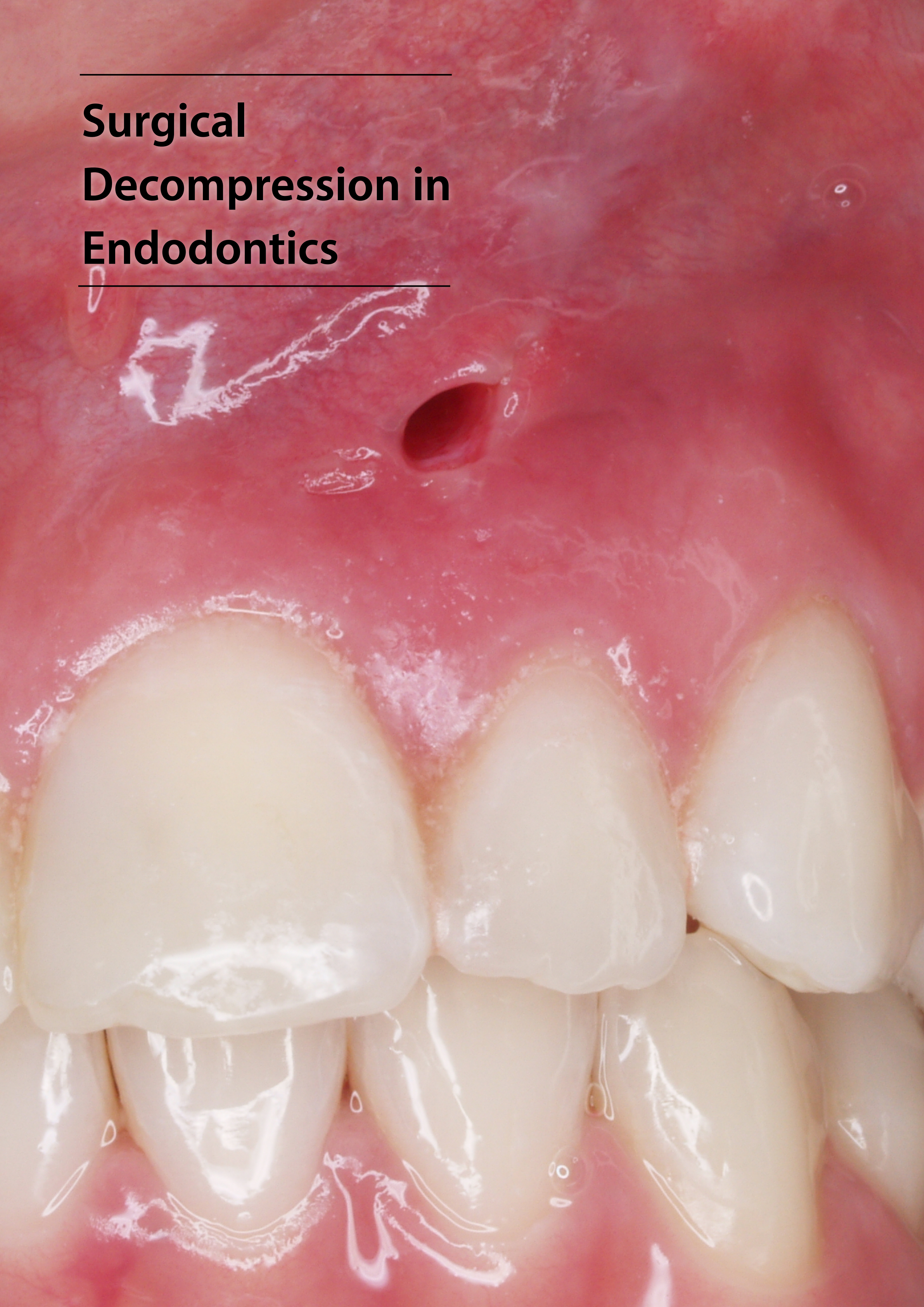
# Surgical Decompression in Endodontics



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## Definition and Overview

Surgical decompression in endodontics is a minimally invasive technique employed to manage large periapical lesions—often of cystic nature—by relieving internal pressure and maintaining a pathway for drainage. The procedure consists of creating a small surgical opening into the cystic cavity and inserting an indwelling drain, such as a plastic tube, to facilitate continuous evacuation of cystic fluid (1). Sustained drainage through the decompression site leads to gradual lesion shrinkage as the internal pressure decreases, thereby promoting natural bone healing and regeneration. This approach is considered conservative, as it does not require immediate removal of the entire lesion. Instead, it preserves surrounding bone and vital anatomical structures, allowing for gradual resolution of the lesion over time (1)(2).

In clinical practice, decompression is typically performed in conjunction with conventional root canal therapy on the affected tooth. Root canal treatment eliminates the intracanal infection, while decompression addresses the associated cystic component, enabling healing in cases where endodontic treatment alone might not suffice (3). Technically, this method aligns with the principles of marsupialization, as originally described by Partsch; however, unlike traditional marsupialization which necessitates a large surgical window—modern decompression utilizes a small drain or stent, achieving the same objective with significantly less inconvenience for the patient (2).

The main objective of surgical decompression in endodontics is to provide a conservative management option for persistent or extensive periapical lesions. It often allows clinicians to avoid or postpone more aggressive interventions, such as apicoectomy or complete cyst enucleation, while still facilitating satisfactory lesion resolution.

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# Clinical Indications

Surgical decompression is indicated in selected clinical situations, particularly in the management of large or persistent periapical lesions where conventional treatment may not be sufficient, or where more invasive surgical approaches entail significant risk. The main indications include:

**Large Periapical Lesions (Cystic Radiolucencies):** When a periapical radiolucency is notably large (commonly >10 mm in diameter or >200 $mm^2$ in area) and involves a non-vital tooth, a cystic lesion is likely (1). Extensive radicular cysts can encompass multiple teeth and extend toward critical anatomical structures such as the maxillary sinus, nasal floor, or mandibular canal. In these circumstances, surgical enucleation may pose a threat to adjacent teeth or vital anatomical elements. Decompression provides a conservative alternative, allowing for gradual size reduction by relieving internal pressure. This, in turn, fosters bone regeneration while minimizing surgical trauma (2). It is particularly indicated in cases where immediate apical surgery would be excessive or carry elevated risk.

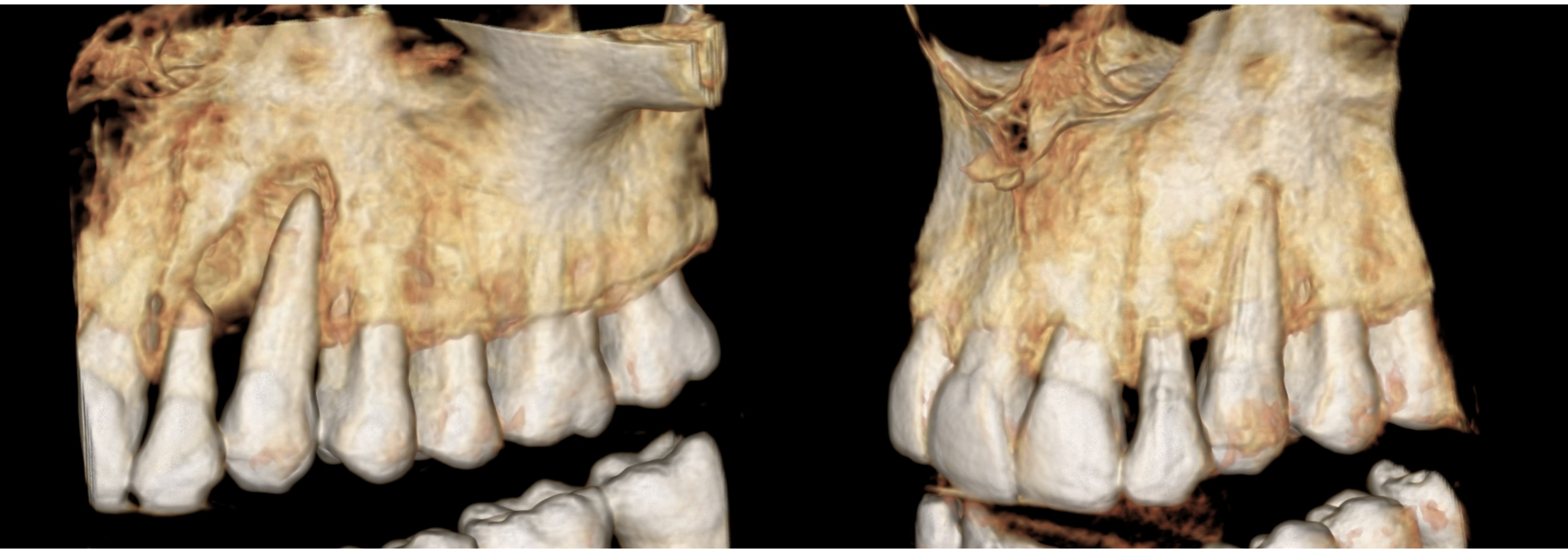
**Persistent Lesions Despite Endodontic Therapy:** Although most inflammatory periapical lesions resolve following adequate root canal treatment, a subset—especially true cysts lined entirely by epithelium—may persist or remain radiographically stable (3). In such cases, where a lesion fails to resolve or recurs after properly executed treatment or retreatment, decompression may be considered as an alternative to immediate apical surgery. This approach enables continued drainage and healing, and is particularly advantageous when the tooth remains asymptomatic and structurally intact. Decompression can often lead to resolution of a chronic lesion without the morbidity associated with more invasive procedures.

**Excessive Intracanal Exudation (Wet Canals):** In some patients with extensive lesions, persistent intracanal exudation may be encountered during endodontic treatment. This continuous fluid or purulent discharge may preclude adequate canal drying and thus prevent obturation. When such a "wet" canal persists despite days or weeks of intracanal medication, it may indicate the presence of a cystic cavity that is draining into the root canal system (4). In these instances, decompression is indicated if standard management, such as calcium hydroxide therapy, proves ineffective. Establishing external drainage through a small surgical opening reduces internal pressure and facilitates canal drying, thereby allowing for definitive obturation (4).

**Contraindications to Major Surgery:** In cases where apical surgery or enucleation is contraindicated—due to proximity to vital structures such as the inferior alveolar nerve, mental foramen, or sinus floor, or because of patient-related systemic risks—decompression is a valuable alternative (5). This technique requires minimal bone removal and can typically be performed under local anesthesia, making it particularly suitable for patients who are medically compromised or in whom general anesthesia is not advisable (6). In some situations, decompression serves as a preliminary step to reduce lesion size and inflammation, potentially enabling a more conservative secondary surgical approach if needed (1).

**Clarifications:**
It is important to note that not all large periapical radiolucencies are true cysts, nor do all require surgical decompression. Histopathological analyses have revealed that many radiographically extensive lesions are in fact granulomas rather than true cysts (Nair, 1998; Simon et al., 2006). Hence, radiographic findings alone should not dictate surgical decision-making.

When the lesion is confirmed to be of endodontic origin, conventional root canal treatment may still be effective—even for large lesions—provided that the case is properly managed. Several studies have demonstrated high healing rates in lesions exceeding 1.5 cm, especially when the root canal system is adequately disinfected and intracanal exudation is controlled (Ng et al., 2011). Furthermore, in the absence of persistent suppuration, treatment in a single visit has been shown to be equally successful (Sjögren et al., 1990).



Successful resolution of a large periapical lesion through nonsurgical root canal therapy performed in a single session.

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# Procedure.

## Surgical Decompression Procedure and Clinical Considerations

## Patient Preparation

Proper patient preparation and thorough counseling are crucial for the success of surgical decompression, especially considering the multi-step nature of this treatment and the extended cooperation required from the patient. Once the decision to proceed is made, it is the clinician's responsibility to explain all aspects of the procedure clearly. This includes informing the patient that a small drain or stent will be placed and maintained for a prolonged period—typically several weeks to months—and emphasizing the importance of excellent oral hygiene practices around the device. The informed consent process should cover all relevant risks, such as the potential for infection, accidental dislodgement of the tube, and the possible need for further surgical intervention, in addition to outlining the anticipated follow-up schedule.

A comprehensive review of the patient's medical history is performed preoperatively to ensure there are no contraindications to minor oral surgery. In general, decompression is carried out under local anesthesia in a standard outpatient dental or surgical setting. As part of routine presurgical protocols, the use of an antiseptic mouthrinse, such as chlorhexidine gluconate, is recommended to reduce the microbial load in the surgical field. Antibiotic prophylaxis is not routinely indicated unless there is a concern for systemic spread of infection or the patient is immunocompromised. Endodontic therapy is typically initiated prior to the surgical intervention. Most protocols suggest that root canal instrumentation and shaping be completed, followed by the placement of calcium hydroxide as an intracanal medicament for a period of 1 to 2 weeks, and obturation—if feasible—before the decompression procedure is performed (4). Complete disinfection and sealing of the root canal system are vital, as persistent intracanal infection may prevent periapical healing. A radiographic assessment, including periapical radiographs or CBCT imaging, should be repeated immediately prior to surgery to determine the optimal site for cortical access, ideally where the bone is thinnest—commonly the buccal cortical plate in anterior regions.

All necessary materials and surgical instruments must be prepared and sterilized. The decompression device is typically a small, flexible catheter or tube made of plastic or rubber. Historically, clinicians have used a variety of materials for this purpose, including rubber dam strips, polyethylene tubing, and metal tubes. Neaverth and Burg (1982) advocated for the use of radiopaque catheters, such as 8-French pediatric surgical catheters or umbilical artery catheters, approximately 1.5 mm in diameter, which can be easily visualized on radiographs if displacement occurs (5). The chosen device is cut to the appropriate length, smoothed to eliminate sharp edges, and sterilized prior to use. Essential instruments include a scalpel, periosteal elevator, round bur with a slow-speed handpiece, curettes, scissors, a needle holder, and sutures. Silk or nylon sutures are most commonly used to affix the drain to the surrounding soft tissue.

Local anesthesia (e.g., 2% lidocaine with 1:100,000 epinephrine) is administered to achieve profound anesthesia and effective hemostasis. The surgical area is draped to maintain asepsis. The fundamental goal of decompression is to establish a small bony window that facilitates long-term drainage of cystic fluid, thus reducing internal pressure and stimulating healing.

**Incision and Access to the Lesion:**
A conservative mucosal incision is made directly

over the area of interest. In cases involving large anterior cysts, a vertical incision in the labial vestibule is often sufficient. A small mucoperiosteal flap or a direct stab incision is elevated to expose the underlying cortical plate. The cortical bone is then carefully perforated using a round bur or trephine to create a small osteotomy—generally only a few millimeters in diameter—to access the lesion (5). Once the bone is penetrated, cystic fluid typically escapes spontaneously, indicating successful entry into the lesion.

**Aspiration and Biopsy:**
The cystic contents are aspirated using sterile suction or a syringe, confirming the presence of fluid and contributing to decompression. A small incisional biopsy is taken from the cyst lining or internal wall to allow for histopathological evaluation, which is essential to rule out neoplastic or other pathologies (4). Unlike enucleation, only a small portion of tissue is removed, preserving the remaining lesion walls.

**Irrigation of the Cavity:**
Following aspiration and biopsy, the cavity is irrigated copiously with sterile saline to remove debris and lower the bacterial load. Some authors have described an aspiration–irrigation technique as an alternative to placing a drain (8). However, in most decompression protocols, irrigation is followed by the insertion of a long-term drainage device.

**Placement of the Decompression Tube:**
The prepared catheter is inserted into the cystic cavity through the osteotomy so that one end rests within the lesion and the other protrudes into the oral cavity. A typical length is between 1–2 cm, depending on soft tissue thickness (5). It is essential to confirm that the lumen remains patent to maintain drainage. Some clinicians make a safety perforation or attach a stopper at the oral end to prevent inward migration. In cases with circular incisions, the cyst lining may be sutured to the oral mucosa to create a stable communication, similar to marsupialization (4).

**Securing the Tube in Place:**
Once inserted, the tube is stabilized using sutures that may pass through or around it and through the surrounding mucosa (5). Alternatively, a collar of tissue may be sutured to the tube to anchor it in position. Silk sutures are preferred due to ease of later removal. In some techniques, auxiliary devices such as orthodontic buttons or acrylic stops are used to prevent displacement. Once secured, a periapical radiograph may be taken to confirm the tube's location and assess its radiopacity.

**Hemostasis and Completion:**
Bleeding is typically minimal due to the small size of the osteotomy and the presence of the tube occupying the defect. Hemostasis is achieved with gentle pressure using sterile gauze. The cavity is not packed, as the drain itself maintains patency. Patients should be informed that minor bleeding or fluid oozing is expected in the initial postoperative phase.

**Postoperative Care**

Postoperative care instructions must be clearly explained both verbally and in writing. Patients should rinse with saline or chlorhexidine starting the day after surgery and continue several times daily. They are also instructed to irrigate the tube directly using a syringe to prevent obstruction from dried secretions. Gentle brushing around the site is encouraged.

Pain is generally mild and manageable with nonsteroidal anti-inflammatory drugs (NSAIDs). Antibiotics may be prescribed only in cases with extensive tissue manipulation or evidence of infection. Dietary modifications are recommended, including a soft diet and avoiding hot or spicy foods. Smoking and alcohol consumption should be discouraged to optimize healing.

Patients are advised not to manipulate the tube with their tongue or fingers. If the drain becomes dislodged or partially displaced, the clinician should be contacted immediately. Follow-up typically occurs within one week, during which the site is examined, the drain is cleaned or replaced if necessary, and oral hygiene is reviewed.

**Follow-Up and Healing Progress**

Decompression requires extended follow-up, with visits scheduled every 2–4 weeks to evaluate clinical signs, radiographic progression, and drain patency (5). Gradual shortening of the tube is often performed during follow-up appointments to match lesion shrinkage. Neaverth and Burg described this approach as a way to encourage healing and allow gradual closure of the cystic cavity (5).

Serial radiographs or CBCT scans are taken at 6, and 12 months to document lesion resolution. Clinical indicators for drain removal include minimal or absent drainage, radiographic evidence of bone regeneration, and tissue contraction around the drain.

**Clinical Outcomes and Prognosis**

Numerous studies support the clinical effectiveness of decompression in the management of large cystic lesions. Anavi et al. reported a mean reduction to 21% of original lesion volume after nine months in a cohort of 73 cases (6). Kwon et al. documented a 55% reduction in cyst volume over a similar period using 3D volumetric analysis (7). Pediatric and adolescent patients particularly benefit from this conservative approach, as it allows for preservation of the developing jaw structure and avoids more invasive interventions (8).

Despite these advantages, decompression is not without limitations. Patient compliance is essential for maintaining hygiene and avoiding complications. Approximately 10–15% of cases may require secondary surgical intervention if the lesion fails to resolve fully (6). However, subsequent surgery after decompression is often simplified by the smaller, well-circumscribed nature of the residual lesion.

**Conclusion:**

While surgical decompression is traditionally established as a long-term method for reducing large periapical lesions, contemporary clinical evidence and the cases presented in this work suggest a shift in the therapeutic paradigm.

The success of the procedure does not solely depend on the mechanical reduction of cystic volume over several months, but rather on its capacity to act as a biological catalyst. By establishing a temporary external drainage (7–10 days), the clinician can disrupt the internal hydrostatic pressure (the primary barrier to healing in stagnant lesions) and transform a chronic, non-responsive environment into an active reparative phase.

This approach allows for:

**Rapid Exudate Control:** Facilitating the drying and hermetic sealing of "wet" canals that otherwise preclude obturation.

**Restoration of Homeostasis:** Triggering immediate bone regeneration and cortical plate reformation by neutralizing intralesional osmotic pressure.

**Minimized Morbidity:** Achieving predictable healing outcomes with significantly reduced treatment times and improved patient compliance.

The following section presents a series of clinical cases where this **short-term catalytic approach** resulted in complete resolution and bone regeneration, challenging traditional long-term drainage protocols.

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# Advantages and Limitations

## Advantages of Surgical Decompression

**Conservative and Minimally Invasive Approach:**
Surgical decompression is significantly less invasive than procedures such as complete cyst enucleation or apicoectomy. The intervention requires only a small osseous window, preserving the majority of the surrounding bone and minimizing trauma to adjacent anatomical structures, including neighboring teeth and critical anatomical elements like the maxillary sinus or neurovascular bundles (1,2). The apex of the treated tooth remains intact, and adjacent teeth are not disturbed. This minimally invasive profile is often associated with less postoperative discomfort and inflammation in comparison with traditional periapical surgery (3). Additionally, the procedure is typically performed under local anesthesia in a standard dental setting.

**Effective Resolution of Large Periapical Lesions:**
Decompression promotes gradual healing through sustained drainage and pressure reduction, allowing for progressive bone regeneration. Published clinical studies have reported favorable outcomes. For instance, one long-term analysis involving 73 cases demonstrated an average reduction in lesion size of approximately 79% following decompression (3). In many cases, lesions heal entirely or reduce sufficiently to eliminate the need for more invasive interventions (4). This method may also facilitate preservation of teeth that might otherwise require extraction or surgical curettage, and in many instances leads to the reestablishment of normal periapical bone morphology.

**Low Morbidity and Complication Risk:**
Due to its conservative nature, the risk of significant postoperative complications is minimal. Compared to complete enucleation of large cysts, the risk of injury to vital structures—such as nerves or the sinus floor—is substantially reduced (2). Most patients report only mild postoperative discomfort, and the reduced surgical field contributes to shorter recovery times. This technique is particularly beneficial for medically compromised individuals or patients for whom general anesthesia or extensive surgery is contraindicated (3).

**Preservation of Future Treatment Possibilities:**
Importantly, decompression does not preclude subsequent surgical procedures. Should the lesion fail to resolve completely, a follow-up apicoectomy or enucleation can still be conducted under improved conditions—typically involving a smaller and better-defined lesion (1). In some cases, decompression serves as the initial phase of a two-step surgical plan, with definitive cyst removal deferred until lesion size is reduced and bone walls have thickened. This staged approach improves surgical predictability and safety. Moreover, decompression preserves the option of alternative treatments—including apical surgery or extraction—if necessary, although many of these measures often become unnecessary following successful decompression.

## LIMITATIONS:

**Patient Compliance and Duration of Therapy**

The success of decompression procedures largely depends on the patient's commitment to postoperative care. Maintaining the drainage device involves regular irrigation and strict oral hygiene, typically over a prolonged period that may extend from several weeks to months (2). This extended regimen may not be feasible for every patient, as lapses in compliance can result in device blockage, dislodgement, or even treatment failure. In contrast to surgical enucleation, which aims to remove the lesion in a single step, decompression demands sustained monitoring to achieve full resolution. While the use of radiopaque, well-fixed drains reduces the likelihood of displacement or accidental ingestion, such risks cannot be entirely ruled out (1). Therefore, careful case selection and clear preoperative communication are fundamental.

**Risk of Contamination and Hygiene-Related Challenges**

Because decompression maintains an open path between the lesion and the oral environment, there is an inherent risk of introducing microorganisms into the site. This opposes the standard principle of complete root canal system isolation in endodontics (2). Poor hygiene practices can foster bacterial colonization within the cavity, potentially leading to superinfection or prolonged inflammation. Additionally, the presence of a foreign object, such as a drain, may provoke mild mucosal irritation. These reactions are generally self-limiting but still require monitoring throughout the follow-up period.

**Uncertain Outcomes and Potential for Additional Surgery**

Although many lesions respond favorably to decompression, complete healing is not always achieved. In some cases, the lesion may decrease in size but persist, particularly if fluid production continues or the drain seals prematurely (3). If resolution stalls, further intervention—such as cyst enucleation or apical surgery—might be necessary to fully eradicate the pathology (2). As such, clinicians must be prepared to adjust the treatment plan based on the lesion's evolution.

**Diagnostic Constraints**

A major limitation of decompression is its inability to provide complete tissue for histopathological assessment. Typically, only a small biopsy sample is taken during the initial procedure, which may delay identification of more serious or atypical conditions, such as neoplastic changes or dysplastic epithelium mimicking inflammatory lesions. Moreover, residual epithelial remnants may persist after decompression (2), potentially obscuring relevant findings until a more extensive procedure is performed. For these reasons, imaging studies and strategic biopsy remain crucial in treatment planning.

**Patient Comfort and Esthetic Considerations**

Wearing an intraoral drainage device for an extended period can affect patient comfort and overall quality of life. Some individuals may experience minor discomfort, interference with chewing, or soft tissue irritation. In anterior regions, visibility of the device during speech or smiling may also raise esthetic concerns. Although typically manageable, these factors can influence treatment acceptance. A transparent explanation of the rationale and expected outcomes is essential to promote patient cooperation and satisfaction.

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# Comparison with other techniques

## Decompression in Endodontics: A Comparative Perspective

### Decompression vs. Apicoectomy

An apicoectomy involves surgically exposing the root apex, resecting a portion of the root tip, and curetting the associated periapical lesion—often with placement of a retrograde filling. While this approach is more invasive than decompression, it offers the immediate benefit of removing pathological tissue and provides a specimen for histopathological analysis. It is typically indicated in cases where nonsurgical retreatment is insufficient or when persistent lesions—such as cysts or granulomas—fail to resolve (1).

Success rates for apical surgery are high, often reported between 85% and 95% in appropriately selected cases, and healing tends to be faster due to physical removal of the lesion (1). However, this approach is not without risks. Apicoectomy requires bone removal and root-end resection, and may result in complications such as sinus perforation, neurovascular damage, or inadvertent trauma to adjacent teeth—especially in cases involving large lesions (1).

Decompression, in contrast, avoids resecting the root or removing significant bone. It is less invasive, better tolerated by patients, and is particularly useful when conventional surgery is contraindicated—such as in cases of proximity to critical structures like the inferior alveolar nerve, or in patients with medical limitations (1). The key trade-off is time: apicoectomy often resolves the pathology in a single intervention, whereas decompression requires a longer healing period and meticulous follow-up. In clinical practice, decompression is often preferred for very large cystic lesions in strategic teeth, with apicoectomy reserved for cases in which decompression fails to promote adequate healing (2). In certain scenarios, both methods may be employed sequentially—starting with decompression to reduce lesion size and inflammation, followed by apical surgery if necessary (2).

In summary, apicoectomy is a more immediate and decisive approach, while decompression is conservative and tissue-preserving. The choice depends on anatomical, clinical, and patient-specific factors.

### Decompression vs. Marsupialization

The terms "decompression" and "marsupialization" are sometimes used interchangeably, though they refer to distinct procedures. Marsupialization, also known as Partsch's operation, involves creating a wide surgical window in the cystic wall and suturing it to the oral mucosa, essentially establishing a permanent communication between the cystic cavity and the oral environment (1). Decompression achieves a similar outcome but through a smaller, controlled opening maintained by a drain or stent (1).

Both techniques aim to reduce intracystic pressure, promote gradual shrinkage of the lesion, and are considered conservative surgical strategies. The practical differences are important: marsupialization leaves a larger wound, which may be more difficult for the patient to maintain and may heal more slowly (1). Decompression via a small tube is generally easier for patients to manage; the drain can be flushed regularly, and the surrounding mucosa typically heals with minimal disruption (1).

In endodontics, decompression is typically preferred for radicular cysts, given its minimal invasiveness and favorable patient tolerance. Marsupialization may still be used in oral surgery for large odontogenic cysts, such as odontogenic keratocysts or dentigerous cysts, but for lesions of endodontic origin, decompression with tube drainage has demonstrated high efficacy (3). Both approaches require consistent patient compliance and carry some risk of residual cystic tissue remaining post-treatment (3).

In summary, decompression can be viewed as a modern, patient-friendly evolution of marsupialization—achieving the same biological outcome with a smaller access and simpler maintenance.

## Decompression vs. Conventional Non-Surgical Therapy

The standard of care for apical periodontitis remains conventional non-surgical root canal treatment or retreatment. In many cases, large periapical lesions resolve with proper cleaning, disinfection, and obturation of the root canal system, without the need for surgical intervention (4). Reported healing rates for nonsurgical management of even large lesions are high, and most periapical radiolucencies, including those measuring up to 8–10 mm, resolve within 6–12 months if the microbial source is effectively eliminated (4).

Decompression is not intended as a substitute for proper endodontic therapy, but rather as an adjunct in select cases. For instance, in the presence of large, fluid-filled lesions that prevent canal obturation due to persistent exudation, decompression can help stabilize the environment and enable completion of treatment. Similarly, if a lesion persists following otherwise adequate root canal therapy, decompression may be attempted prior to considering more invasive surgical options (4).

There are also **non-surgical** variants of **decompression** described in the literature. These include long-term drainage through the canal itself—placing a tube through the tooth into the lesion—or repeated aspiration over time (3). While these methods avoid soft tissue incision, they are technically challenging, can increase the risk of reinfection, and often require prolonged tooth access, making them less favorable in routine endodontic settings. Surgical decompression with a mucosal drain remains the preferred approach when decompression is indicated.

In summary, nonsurgical endodontic therapy addresses the cause—the intraradicular infection—while decompression helps manage the consequence—a persistent or cystic periapical lesion. Both approaches are complementary and should be integrated thoughtfully based on the clinical scenario.

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# Timing in Decompression Therapy

## Duration of Decompression: Clinical Evidence and Considerations

### Single-Visit Decompression

When the lesion is purely inflammatory in nature, such as a periapical granuloma, abscess, cellulitis, or purulent collection, it does not represent a true cyst. In these cases, there is no epithelial lining and therefore no structured cavity maintained by osmotic or proliferative mechanisms.

As a result:

1. There is no sustained osmotic pressure driving lesion expansion.
2. There is no organized cystic architecture requiring gradual remodeling.
3. The purulent or inflammatory contents can often be fully evacuated in a single session.

Once the source of infection, typically intraradicular, is properly addressed, the tissues are likely to undergo spontaneous healing.

In such scenarios, prolonged decompression through a stent or tube is usually unnecessary. A single surgical intervention to relieve pressure may be sufficient, especially when followed by appropriate root canal disinfection and clinical monitoring.

### Short-Term Decompression (3–12 weeks)

While decompression is often thought of as a long-term strategy, several cases suggest that shorter durations can also result in favorable outcomes. Tian et al. (2019) presented two cases in which decompression tubes were maintained for just 3 and 4 weeks, respectively. Remarkably, both patients showed complete radiographic healing confirmed 1–2 years post-treatment (5). Similarly, Neaverth and Burg (1982) documented healing in two cases treated with decompression for 5 weeks and 4 months. Resolution was observed at 13 and 15 months of follow-up, underscoring the potential of shorter interventions in selected scenarios (3).

### Mid-Term Decompression (3–12 months)

Mid-range protocols—lasting several months—are among the most frequently reported in the literature. Chung et al. (2020) analyzed 50 cystic lesions and found an average decompression period of approximately 9.4 months (range: 3 to 27 months). The greatest reduction in lesion volume occurred within the first 3–6 months, although extended durations continued to provide measurable benefit. A statistically significant correlation between decompression time and volume reduction was observed (6).

Complementing these findings, Kwon et al. (2020) reported about 48% reduction in lesion size after 6 months, based on three-dimensional analysis (7). Clinical evidence also supports this timeline: Lopes et al. (2023) described a case managed over 6 months with excellent healing outcomes (4), while Niavarzi et al. (2022) achieved near-complete bone fill at 12 months following just 3 months of decompression, with complete radiographic resolution by the third year (2).

### Long-Term Decompression (12–18+ months)

Although less common, longer decompression protocols are occasionally indicated, especially in cases where surgical enucleation poses a high risk. Enislidis et al. (2004) reported on 16 such cases with an average decompression duration of 446 days (approximately 15 months). The lesions demonstrated a mean volume reduction of 81%, suggesting that extended decompression can be highly effective when carefully managed (8).

## Clinical Implications and Emerging Trends

The existing body of evidence suggests that decompression durations typically range between 3 and 12 months, depending on lesion characteristics, patient factors, and clinical objectives. The most significant volume reduction appears to occur in the first 3–6 months of treatment, after which the rate of shrinkage tends to plateau. While extended decompression may be justified in select cases, particularly where enucleation carries higher morbidity, it must be balanced against patient comfort, hygiene maintenance, and adherence to follow-up.

Importantly, shorter decompression protocols—lasting a few weeks—have shown success in several well-documented cases. These outcomes challenge the traditional assumption that long-term drainage is always necessary. In our own clinical experience, we have observed comparable healing in cases managed with decompression lasting only a few days to several weeks, particularly when combined with effective endodontic disinfection and close monitoring.

While the literature on ultra-short decompression remains limited, preliminary observations suggest that such protocols may be a viable alternative in carefully selected cases. Reduced treatment duration may improve patient compliance and quality of life, especially in young or anxious individuals. Nonetheless, more clinical studies are needed to define the boundaries of these shortened interventions, including indications, contraindications, and long-term outcomes.

| Autor | Tiempo de Descompresión | Artículo y enlace |
|---|---|---|
| Neaverth EJ, Burg HA (1982) | 5 semanas – 1 año | Decompression of large periapical cystic lesions |
| Kehoe JC (1986) | 10 días | Decompression of a large periapical lesion: a short treatment course |
| Gunraj MN (1990) | 5 to 7 weeks | Decompression of a large periapical lesion utilizing an improved drainage device |
| Loushine RJ et al. (1991) | 2 days but with enucleation | Loushine RJ, Weller RN, Bellizzi R, Kulild JC. A 2-day decompression: a case report of a maxillary first molar. J Endod. 1991;17(2):85-87. doi:10.1016/S0099-2399(06)81614-6 |
| Loushine RJ et al. (1991) | 2 días | A 2-day decompression: a case report of a maxillary first molar |
| Rees Js (1997) | 7 days( Stitches removal ) then many weeks | Rees JS. Conservative management of a large maxillary cyst. Int Endod J. 1997;30(1):64-67. doi:10.1111/j.1365-2591.1997.tb01100.x |
| Martin SA (2007) | 6 semanas | Conventional endodontic therapy of upper central incisor combined with cyst decompression: a case report |
| Balaji Tandri S (2010) | 7 semanas | Management of infected radicular cyst by surgical decompression |
| Wang FM, Liang H, Glickman GN, Gutmann JL | NO citado en el resumen | Wang FM, Liang H, Glickman GN, Gutmann JL. Use of a Penrose Drain for Decompression of a Large Periapical Lesion: A Case Report With 4.5-Year Follow-up. J Endod. 2024;50(10):1521-1526. doi:10.1016/j.joen.2024.07.005 |
| Tian FC, Bergeron BE, Kalathingal S, et al (2019) | 3 Semanas | Tian FC, Bergeron BE, Kalathingal S, et al. Management of Large Radicular Lesions Using Decompression: A Case Series and Review of the Literature. J Endod. 2019;45(5):651-659. doi:10.1016/j.joen.2018.12.014. |
| Cho YS, Jung IY. (2019) | 4 weeks | Cho YS, Jung IY. Complete Healing of a Large Cystic Lesion Following Root Canal Treatment with Concurrent Surgical Drainage: A Case Report with 14-Year Follow-Up. J Endod. 2019;45(3):343-348. doi:10.1016/j.joen.2018.12.008 |

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# Cases and Outcomes

# Cases and Outcomes

## short-term decompression

Although a general guideline has been previously described for the management of cases requiring surgical decompression, it is essential to understand that each case must be addressed individually. The cases presented below share similarities with the standard protocol, yet they also introduce important variations. In these cases, drainage was maintained for a period ranging from seven to ten days. Unlike the conventional approach—which recommends maintaining the drainage until complete radiographic resolution of the defect is observed—the drainage was removed earlier, without compromising the clinical outcome. This was possible as long as the removal occurred once the main root canal was kept dry and free of extra-radicular exudate.

**Cases 1 to 4**

# SUCCESSFUL SURGICAL DECOMPRESSION OF A THROUGH-AND-THROUGH BONE DEFECT IN JUST 10 DAYS

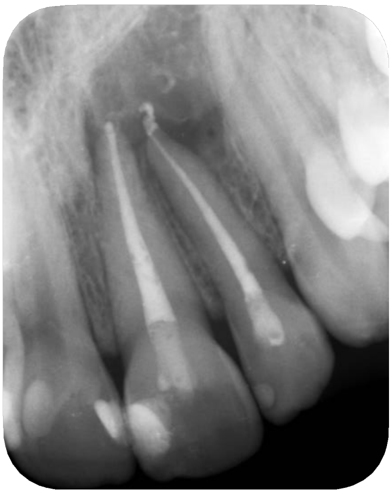

## Abstract

This case report presents the successful management of a large periapical lesion associated with tooth 2.1 in a 31-year-old patient using a combination of non-surgical root canal therapy and surgical decompression. The approach led to complete regeneration of the buccal cortical bone within six months, as evidenced by CBCT imaging. The case demonstrates that decompression can be a valuable adjunct in the treatment of chronic periapical pathologies, especially when associated with cortical bone destruction.


## Introduction

Periapical finding resulting from pulpal necrosis are typically managed with conventional endodontic treatment. However, when these lesions are extensive, particularly when they lead to cortical bone destruction or exhibit persistent exudation, adjunctive surgical interventions may be necessary. Decompression, a minimally invasive surgical procedure, allows for gradual reduction of hydrostatic pressure within the lesion and facilitates healing while preserving surrounding structures.

Obturation of tooth 2.1 with calcium hydroxide



Final Obturation

## Case report

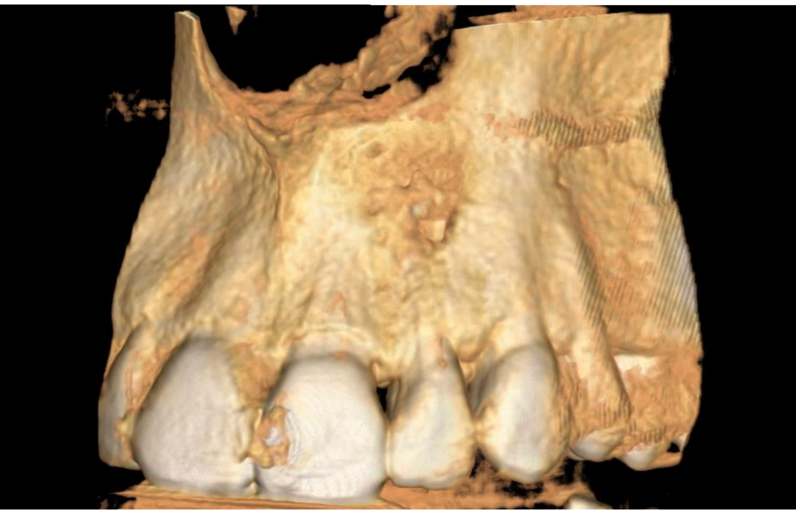
A 31-year-old female patient presented with a history of mild pain and swelling in the anterior maxilla. Clinical examination revealed a sinus tract associated with tooth 2.1. Radiographic evaluation, including a CBCT scan, demonstrated a large periapical radiolucency involving tooth 2.1, with evident loss of the buccal cortical plate. Tooth 2.2 had been previously treated endodontically by the referring dentist and showed a good limit and extension of the filling material, although it was encompassed by the lesion.

The diagnosis for tooth 2.1 was chronic apical periodontitis (K04.5) and pulpal necrosis (K04.1). No systemic conditions were reported, and no antibiotic therapy was prescribed.

In the first session, root canal treatment was initiated on tooth 2.1. The canal was chemomechanically prepared using sodium hypochlorite and EDTA, with irrigation activated passively using a gutta-percha cone. The canal was filled with calcium hydroxide, and a surgical decompression procedure was performed. A 3 mm diameter, 5 mm long irrigation tube, typically used in the tubing from an IV set., was placed through the soft tissue fenestration and sutured to the free gingiva. No intra-lesional irrigation was prescribed; the patient was advised to maintain hygiene using chlorhexidine rinses.

10 days later, the tube was removed. The sinus tract appeared clean, non- suppurative, and epithelialized. The root canal was then obturated using continuous wave condensation with gutta-percha and AH Plus sealer.

Initial CBCT. Through and Through Defect



6 Months Follow Up

At the six-month follow-up, a CBCT scan revealed complete regeneration of the buccal cortical plate and resolution of the periapical radiolucency. The patient was asymptomatic, and soft tissues had healed fully.

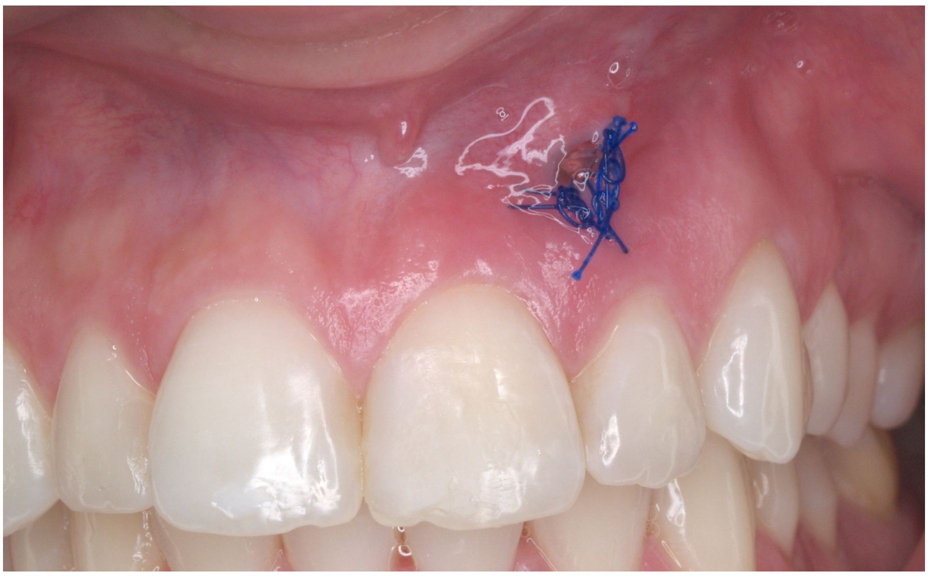
The tubing from an IV set.

**Discussion**

The successful healing observed in this case reinforces the effectiveness of surgical decompression as an adjunct to conventional root canal therapy in managing large periapical lesions. The use of a simple, cost- effective drainage device enabled rapid reduction of pressure and elimination of exudate, promoting a favorable healing environment. Avoiding systemic antibiotics in this case also highlights the body's natural regenerative capabilities when proper drainage and disinfection are achieved.

Although no active irrigation was performed through the decompression tube, maintaining local hygiene was sufficient to prevent secondary infection and support healing. The rapid resolution of the lesion and bone regeneration confirm the biological potential of decompression to support conservative management of severe periapical infections.

Conclusion This case illustrates how combining conventional endodontic therapy with surgical decompression can lead to complete healing of large periapical lesions with buccal cortical perforation. This conservative and effective approach should be considered in similar clinical situations to avoid more invasive surgical interventions.



The tube remained sutured to the gingiva for 10 days.

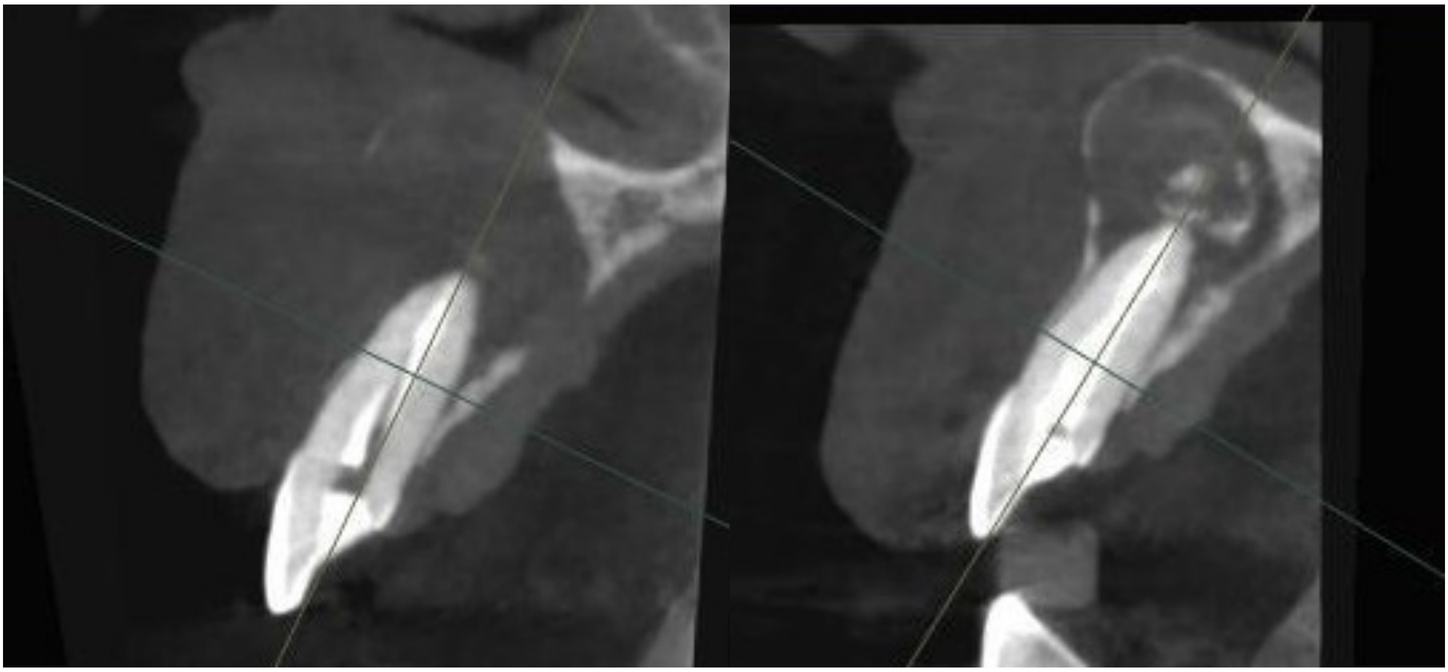
# SUCCESSFUL SURGICAL DECOMPRESSION OF TOOTH 2.1 AND 2.2 IN JUST 7 DAYS

Abstract

This clinical case describes the successful management of chronic apical periodontitis with an extensive periapical lesion affecting teeth #21 and #22. Surgical decompression was performed using a modified plastic cannula sutured to the gingiva to allow controlled drainage. No systemic antibiotics were needed. The root canals were filled with calcium hydroxide, which was maintained for five months. A follow-up CBCT showed evidence of cortical bone regeneration, supporting the decision to proceed with definitive root canal obturation.

## Introduction

Extensive periapical lesions represent a therapeutic challenge in endodontics, particularly when persistent exudate is present. In such cases, surgical decompression offers a minimally invasive alternative to manage large lesions by allowing continuous drainage, reducing intralesional pressure, and facilitating the regeneration of periapical tissues. When combined with effective intracanal disinfection, this approach may prevent the need for more invasive interventions such as apical surgery or extraction.



The initial CBCT on the left reveals a through-and-through defect with complete loss of the buccal cortical bone. The five-month follow-up CBCT on the right shows evidence of healing and bone regeneration. Calcium hydroxide remained in place, as drainage was under control on the day the tube was removed. Notably, new cortical bone formation is observed, indicating successful reparative processes.

**Case Report**

A 60-year-old male patient was referred to the endodontic office due to a large periapical lesion affecting teeth #21 and #22. Both teeth had been accessed by his general dentist but treatment could not be completed due to persistent purulent drainage. The diagnosis was chronic apical periodontitis (ICD-10: K04.5).

A CBCT scan revealed an extensive periapical lesion with destruction of the buccal cortical bone. Surgical decompression was indicated. A plastic cannula, originally intended for cement dispensing, was trimmed and placed into the lesion. The cannula was secured to the free gingiva with sutures to ensure stability.

The drainage device was left in place for one week. Once exudate had ceased, the canals were refilled with calcium hydroxide. A radiopaque formulation was chosen to allow radiographic confirmation of canal filling. Vehicles such as silicone or propylene glycol were preferred over aqueous ones to ensure that the calcium hydroxide remained inside the canal for several months. Although its alkalizing effect may not persist throughout, the filling served as a long-term barrier.

No systemic antibiotics were prescribed. After five months, a new CBCT scan showed clear signs of healing, including new cortical bone formation. Based on this favorable evolution, the case was considered ready for final root canal obturation to ensure long-term stability.

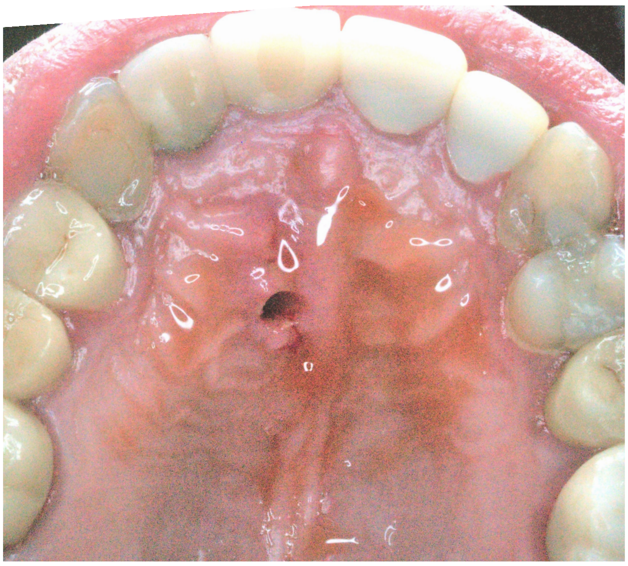
## Discussion

Surgical decompression has proven to be a reliable and minimally invasive technique for managing large periapical lesions. In this case, a simple and cost-effective solution using a modified plastic cannula allowed efficient drainage and symptom resolution without complications.

The absence of systemic antibiotics reinforces the concept that adequate drainage and proper intracanal disinfection are often sufficient to control infection and support healing. Maintaining calcium hydroxide inside the canal for an extended period was critical. The choice of a viscous vehicle ensured that the intracanal medication was not prematurely resorbed, maintaining a physical barrier against reinfection.

This case highlights the importance of individualizing treatment protocols. Within five months, the infection was controlled, healing was evident, and the affected teeth were preserved. Surgical decompression, when properly executed, may offer a favorable outcome in cases where conventional endodontic treatment alone would be insufficient.

# MINIMALLY INVASIVE MANAGEMENT OF A LARGE PALATAL LESION WITH A SHORT-TERM DECOMPRESSION

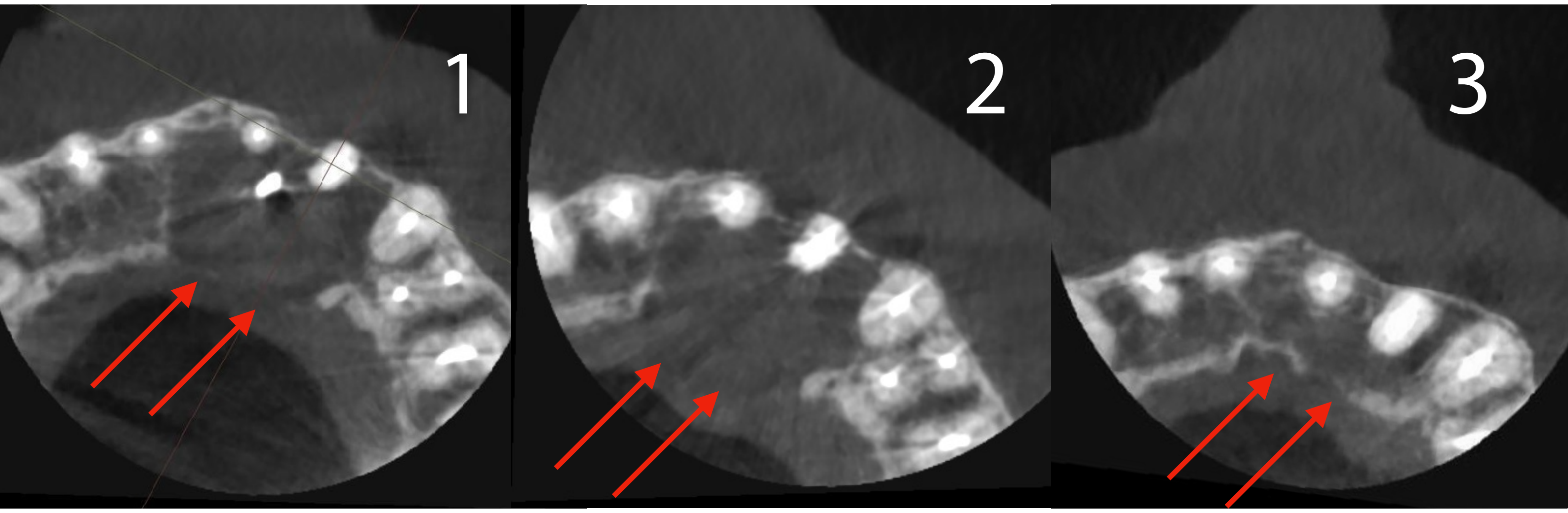



## Abstract

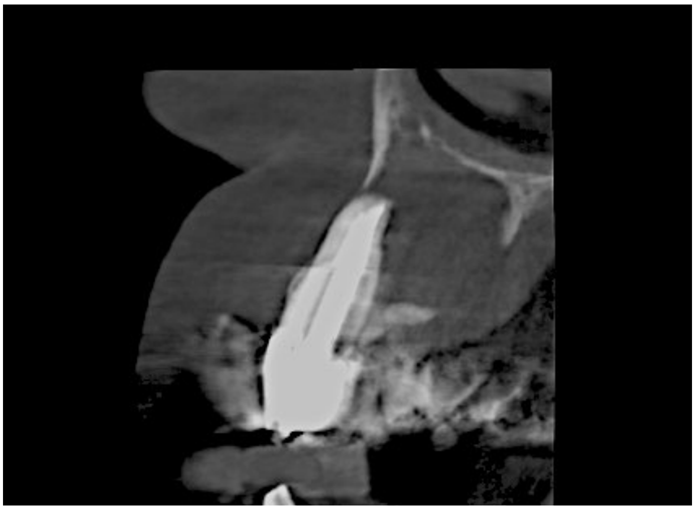
This clinical case describes the conservative management of a large periapical lesion associated with teeth 21 and 22 in a 50-year-old male patient with no relevant medical history. Despite conventional endodontic retreatment and long-term calcium hydroxide medication, no signs of healing were observed. Surgical decompression was performed for only one week, followed by another period of intracanal medication. A CBCT obtained five months later confirmed bone regeneration of the previously destroyed palatal cortical plate. This case highlights the value of decompression as a minimally invasive surgical adjunct when faced with persistent apical pathology.


## Introduction

Chronic apical periodontitis can present with extensive periapical lesions, including the development of cyst-like structures. When conventional endodontic retreatment fails to promote resolution, surgical alternatives may be considered. Among these, decompression offers a conservative and effective method to facilitate drainage and reduce intralesional pressure, thereby stimulating healing. This case demonstrates the potential of short-term decompression in managing a large palatal bone defect while preserving tooth structure and promoting guided bone regeneration.




1) Initial CBCT. Axial view
2) Six-month follow-up after intracanal placement of calcium hydroxide showed no radiographic improvement
3) Five months after surgical decompression, a new CBCT scan revealed regeneration of the palatal cortical bone.



Sagital view. CBCT
Palatal bone loss

## Case Report

A 50-year-old male presented with a diagnosis of chronic apical periodontitis (K04.5) affecting teeth 21 and 22. Clinical and radiographic examination revealed a large periapical radiolucency with complete loss of the palatal cortical bone. Although the lesion had not perforated the gingival mucosa, it produced noticeable palatal swelling. The previous root canal treatments had been performed through cast post and core restorations in tooth 22 and a fiber post in tooth 21, both covered with crowns.

These restorations were removed, and non-surgical endodontic retreatment was initiated. The canals were filled with calcium hydroxide and maintained under medication for five months. A follow-up CBCT showed no radiographic signs of healing.

Due to the persistent lesion and extent of bone destruction, surgical decompression was performed through a palatal access. A sterile tube was inserted and sutured to the palatal mucosa to maintain drainage. Unlike standard decompression protocols, which recommend leaving the drain until radiographic resolution, in this case the decompression was limited to just one week.

Upon removal of the tube, the canals were again filled with calcium hydroxide for another five-month period. A new CBCT scan at the end of this phase demonstrated clear evidence of bone regeneration, particularly with the reformation of the palatal cortical plate. At this point, the root canals were obturated, completing the endodontic therapy. Given the absence of exudate and the radiographic signs of healing, the prognosis was considered favorable.

## Discussion

This case underscores several important aspects in the management of large periapical lesions. First, the failure to observe improvement after prolonged intracanal calcium hydroxide dressing suggests that some lesions, likely of cystic nature, may not resolve through chemical disinfection alone. The decision to perform decompression enabled a minimally invasive solution that reduced hydrostatic pressure and facilitated healing without the need for enucleation.

Although most decompression protocols recommend maintaining the drain until radiographic resolution, this case shows that even short-term decompression (7 days) can be effective when combined with continued intracanal disinfection and a controlled endodontic environment. The reformation of the palatal cortical plate within five months confirms the regenerative capacity of periapical tissues when favorable conditions are established.

In the absence of a draining sinus tract or mucosal perforation, decompression was still successfully implemented, expanding its indications. The outcome supports the individualized management of surgical endodontic cases, balancing invasiveness with biological potential for healing.

# Seven-Day Surgical Decompression of a Draining Through-and-Through Osseous Lesion


## Abstract

This case report describes the successful endodontic management of a large draining through-and-through periapical osseous lesion associated with a necrotic maxillary left lateral incisor (FDI #22) in a 33-year-old female. Cone-beam computed tomography (CBCT) revealed extensive destruction of both buccal and palatal cortical plates, accompanied by an acute apical abscess. Initial intracanal medication with calcium hydroxide and systemic antibiotics failed to control the infection. A surgical decompression procedure was performed using a customized drainage stent left in place for seven days. This approach effectively resolved the persistent purulent drainage, enabling completion of root canal therapy. This case highlights the utility of decompression as a conservative and effective technique for managing persistent exudative lesions.


## Introduction

Periapical lesions of endodontic origin are commonly managed with nonsurgical root canal treatment (RCT) and intracanal medication. However, in cases of extensive bone destruction and persistent purulent drainage, alternative strategies may be required to complement conventional therapy. One such technique is surgical decompression, which allows continuous drainage and reduces intralesional pressure, thereby promoting healing while preserving surrounding structures. This report presents a case where a seven-day decompression strategy led to resolution of a large through-and-through lesion, enabling successful completion of RCT.

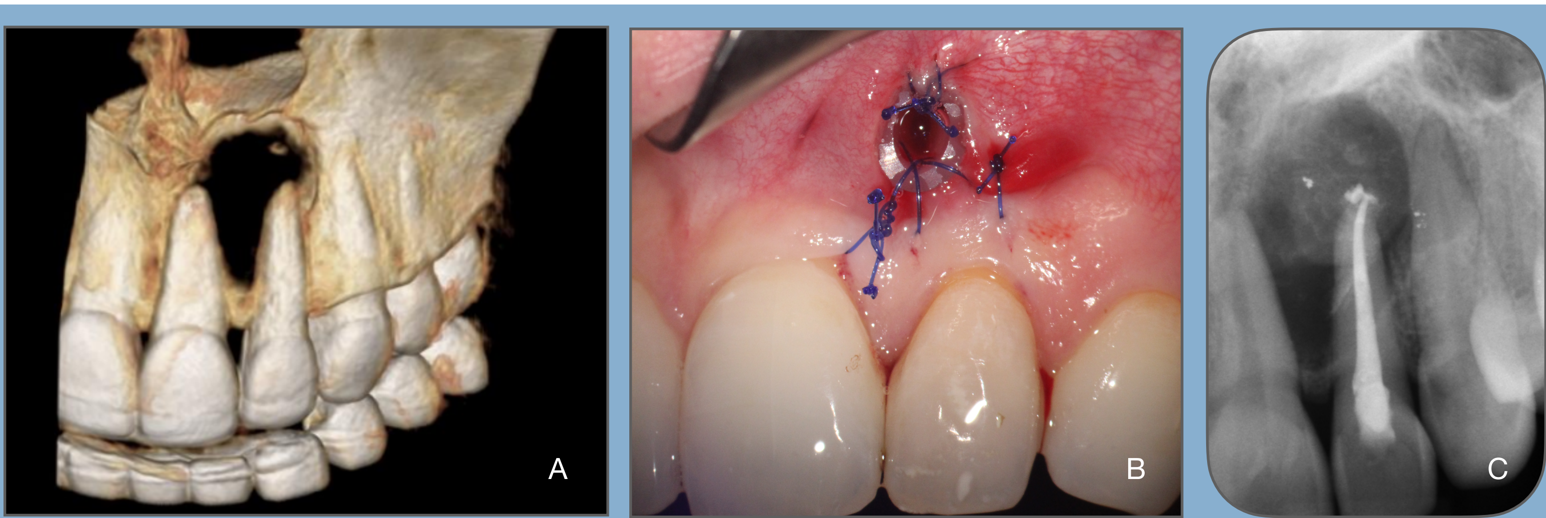



**Figure 1.**
(A) CBCT 3D volumetric reconstruction prior to initiating treatment.
(B) Intraoperative view of the surgical decompression procedure.
(C) Final radiograph taken immediately after completion of root canal treatment.

## Case Report

A 33-year-old female was referred for evaluation and treatment of tooth #22 (FDI notation), which had previously been opened by her general dentist. Clinical examination revealed swelling, tenderness to palpation, and purulent exudate from the canal. The tooth was non-vital. CBCT imaging revealed a large periapical radiolucency with destruction of both buccal and palatal cortical plates, consistent with a through-and-through lesion and associated acute apical abscess.

First Visit

The canal was accessed, irrigated, and dressed with calcium hydroxide. Significant purulent drainage was noted and aspirated. Although systemic antibiotics are not routinely indicated for localized endodontic infections [1], a short course was prescribed due to the extent of the lesion and potential for systemic involvement. The canal was sealed temporarily.

Second Visit (2 weeks later)

Persistent purulent exudate was present upon canal access, indicating that antibiotic therapy had not resolved the infection. The canal was irrigated and medicated again with calcium hydroxide. The patient was informed that, if drainage persisted, surgical decompression would be necessary.

Third Visit (4 weeks after initial visit)

Despite two rounds of calcium hydroxide therapy, the canal still exhibited purulent drainage. Following informed consent, a surgical decompression procedure was performed. A sterile plastic tube (typically used for irrigation in implant surgery) was trimmed and sutured into the apical site to allow continuous drainage. The patient was instructed to irrigate the site daily with chlorhexidine using a syringe to maintain patency.

Fourth Visit (One week after decompression)

The drainage had completely resolved. The canal was clean and dry after removal of the calcium hydroxide. Working length was established at 23 mm, with an apical diameter of 0.55 mm. The canal was obturated with AH Plus resin-based sealer, gutta-percha, and warm vertical compaction.

The patient remained asymptomatic, and follow-up radiographs are planned to assess long-term healing.

Fourth visit ( 2 weeks after completion of the root canal on 21 FDI)

At a follow-up visit 2 weeks after completion of decompression and root canal treatment of tooth 22, the patient reported localized discomfort in tooth 21. Nonsurgical root canal treatment of tooth 21 was completed without complications. No purulent exudate was noted, and no drainage procedure was necessary.

## Discussion

This case demonstrates the clinical value of decompression in managing large, exudative periapical lesions. Through-and-through lesions, particularly those with cortical plate perforation, present significant challenges. When persistent drainage prevents completion of RCT, decompression offers a conservative alternative to more aggressive surgical curettage.

The decision to prescribe antibiotics was taken cautiously. According to Segura-Egea et al. [1], antibiotics in endodontics should be reserved for cases with systemic involvement or spreading infections. However, given the extensive lesion and repeated exudation, a short antibiotic course was justified as an adjunct.

Despite thorough canal debridement, intracanal medication, and systemic antibiotic therapy, purulent drainage persisted at the second visit (Figure 2), demonstrating the inefficacy of antibiotics in this context. Definitive control was achieved only after surgical decompression performed at the third appointment. . This clinical outcome underscores the fact that antibiotics alone are not an effective means of managing such cases. The resolution relied on mechanical intervention rather than pharmacologic control, highlighting the importance of local surgical management in persistent lesions with extraradicular infection and drainage.

Decompression, first described by Neaverth and Burg [2], has shown consistent success in reducing lesion size and allowing subsequent canal obturation without need for surgical enucleation. The technique is minimally invasive, preserves anatomical structures, and provides immediate symptomatic relief in cases with active infection.

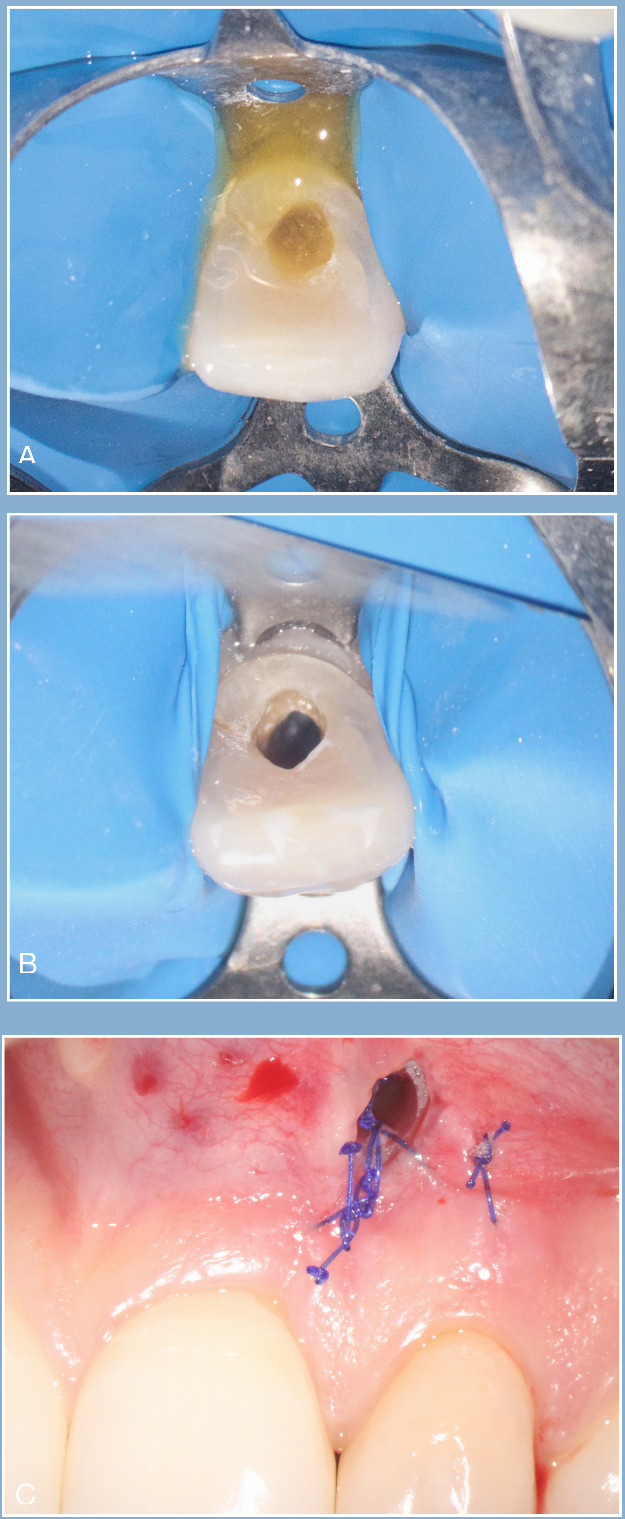



**Figure 2.**
(A) Persistent Drainage Following the Second Appointment with Calcium Hydroxide Dressing
(B) Following Seven Days of Decompression, Purulent Exudate Was Successfully Controlled, Allowing for Complete Canal Cleaning, Drying, and Completion of Root Canal Therapy
(C) One week after placement of the surgical drain

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**Figure 3**
Soft tissue follow-up after 6 months.

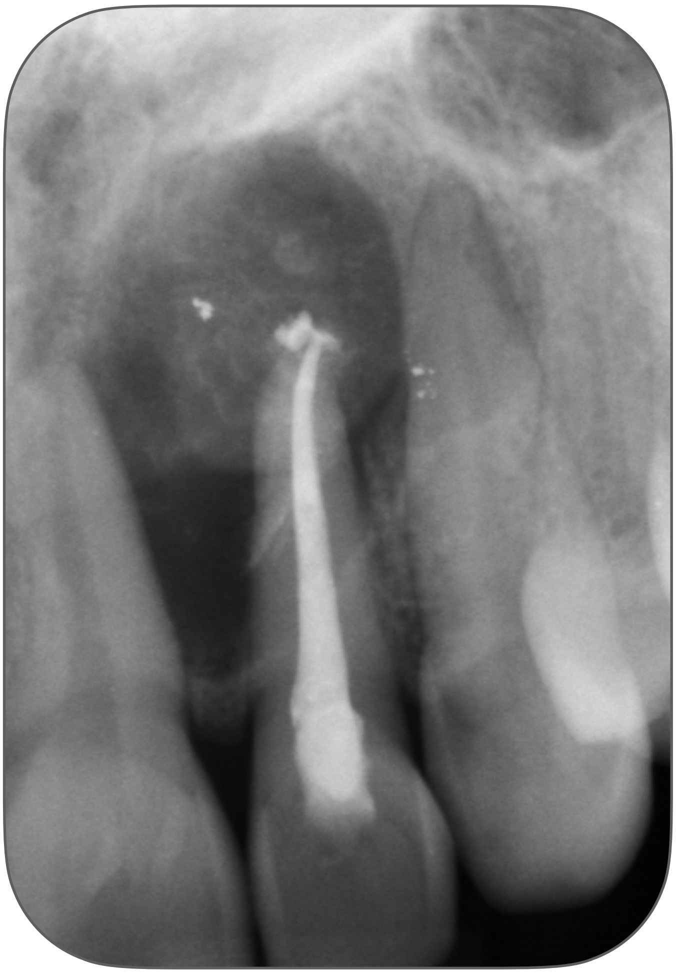

**Figure 4**
Periapical radiograph at the completion of treatment of tooth 22 (FDI).

**Figure 5**
6 months follow up.
Large periodical lesion Healed