
Behavioral Management Of A Child with A Gag Reflex During Pulpotomy: A Case Report

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Abstract

Pulpotomy is a vital pulp therapy for primary teeth that aims to preserve radicular pulp vitality. Successful treatment depends not only on the dental condition but also on the child's cooperation. A pronounced gag reflex may interfere with treatment when instruments stimulate the oral cavity. Behavioral management using enhanced control may help improve patient cooperation and comfort. This case report describes the application of enhanced control in managing a child with a gag reflex during pulpotomy. A 9-year-old boy presented with caries in tooth 75 and sensitivity to cold and heat. Clinical and radiographic examinations revealed a dentinal cavity approaching the pulp chamber, positive pulp vitality, and no pathological signs in the radicular region, leading to a diagnosis of reversible pulpitis. The patient exhibited a gagging response during intraoral instrumentation. Pulpotomy was performed using enhanced control, with a simple signaling system established to communicate discomfort. At the one-week follow-up, no pain, swelling, bleeding, or tooth mobility was observed. Percussion and palpation were negative, and pulp vitality remained positive. Enhanced control facilitated communication, improved cooperation, and supported a more controlled and comfortable pulpotomy procedure in a child with a gag reflex.

Keywords: *Pulpotomy; Pediatric Dentistry; Gag Reflex; Behavioral Management; Enhanced Control*

INTRODUCTION

Dental caries is often perceived by parents as a common disease and is therefore frequently neglected (Nanda et al., 2025). Untreated caries may progress into deeper cavities that eventually involve the dental pulp, causing pain that can interfere with children's ability to eat, sleep, and concentrate at school (Fitriani et al., 2023). This progression may result in pulpitis, an inflammatory condition of the dental pulp that may resolve or progress depending on its severity. Pulpitis is generally classified into reversible and irreversible pulpitis. Reversible pulpitis is characterized by mild pulpal inflammation, in which pain occurs in response to a stimulus and subsides after the stimulus is removed. In contrast, irreversible pulpitis is characterized by persistent inflammation of the dental pulp that cannot resolve spontaneously (Arvetona & Pratama, 2024).

One of the available pulp treatment modalities is pulpotomy for primary teeth with extensive caries but without pathological changes in the radicular tissues, particularly in cases of reversible pulpitis. During pulpotomy, the coronal pulp is removed while the radicular pulp is preserved and treated with an appropriate medicament to maintain its vitality and prevent pathological changes (Annisa & Pertiwi, 2018). Pulpotomy is an important treatment option for preserving primary teeth; however, its implementation in pediatric patients may present various challenges, particularly in managing behavior during treatment. One such challenge is the gag reflex, which may interfere with dental procedures and affect treatment success. Some children have difficulty or are unable to tolerate intraoral stimulation by foreign objects, such as a mouth mirror or dental radiographic film, which are commonly required during the initial stages of diagnosis and treatment (Sarwono, 2022).

These challenges require appropriate behavioral management to improve patient cooperation and facilitate effective treatment. Behavioral management approaches that may be used include *tell-show-do* and *enhanced control*. The *tell-show-do* technique involves introducing dental procedures to children in a structured manner to promote understanding and appropriate behavior. In contrast, *enhanced control* allows patients to use a

predetermined signal during treatment to communicate discomfort or request a pause, thereby providing them with a degree of control over the procedure and helping minimize disruptive behavior (Kaswindiarti, et al., 2025).

RESEARCH METHODS

A 9-year-old boy accompanied by his parents presented to Soelastri Dental Hospital with a complaint of a carious lesion in the lower left posterior region, associated with sensitivity to cold and hot stimuli. There was no swelling or bleeding associated with the affected tooth. The patient's parents reported no history of systemic disease, and the patient had no known allergies to medications or food. The patient had never previously visited a dentist. He reported brushing his teeth twice daily, in the morning and evening, and frequently consuming sugary foods and beverages. The patient was cooperative, able to communicate, and demonstrated good cooperation throughout the treatment. However, during intraoral examination using diagnostic instruments, the patient exhibited a gagging response. Therefore, behavioral management using the *tell-show-do* and *enhanced control* techniques was implemented throughout the examination and treatment procedures.

Intraoral examination revealed an occlusal carious cavity on tooth 75 extending into dentin and approaching the pulp (Figure 1). Percussion and palpation tests were negative, while the response to probing was positive. Pulp vitality was positive, with an electric pulp test (EPT) value of 25. Periapical radiographic examination revealed a radiolucent lesion on the occlusal aspect of tooth 75 extending toward the pulp chamber, with no evidence of root resorption (Figure 2).



Figure 1. Clinical appearance of tooth 75 before treatment.



Figure 2. Periapical radiographic appearance of tooth 75 before treatment.

Diagnosis and Etiology

Based on the clinical and radiographic findings, tooth 75 was diagnosed with reversible pulpitis. Reversible pulpitis is a mild to moderate inflammatory condition of the dental pulp commonly associated with noxious stimuli, particularly dental caries that has not yet resulted in irreversible pulpal damage. Other potential etiological factors include dental trauma and restorative procedures. Primary teeth that remain in the oral cavity for longer periods are exposed to cariogenic factors more frequently, increasing their susceptibility to

dental caries. An early clinical manifestation of caries may appear as a white spot lesion, which becomes more evident after plaque removal. The extent of the white spot lesion is associated with the distribution of cariogenic plaque and may involve a relatively broad area that differs from the surrounding enamel. If left untreated, the lesion may progress and eventually cause pulpal inflammation (Arvetona & Pratama, 2024).

Reversible pulpitis is characterized by transient pulpal pain that subsides following elimination of the causative stimulus. Clinically, it is typically associated with short-lasting pain triggered by cold or sweet stimuli, which disappears shortly after the stimulus is removed, with pulp vitality responses remaining within normal limits. Potential causes include early dental caries, operative procedures, minor trauma, cervical erosion, occlusal attrition, deep periodontal curettage, and crown fractures resulting from trauma (Kaswindiarti, et al., 2025).

RESULTS AND DISCUSSION

Pulpotomy treatment was initiated by isolating the operative field using cotton rolls placed on the buccal and lingual aspects of tooth 75, followed by antisepsis with povidone-iodine. Topical anesthesia with benzocaine gel was then applied to reduce discomfort during subsequent infiltration anesthesia. The buccal and lingual mucosa adjacent to tooth 75 was dried before benzocaine gel was applied. After several minutes, once the mucosa appeared blanched, local infiltration anesthesia was administered on the buccal and lingual aspects of tooth 75. Behavioral management was provided throughout the procedure using the *tell-show-do* and *enhanced control* techniques. The *tell-show-do* approach was selected because the 9-year-old patient was able to understand and follow explanations regarding the treatment. *Enhanced control* was additionally implemented because the patient exhibited a gagging response when instruments were introduced into the oral cavity.



Figure 3. Behavioral management during dental treatment.

Caries removal was performed using a round metal bur. The pulp chamber roof was then accessed using a round diamond bur and further enlarged with a diamond fissure bur. Following pulp chamber exposure, bleeding was controlled using a sterile cotton pellet moistened with saline solution (Figure 4A). The coronal pulp was amputated using a round diamond bur or a sterile excavator (Figure 4B). Residual pulp tissue was removed, and the pulp chamber was irrigated with saline solution. Hemostasis was subsequently achieved by applying a sterile cotton pellet for approximately 5 minutes. Once adequate hemostasis was confirmed, pulpotomy treatment was continued. A sterile cotton pellet moistened with formocresol was placed over the root canal orifices and maintained for 5 minutes before removal (Figure 4C). Zinc oxide–eugenol (ZOE) was then mixed and placed over the pulp chamber floor and canal orifices. Type III glass ionomer cement (GIC) was applied as a liner over the ZOE (Figure 4D), followed by placement of a temporary restoration using Cavit (Figure 4E).

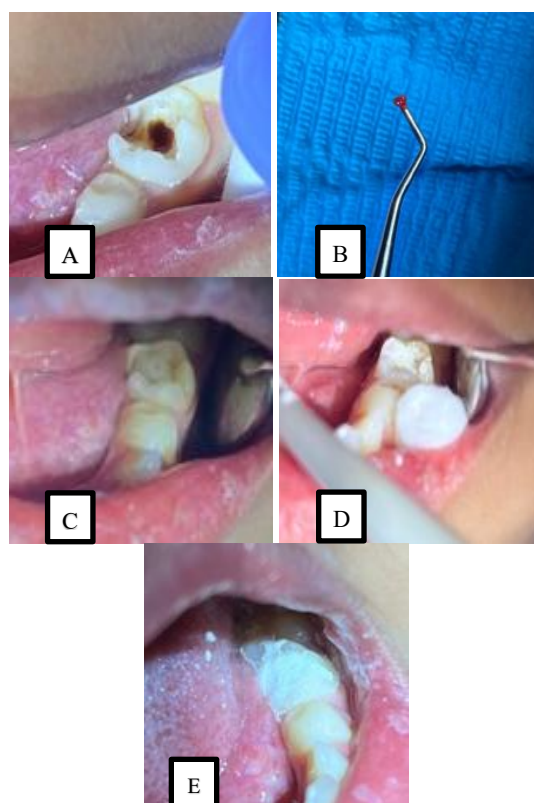


Figure 4. Pulp chamber access (A), coronal pulp amputation (B), formocresol application (C), application of type III glass ionomer cement as a liner (D), and temporary restoration with Cavit (E). Follow-Up and Final Restoration

Treatment success was evaluated one week after pulpotomy. According to the patient and parent, the patient experienced no pain or sensitivity following treatment. Clinical examination revealed an intact temporary restoration, with no swelling or bleeding. Probing, percussion, and palpation were negative, while pulp vitality remained positive. No tooth mobility was observed in tooth 75 (Figure 5A). The temporary restoration was subsequently removed, and the tooth was restored with a stainless steel crown (SSC) as the final restoration (Figure 5B).

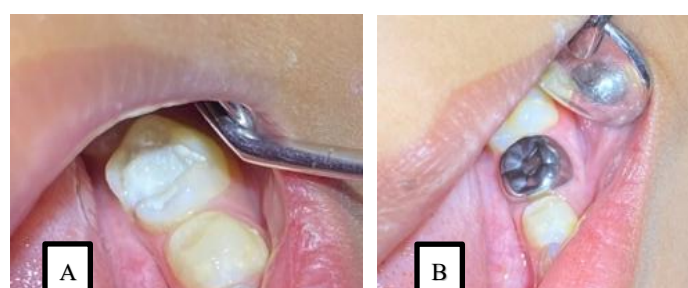


Figure 5. One-week follow-up after pulpotomy (A) and final restoration of tooth 75 with a stainless steel crown (B).

Discussion

Pulpotomy in primary teeth is a treatment intervention for teeth with deep dentinal caries or traumatic injuries. This treatment is considered preferable to root canal therapy in terms of maintaining pulp vitality and proprioception, as well as preserving neurosensory function. Pulpotomy is a procedure in which the vital coronal portion of the pulp is removed and a medicament is applied to preserve the vitality of the remaining radicular pulp tissue. Coronal pulpotomy is recommended as an emergency procedure to relieve pain before

definitive root canal treatment. In addition, pulpotomy is more cost-effective, requires minimal treatment time, has a low risk of complications, and provides better assessment of inflammatory changes in the pulp tissue (Almutairi, 2024)

The objectives of pulpotomy are to protect the radicular pulp tissue, prevent pain and swelling, and preserve the affected tooth. Indications for pulpotomy include pulp exposure caused by caries or mechanical procedures in a vital primary tooth, absence of radicular pulpitis, absence of spontaneous or persistent pain, a remaining root length of at least two-thirds of the original root length, absence of internal root resorption, absence of interradicular bone loss, absence of a fistula, and pale-colored bleeding following pulp amputation that can be readily controlled. In addition, the child should be sufficiently cooperative to allow the treatment to be performed successfully (Hartomo et al., 2021).

During treatment, the patient exhibited a gagging response when instruments such as a mouth mirror or other diagnostic instruments were introduced into the oral cavity. The gag reflex may be influenced by both tactile and psychogenic factors. Tactile factors are associated with stimulation caused by physical contact or movement in the oral cavity and pharyngeal region, whereas psychogenic factors may be triggered by fear, anxiety, anticipation, visual stimuli, odors, or imagination (Sarwono, 2022). In this case, the patient demonstrated a gagging response when the instruments were initially introduced into the oral cavity. This response was presumed to be associated with a combination of tactile stimulation caused by the presence of the instruments in the oral cavity and psychogenic factors related to anticipation of the dental procedure. Three major factors contribute to dental anxiety and behavioral management problems in children: personal factors, such as the child's age, which reflects psychological development and the ability to cope with dental treatment; external factors, which are associated with the role of parents and the child's environment, as fear of dental treatment may be learned from siblings or peers; and dental factors, which are commonly associated with previous painful dental experiences (Lady Andita & Apriani, 2023).

Children's behavior can be classified according to the Frankl behavior rating scale, which categorizes children's attitudes into four classes: 1) (—), definitely negative, in which the child refuses dental treatment and exhibits intense crying, fear, or oppositional behavior; 2) (–), negative, in which the child is reluctant or unwilling to accept treatment, is uncooperative, and demonstrates some negative behavior; 3) (+), positive, in which the child accepts treatment and follows the dentist's instructions but remains cautious and may place certain conditions on the dentist; and 4) (++), definitely positive, in which the child establishes a good relationship with the dentist, shows interest in the dental procedure, and appears happy and comfortable during treatment (Riba et al., 2017). In this case, the patient was undergoing dental treatment for the first time and demonstrated positive behavior, with a Frankl rating of 3 (+), indicating willingness to accept treatment but accompanied by a gagging response when instruments were introduced into the oral cavity. This condition created a less conducive treatment environment and therefore required appropriate behavioral management to reduce the gag reflex, alleviate anxiety, improve patient comfort, and establish effective cooperation throughout the procedure (O'Donald et al., 2025).

The behavioral management techniques used during treatment in this case were *tell-show-do* and *enhanced control*. Communication with children during dental treatment should use language that is simple and easy to understand. The *tell-show-do* technique involves introducing the dental procedure to the child and is considered effective for a cooperative 9-year-old child in shaping behavior and preparing the child to accept dental treatment. This technique consists of a verbal explanation of the procedure in a non-threatening manner (*tell*), a visual and sensory demonstration of the procedure (*show*), and

subsequently performing the procedure as previously explained (*do*) (Kusmana & Nugroho, 2024).

Enhanced control is a behavioral management technique that provides patients, particularly those experiencing anxiety or fear, with an opportunity to participate in controlling the course of treatment through communication with the operator (Dhaliwal et al., 2025). In this technique, the operator establishes a simple signal that the patient can use to communicate discomfort or request a temporary interruption of the procedure. The signal may involve raising a hand, moving a finger, or using another agreed-upon form of nonverbal communication established before treatment begins (Kaswindiarti, et al., 2025). The application of enhanced control is particularly important because the procedure involves relatively prolonged intraoral manipulation that may stimulate areas of the oral cavity capable of triggering the gag reflex. Such stimulation may increase discomfort, anxiety, and negative behavioral responses in the patient. Therefore, before treatment begins, the operator should explain the treatment steps to the patient in simple terms and establish an easily performed stop signal. The patient should then be given an opportunity to practice the signal to ensure that they understand that, when the signal is given, the operator will stop or temporarily pause the procedure (Anisyah et al., 2025).

For treatment of the mandibular primary molar, specifically tooth 75, in a patient with a pronounced gag reflex, the patient's head position can be adjusted slightly forward or maintained in a relatively upright and comfortable position to facilitate operator access to the oral cavity. The head should not be positioned in excessive extension or tilted backward, as this may increase stimulation of the oropharyngeal region and potentially trigger the gag reflex. In addition to appropriate head positioning, intraoral instruments should be inserted and positioned in a controlled manner while avoiding areas that may trigger the gag reflex, particularly the floor of the mouth, soft palate, and posterior pharyngeal wall. Instruments should preferably be positioned more anteriorly, particularly along the buccal aspect, to minimize contact with the tongue, and should be moved minimally and predictably. Suction should also be used carefully and positioned in the distal buccal vestibular region to remove fluids from the oral cavity without excessive stimulation of the posterior tissues. The combination of appropriate head positioning, proper instrument placement, and controlled use of suction is expected to minimize stimulation of trigger areas and thereby help reduce gag reflex stimulation during pulpotomy treatment (Kunasarapun et al., 2025).

The application of *enhanced control* in this case was not intended to give the patient complete control over the entire procedure but rather to provide structured and limited control during treatment. This approach allows the patient to communicate discomfort without compromising the objectives or safety of the procedure. It is expected to help the patient regulate emotional and behavioral responses while allowing the operator to perform the treatment in a more controlled manner. In patients with a pronounced gag reflex, establishing a clear communication mechanism may also help the operator recognize the patient's condition at an early stage and provide a brief pause before the gag reflex develops into a more severe response (Dhaliwal et al., 2025).

CONCLUSION

The application of behavioral management using the *enhanced control* technique in a pediatric patient with a gag reflex may help improve communication, comfort, and cooperation during pulpotomy treatment. Providing structured control through the use of a stop signal allows the patient to communicate discomfort to the operator, enabling the procedure to be paused as needed without compromising the objectives or safety of treatment. In this case, the application of *enhanced control* facilitated the completion of

pulpotomy treatment on tooth 75 through final restoration with a *stainless steel crown*. At the one-week post-treatment evaluation, the patient reported no pain or sensitivity, and no clinical signs of pathology were observed. Therefore, *enhanced control* may be considered as one of the behavioral management approaches for pediatric patients with a gag reflex during dental treatment.

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