlighted that effective irrigation protocols play a crucial role in maintaining long-term outcomes by ensuring substantial microbial reduction within a single appointment. Additionally, the natural healing capacity of pediatric periapical tissues, characterized by rich vascularity and high cellular turnover, further supports favorable long-term results. Importantly, the physiologic root resorption process of primary teeth does not compromise treatment success when obturating materials compatible with resorption are used.

In summary, short-term success of single-sitting pulpectomy is reflected by immediate symptom resolution and absence of postoperative complications, while long-term success depends on sustained clinical function, radiographic healing, and preservation of the tooth until normal exfoliation. When strict case selection, proper asepsis, effective chemo-mechanical preparation, and suitable obturation materials are employed, single-visit pulpectomy in primary teeth demonstrates predictable and reliable outcomes comparable to conventional multiple-visit approaches.

Table 1: Radiographic Evaluation Checklist for Obturation of Primary Teeth

Checklist	Name:	Age/Sex:	Tooth No:
A} Access cavity preparation • Outline form • Convenience form • Straight line access • Removal of all carious dentin and defective restoration			Outcome
B} Access related mishaps • Damage to existing restoration • Ledge formation • Crown fracture • Perforation of floor of pulp chamber			Correction
C} Working length • Adequate • Short • Weine's modification			
D} Root canal related mishaps • Missed canals • Ledge formation • Cervical canal perforation • Mid root perforation • Apical perforation • Separation of instruments • Canal blockage			
E} Obturation Quality • Absence of voids • Presence of voids - Less than 2 - More than 4 • Condensation of Obturating material - Adequate - Not packed well • Density - Scanty or opaque			
F} Coating of walls • Lack of coating • Uniformly coated			
G} Obturation extent after Weine's modification • Under obturation - >1.5 mm short of apex			

<ul style="list-style-type: none"> Optimal obturation (0-1.5mm of the apex) Over obturation <ul style="list-style-type: none"> > 1.5mm beyond the apex > 3mm beyond the apex 		
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Methodology for Validation and Reliability Assessment of the SS Radiographic Evaluation Checklist for Obturation in Primary Teeth

Development of the Evaluation Checklist

The SS newer radiographic evaluation checklist for obturation in primary teeth was developed to provide a comprehensive and standardized method for assessing the technical quality of pulpectomy procedures. The checklist was formulated following an extensive review of existing pediatric endodontic literature, focusing on factors known to influence the success and failure of pulpectomy in primary teeth. Emphasis was placed on incorporating parameters related to access cavity preparation, working length determination, procedural mishaps, obturation quality, and extent of obturation after Weine's modification.

The checklist comprises multiple domains that collectively evaluate the entire pulpectomy procedure, thereby addressing the limitations of conventional assessment methods that primarily rely on obturation length alone.

Validation of the Checklist

Content Validity: Content validity of the checklist was established through expert evaluation. A panel comprising experienced pediatric dentists and endodontists reviewed the checklist for relevance, clarity, and completeness. Each item was assessed for its clinical significance in determining the quality of obturation and its potential impact on pulpectomy outcome in primary teeth. The checklist was confirmed to adequately represent all critical domains of pulpectomy, including:

- Access cavity preparation and associated mishaps
- Accuracy of working length determination
- Root canal procedural errors
- Quality of obturation in terms of voids, density, condensation, and canal wall coating
- Extent of obturation assessed according to Weine's modification.

The expert consensus confirmed that the checklist comprehensively covered all essential parameters, thereby establishing strong content validity.

Face Validity: Face validity was assessed by evaluating the clarity and interpretability of the checklist. The criteria were expressed in simple, objective, and clinically observable terms, enabling straightforward application on radiographic images. The checklist was found to be easily understandable and practically applicable by both postgraduate students and experienced clinicians, supporting acceptable face validity.

Construct Validity: Construct validity was established by ensuring that the checklist measured the theoretical construct of "quality of obturation" in primary teeth. The included parameters are biologically and clinically relevant indicators of endodontic success, as inadequate obturation density, presence of voids, improper canal wall coating, and incorrect obturation extent are known to compromise the seal and predispose the tooth to reinfection and pathological resorption. Teeth categorized as optimally

obturated using the checklist criteria were expected to demonstrate improved clinical and radiographic outcomes during follow-up, thereby confirming that the checklist effectively measures obturation quality and its relationship to pulpectomy success.

Reliability Assessment of the Checklist

Inter-Examiner Reliability: Inter-examiner reliability was assessed by having multiple calibrated examiners independently evaluate the same set of postoperative radiographs using the SS checklist. Each examiner recorded findings without knowledge of the other examiners' scores. The agreement between examiners was statistically analyzed to determine consistency in interpretation of checklist criteria.

The objective nature of the checklist items, with clearly defined categorical outcomes, minimized subjective bias and resulted in high levels of agreement among examiners, indicating good inter-examiner reliability.

Intra-Examiner Reliability: To assess intra-examiner reliability, the same examiners re-evaluated the radiographs after a predetermined time interval. The scores obtained during the first and second evaluations were compared to assess consistency over time. Minimal variation in scoring demonstrated that the checklist provided stable and reproducible results, confirming high intra-examiner reliability.

Role of the Checklist in Assessing Pulpectomy Success

The SS radiographic evaluation checklist facilitates a comprehensive assessment of pulpectomy outcomes by correlating technical quality with biological success. By evaluating parameters beyond obturation length, the checklist enables identification of procedural deficiencies that may adversely affect long-term prognosis, such as voids, poor condensation, and inadequate canal wall coating.

The checklist also allows standardized documentation and objective comparison of treatment outcomes across different obturating materials, techniques, and operators. This standardization enhances the reliability of clinical audits, research studies, and postgraduate training assessments. The SS newer radiographic evaluation checklist demonstrates robust validity and high reliability, making it a dependable tool for assessing obturation quality in primary teeth. Its comprehensive, objective, and reproducible nature strengthens the evaluation of pulpectomy success and supports its use in clinical practice, academic research, and postgraduate education.

8. Challenges and Controversies

Single-sitting pulpectomy in primary teeth, while advantageous in reducing appointments and improving child compliance, is associated with several clinical challenges that continue to generate debate in pediatric endodontics. One major concern is **incomplete disinfection**, as the complex

anatomy of primary root canals—characterized by tortuosity, ribbon-shaped canals, numerous accessory canals, and physiologic root resorption—may limit effective mechanical debridement within a single visit, raising concerns about residual microbial load and its long-term impact on success rates.²⁴ This is closely linked to the **risk of postoperative pain**, which may occur due to apical extrusion of infected debris, irrigants, or obturating materials, particularly in teeth with pre-existing periapical inflammation; however, studies suggest that when proper case selection, gentle instrumentation, and adequate irrigation protocols are followed, postoperative pain in single-visit pulpectomy is comparable to or even lower than that in multiple-visit procedures.^{25,26} **Overfilling and underfilling** remain critical technical challenges in primary teeth because of resorbing apices, wide canals, and difficulty in establishing accurate working length; overfilling may cause foreign-body reactions, delayed exfoliation, or damage to the underlying permanent tooth germ, whereas underfilling can result in persistent infection and treatment failure.²⁷ To minimize these risks, accurate working-length determination using electronic apex locators in conjunction with radiographs, controlled obturation techniques (such as pressure-limited syringe systems), and use of resorbable obturating materials are recommended.^{28,29} In recent years, **biocompatible cellulose- or collagen-based barriers** (such as oxidized regenerated cellulose and collagen sponges) have been advocated as apical matrices in primary teeth with open or resorbing apices to act as a mechanical stop, thereby preventing apical extrusion of obturating materials and facilitating uniform, controlled filling of the canal space.³⁰⁻³² Another ongoing **controversy is the debate over the need for intracanal medicaments** in single-visit pulpectomy; proponents of multiple visits argue that medicaments like calcium

hydroxide enhance microbial reduction, while supporters of single-visit therapy emphasize that thorough chemo-mechanical preparation, effective irrigation, and immediate obturation can adequately entomb remaining microorganisms without the need for interim medicaments.³³⁻³⁵ Finally, **pediatric behavior management issues** play a pivotal role in treatment success, as prolonged chair time, anxiety, fatigue, and limited attention span can compromise the quality of canal debridement and obturation in a single visit; therefore, careful patient selection, efficient clinical protocols, use of tell-show-do techniques, distraction, or pharmacological behavior management when indicated are essential to ensure optimal outcomes.³⁶⁻³⁸

9. Case Presentation

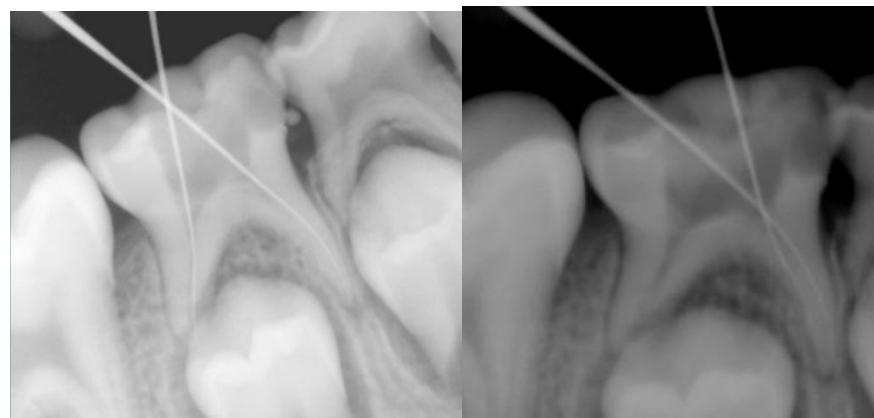
An 8 year old male child came to the department with the chief complaint of pain in the lower right back tooth region since one month. The pain was sudden in onset, continuous type of pain which aggravated on lying down and chewing food, relieves on having cold food. On intraoral examination deep dentinal carious with probing pain present int 85 and tender on percussion was positive. Radiographic examination revealed coronal radiolucency involving enamel, dentin and pulp. No degenerative changes noted in the coronal and the radicular region of the pulp. Periapically, PDL widening seen with intact lamina dura. Final diagnosis was Chronic irreversible pulpitis with apical periodontitis int 85.

Treatment Plan: Single sitting pulpectomy using metapex int 85 followed by stainless steel crown.

Treatment done



Access opening done int 85



Working length determination int 85



Obturation done int 85, Stainless steel crown given int 85, 1 month follow-up

10. Discussion

In the present case, a single-visit pulpectomy was selected based on favorable clinical and radiographic findings, including the absence of swelling, sinus tract, or purulent discharge, and the ability to achieve adequate isolation and canal dryness. The diagnosis of chronic irreversible pulpitis with mild apical periodontitis indicated inflamed but not necrotic radicular pulp tissue, making the tooth a suitable candidate for single-sitting endodontic management. Additionally, the child presented with continuous pain of moderate intensity without systemic involvement, and behavior during examination was cooperative, allowing completion of thorough chemo-mechanical preparation and obturation in one appointment. Use of a resorbable obturating material such as Metapex further supported the decision, as it offers antibacterial properties and resorption compatible with physiologic root resorption in primary teeth.³⁸

Several studies have demonstrated that single-visit pulpectomy in carefully selected primary teeth shows clinical and radiographic success rates comparable to multiple-visit protocols using intracanal medicaments. Evidence suggests that when effective irrigation, adequate canal preparation, and immediate obturation are achieved, remaining microorganisms are either eliminated or entombed, reducing the necessity for inter-appointment medicaments. Moreover, single-visit treatment has been associated with similar or lower incidence of postoperative pain when compared to multi-visit pulpectomy, likely due to reduced risk of inter-appointment contamination and fewer episodes of canal re-instrumentation.³⁶

The major strength of the single-visit approach in this case was reduced treatment time, elimination of the need for multiple appointments, and improved child compliance, all of which are critical in pediatric dental care. Immediate obturation and restoration with a stainless steel crown ensured coronal seal, reducing the risk of microleakage and reinfection. However, limitations of single-visit pulpectomy include the potential risk of incomplete disinfection in teeth with complex canal anatomy or undetected accessory canals, and the technique sensitivity involved in achieving optimal obturation length in resorbing primary roots. These limitations highlight the importance of stringent case selection and operator expertise.³⁷ This case reinforces that single-visit pulpectomy can be a predictable and effective treatment option for primary teeth with irreversible pulpitis and mild periapical changes when

strict selection criteria are met. Pediatric dentists should evaluate pulpal status, periapical health, child cooperation, and feasibility of achieving adequate isolation before opting for a single-sitting approach. When combined with biocompatible obturating materials and definitive full-coverage restoration, single-visit pulpectomy can minimize psychological stress for the child and improve overall treatment efficiency without compromising outcomes.³⁸

11. Conclusion

Single-visit pulpectomy, when performed in carefully selected primary teeth, is a predictable and effective treatment modality. Adequate chemo-mechanical preparation, use of biocompatible resorbable obturating materials, and immediate coronal seal are critical determinants of success. This approach reduces treatment time, minimizes psychological stress, and improves cooperation in pediatric patients. The clinical and radiographic outcome of the present case supports existing evidence that single-visit pulpectomy can achieve outcomes comparable to multi-visit protocols. Hence, single-sitting pulpectomy should be considered a viable and child-friendly option in contemporary pediatric dental practice.

References

- [1] Siqueira JF Jr, Rôças IN. Clinical implications and microbiology of bacterial persistence after treatment procedures. *J Endod*. 2008;34(11):1291–1301.
- [2] Gomes BPFA, Pinheiro ET, Gadê-Neto CR, et al. Microbiological examination of infected dental root canals. *Oral Microbiol Immunol*. 2004;19(2):71–76.
- [3] Sathorn C, Parashos P, Messer H. Effectiveness of single- versus multiple-visit endodontic treatment: a systematic review and meta-analysis. *Int Endod J*. 2005;38(6):347–355.
- [4] Figini L, Lodi G, Gorni F, Gagliani M. Single versus multiple visits for endodontic treatment. *Cochrane Database Syst Rev*. 2008;(4):CD005296.
- [5] American Academy of Pediatric Dentistry. Pulp therapy for primary and immature permanent teeth. *Pediatr Dent*. 2023;45(6):399–411.
- [6] Pinkham JR, Casamassimo PS, Fields HW, McTigue DJ, Nowak AJ. *Pediatric Dentistry: Infancy through Adolescence*. 6th ed. Elsevier; 2019.
- [7] Ingle JI, Bakland LK, Baumgartner JC. *Ingle's Endodontics*. 7th ed. PMPH USA; 2019.

[8] Reddy S, Ramakrishna Y. Evaluation of antimicrobial efficacy of various irrigants in primary teeth. *J Indian Soc Pedod Prev Dent.* 2007;25(2):56–60.

[9] Barr ES, Flatiz CM, Hicks MJ. A retrospective radiographic evaluation of primary molar pulpectomies. *Pediatr Dent.* 1991;13(1):4–9.

[10] Coll JA, Sadrian R. Predicting pulpectomy success and its relationship to exfoliation and succedaneous dentition. *Pediatr Dent.* 1996;18(1):57–63.

[11] Rifkin A. A simple, effective, safe technique for the root canal treatment of abscessed primary teeth. *J Dent Child.* 1980; 47: 435–441.

[12] Walkhoff O. Filling of root canals with iodoform paste. *Dent Cosmos.* 1928.

[13] Nurko C, Garcia-Godoy F. Evaluation of a calcium hydroxide/iodoform paste in root canal therapy for primary teeth. *J Clin Pediatr Dent.* 1999; 23: 289–294.

[14] Ramar K, Mungara J. Clinical and radiographic evaluation of Vitapex in primary teeth. *J Indian Soc Pedod Prev Dent.* 2010;28(1):1–6.

[15] Fuks AB. Pulp therapy for the primary dentition. *Dent Clin North Am.* 2000;44(3):571–596.

[16] Holland R, Souza V, Nery MJ. Calcium hydroxide induced healing of periapical lesions. *J Endod.* 1979; 5: 232–239.

[17] Fuks AB, Eidelman E, Pauker N. Root fillings with Endoflas in primary teeth: a clinical study. *Pediatr Dent.* 2003; 25: 283–288.

[18] Subramaniam P, Konde S, Mathew S. Clinical evaluation of Endoflas. *J Indian Soc Pedod Prev Dent.* 2008;26(2):63–68.

[19] Leonardo MR, Tanomaru Filho M, Silva LAB. Chlorhexidine activity in root canals. *J Endod.* 1999; 25: 788–790.

[20] Gomes BPFA, Ferraz CCR, Vianna ME, et al. In vitro antimicrobial activity of several concentrations of sodium hypochlorite and chlorhexidine. *J Endod.* 2001; 27: 405.

[21] Sato T, Hoshino E, Uematsu H, Noda T. In vitro antimicrobial susceptibility to combinations of drugs. *Int Endod J.* 1996; 29: 332–338.

[22] Takushige T, Cruz EV, Asgor Moral A, Hoshino E. Endodontic treatment of primary teeth using a non-instrumentation technique. *J Dent.* 2004; 32: 173–182.

[23] Mortazavi M, Mesbahi M. Comparison of zinc oxide–eugenol and Vitapex for root canal treatment of primary teeth. *Dent Res J.* 2004; 1:28–33.

[24] Barr ES, Kleier DJ, Barr NV. Use of nickel-titanium rotary files for root canal preparation in primary teeth. *Pediatr Dent.* 2000;22(1):77–78.s

[25] Kummer TR, Calvo MC, Cordeiro MM, Vieira RS, Rocha MJ. Ex vivo study of manual and rotary instrumentation techniques in primary teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008;105(4):e84–e92.

[26] Siqueira JF Jr, Rôças IN. Bacterial pathogenesis and mediators in apical periodontitis. *Endod Topics.* 2004; 8: 11–28.

[27] Ochoa-Romero T, Mendez-Gonzalez V. Postoperative pain in single-visit pulpectomy in primary teeth. *Pediatr Dent.* 2018;40(5):343–347.

[28] Weiger R, Rosendahl R, Löst C. Influence of calcium hydroxide intracanal dressings on prognosis. *J Endod.* 2000;26(4):206–209.

[29] Nelson-Filho P, Leonardo MR, Silva LAB, Assed S. Radiographic evaluation of root canal filling materials in primary teeth. *J Dent Child.* 2000;67(1):35–40.

[30] Subramaniam P, Konde S, Mathew S, Sugnani S. Accuracy of working length determination using apex locator in primary teeth. *J Indian Soc Pedod Prev Dent.* 2005;23(1):7–11.

[31] Metlerska J, Fagogeni I, Nowicka A. Apical barrier materials in pediatric endodontics: a literature review. *J Clin Pediatr Dent.* 2019;43(1):1–7.

[32] Torabinejad M, Parirokh M. Mineral trioxide aggregate: leakage and biocompatibility investigations. *J Endod.* 2010;36(2):190–202.

[33] Kumar P, Sharma A, Mittal R. Use of collagen membrane as an apical barrier in pediatric endodontics. *Int J Clin Pediatr Dent.* 2017;10(1):76–80.

[34] Peters LB, Wesselink PR. Periapical healing in one-versus two-visit endodontic treatment. *Int Endod J.* 2002;35(8):660–667.

[35] Vera J, Siqueira JF Jr, Ricucci D, et al. One- versus two-visit endodontic treatment: a histobacteriologic study. *J Endod.* 2012;38(8):1040–1052.

[36] Wright GZ, Kupietzky A. Behavior Management in Dentistry for Children. 2nd ed. Wiley-Blackwell; 2014.

[37] Klingberg G, Broberg AG. Dental fear and behavior management problems in children. *Int J Paediatr Dent.* 2007;17(6):391–406.

[38] American Academy of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. *Pediatr Dent.* 2023;45(6):292–310.