

Proposal of a minimally invasive technique for acute periapical lesion drainage: a case report and clinical strategy

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ABSTRACT

Acute periapical lesion is caused by infection of the root canal of the tooth and is characterized by presence of purulent inflammatory exudate in periradicular tissues. It is localized intra and/or extraorally and in some clinical cases there is a need for surgical drainage, which can cause discomfort to the patient. This case report describes a minimally invasive technique for acute periapical lesion drainage using a modified tracheal aspiration probe connected to endodontic aspirators to treat a right maxillary lateral incisor. The technique provides a surgical drainage painless to patient and reduces the risk of spreading infection.

After the coronal access of the tooth involved, detoxification and debridement of the root canal, a small incision was performed in palatal mucosa and immediately a modified bronchial aspiration probe was used to aspirate the purulent exudate. In sequence, after remission of the acute signs and symptoms, a surgery with simultaneous root canal filling was performed, using an epoxy-based sealer associated with lateral condensation. The follow-up was for 6 months, through clinical and radiographic analysis and it showed satisfactory bone healing and clinical evolution.

Keywords: Abscess. Cyst. Endodontics. Infection. Surgery.

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Introduction

Acute periapical abscess is the most frequent manifestation of dental abscess and is caused by root canal infection, usually dominated by anaerobic bacteria.¹ In accordance with the evolution of the case, based on their clinical signs and symptoms, it can be classified into periapical, intraosseous or submucosal/subcutaneous, but there are difficulties in establishing clinical parameters for each phase, allowing the use of a single local and systemic treatment protocol.^{2,3}

In some clinical cases, such as when the acute periapical abscess occurs after the root canal filling, it is necessary to drain purulent inflammatory exudate for decompression of the associated increased periradicular tissue pressure and provides pain relief.⁴ Incision with scalpel blades and local compression are usually recommended to acute apical abscess drainage, but this technique is painful and causes the spread of exudate inflammatory to the surrounding tissues.⁵

To avoid these drawbacks, it was proposed to use a needle aspiration as alternative to incision and drainage.⁶ However, in many cases the aspiration is difficult due to obstruction of the needle by inflammatory exudate.^{3,7} On the other hand, it has been used in medicine a micro-sampling probe for aspiration to collect bronchial fluids, with clinical minimally invasive procedures.^{8,9}

Thus, a tracheal aspiration probe can be used to acute periapical lesions drainage inserted into a small incision in alveolar mucosa or skin. But, this technique has limitations, such as difficulty of drainage and/or aspiration of viscous purulent exudate.¹⁰ A method to increase this technique is to use negative pressure in aspiration.^{11,12}

Conventional endodontic treatment using calcium hydroxide as intracanal dressing provides complete healing in 73.8% of the periapical cysts cases.¹³ However, in larger periapical lesions may require additional treatment protocols to aid in regression, such as buccal aspiration decompression.¹⁴ In cases where it is impossible to follow-up the patient or in frequent reagudization situations is recommended the surgical treatment, it may be necessary prior aspiration of the contents of the periapical lesion.¹⁵⁻¹⁷

Therefore, the aim of this case report is to present a minimally invasive technique for acute periapical

lesion drainage, using a modified tracheal aspiration probe under negative pressure and their subsequent resolution by apical lesion enucleation surgery associated with simultaneous root canal filling.

Case report

A 32 year-old man was referred for emergency endodontic treatment of right maxillary lateral incisor. The patient reported a history of accidental trauma (subluxation) for over 5 years, pulp necrosis and previous endodontic treatment. After 4 years, there was pain and swelling in palatal mucosa near the traumatized teeth. During emergency appointment, the clinician detected local edema and a large periradicular lesion on radiographic analysis.

Immediately, the clinician performed the root canal filling removal using xylol, Gates-Glidden burs and K-files. Due to the continuous purulent exudate intracanal drainage, the tooth was kept open and the patient received a referral to the Restorative Dentistry Department, Araraquara Dental School, Araraquara, Brazil, for evaluation and endodontic and surgical treatment.

In the first appointment, the patient still reported spontaneous pain and the swelling was present. In panoramic radiograph was observed a large periapical lesion in the right maxillary lateral incisor region (Fig 1A). The right maxillary lateral incisor had a large periradicular radiolucency, open apex due to the apical reabsorption and gutta-percha point beyond the root apex, as shown in periapical radiograph (Fig 1B). The root canal was irrigated with 2.5% sodium hypochlorite gel (Ultradix; Ultradend, Salt Lake, UT, USA) and instrumented manually with a #80 K-file (Maillefer, Baillagues, Switzerland). After local anesthesia, an aspiration was performed using a Gauge 25 hypodermic needle to identify the ideal localization for drainage and the content of the lesion (Fig 1C). However, there was still a continuous exudate drainage through the root canal, being impossible to place an intracanal dressing and/or temporary restoration (Fig 1D).

The area of the swelling was delineated and a small incision (5 mm) was made using a #15 scalpel blade (BD, São Paulo, SP, Brazil) into palatal mucosa (Figure 2A and 2B). In sequence, a #18 tracheal aspiration probe (Embramed, São Paulo, SP, Brazil) was

attached to the endodontic aspiration tip, previously connected to vacuum suction device (Ciclone; Dabi Atlante, Ribeirão Preto, SP, Brazil) and inserted in the swelling through the palatal incision (Fig 2C and 2D). The tracheal aspiration probe was left in place for 10 minutes under constant negative pressure. No local suture or drain was maintained in local after the purulent exudate drainage.

After 7 days, there was a regression of swelling (Fig 3A). At this time, since the continuous exudate drainage through the root canal was impossible to be controlled, the option was for endodontic surgery technique with simultaneous root canal filling, by buccal access (Fig 3B). The surgical area access was performed by intrasulcular and two vertical incisions and partial thickness gingival flap, as described by Magro et al.¹⁸

After the flap elevation, the alveolar bone was partially perforated with buccal surface exposition of the cyst-like periapical lesion membrane (Fig 3C). The osteotomy was performed with conventional bur under copious saline irrigation (Fig 3D). The periapical lesion was initially removed with a Luccas B5 curette (Golgran, São Caetano do Sul, SP, Brazil) and finished with McCall 17-18 curette (Golgran, São Caetano do Sul, SP, Brazil) (Fig 3E). After these procedures, the periapical lesion was removed from bone cavity and the lesion excised sent for histopathological analysis (Fig 3F).

In sequence, the tooth was isolated with rubber dam and metal clamp, and root canal re-instrumented at F5 instrument (ProTaper; Maillefer, Ballaigues, Switzerland), 1 mm beyond the root apex, irrigated with 2% chlorhexidine digluconate gel (Biodinâmica,

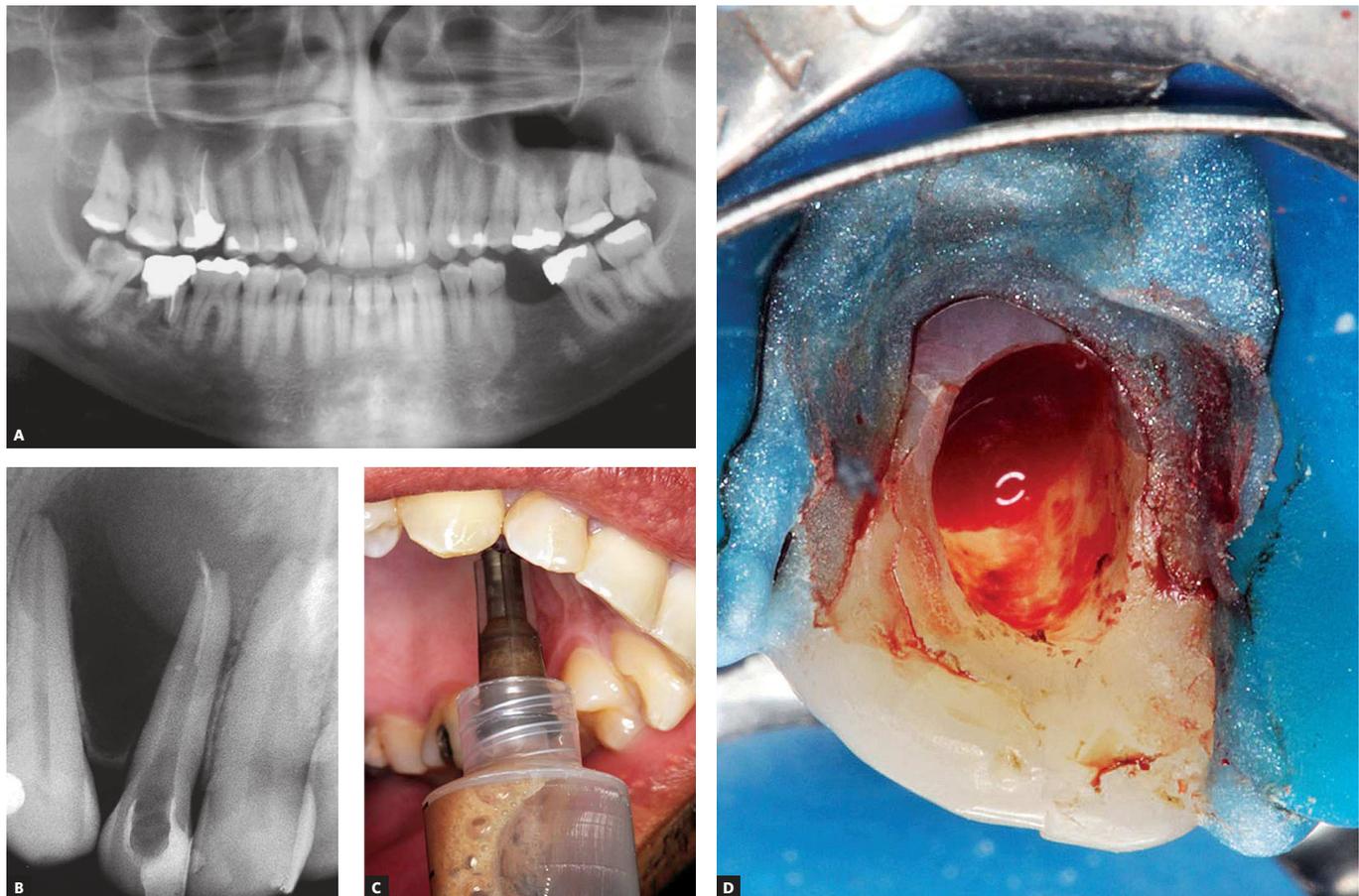


Figure 1. **A)** Large periapical lesion in maxillary right lateral incisor region observed in panoramic radiograph. **B)** Open apex and gutta-percha point beyond the root apex. **C)** Local aspiration using Gauge 25 hypodermic needle. **D)** Continuous exudate drainage through the root canal.

Ibiporã, PR, Brazil) and dried with paper point (Tanari, Manaus, AM, Brazil). A ProTaper F5 gutta-percha point was inserted in root canal, beyond the root apex (Fig 4A). Thus, the root canal filling was performed using AH Plus sealer (Dentsply DeTrey GmbH, Konstanz, Germany) and gutta-percha point (Dentsply, Petrópolis, RJ, Brazil), by lateral condensation technique (Fig 4B).

A radiographic image was performed immediately after to evaluate the quality of root canal filling (Fig 4C). The flap was sutured and 1 week after patient returned for suture removal and a new radiographic image was taken (Fig 4D). A follow-up of 3 months after the surgery was performed and no clinical changes were observed at alveolar and/or gingival mucosa and functional tooth, nor the presence of periodontal pockets (Fig 4E). Another radiographic

image was taken in 6 months, and revealed an increase of local radiopacity (Fig 4F).

Discussion

This case report describes a proposal of a minimally invasive technique for acute periapical lesion drainage using a modified tracheal aspiration probe connected to a negative pressure device and, in sequence, describes the clinical solution by apical lesion enucleation with endodontic surgery by simultaneous root canal filling technique.

This technique has advantages when compared to the traditional method which recommend the incision and drainage of the area.¹⁹ In this technique, the soft tissue swelling is dissected and all areas of the abscess cavity are explored to disrupted and evacuate the purulent exudate, but it is a painful procedure for the patient.^{1,3}

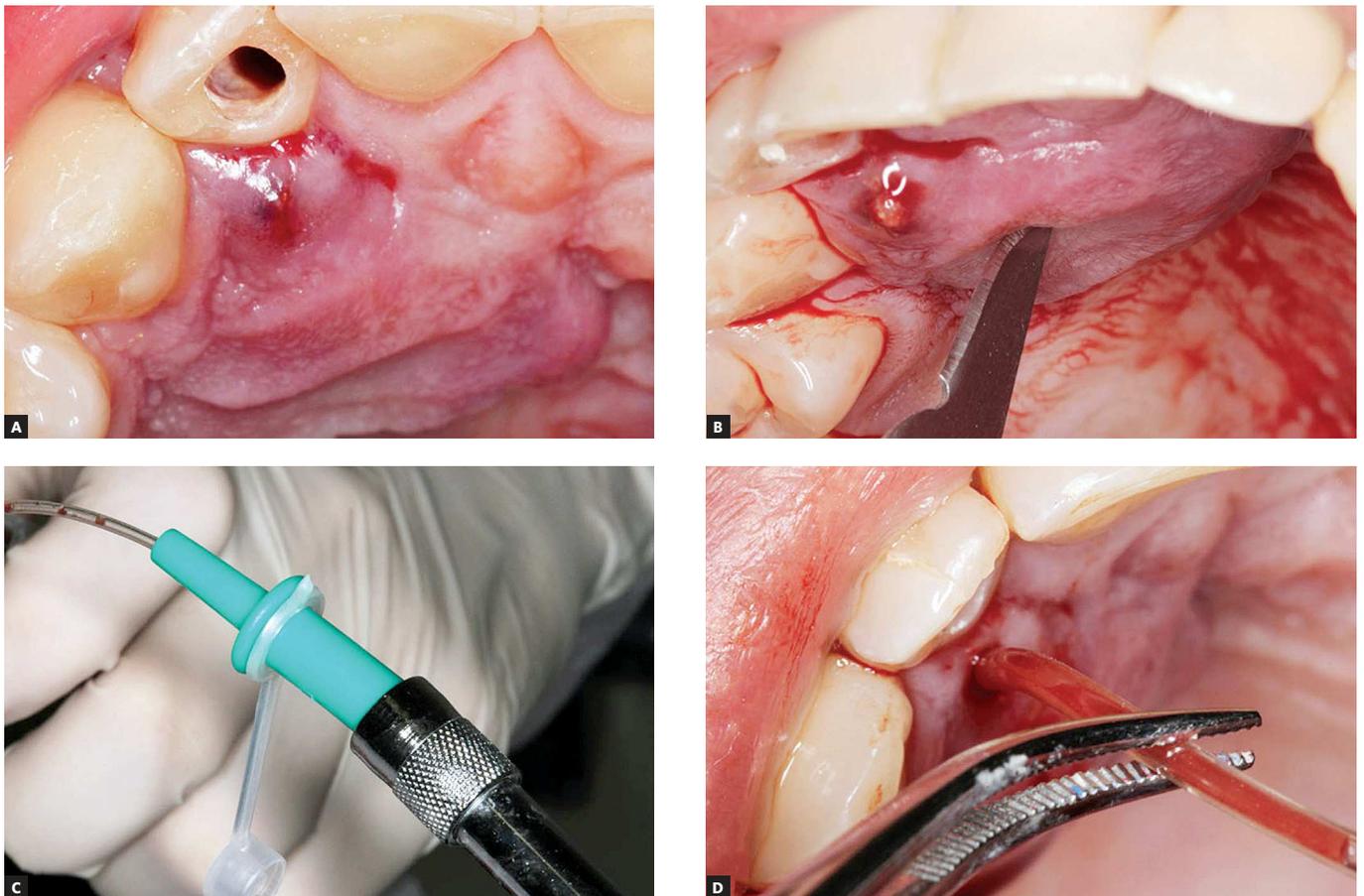


Figure 2. A) Swelling in palatal mucosa. B) Incision. C) #18 tracheal aspiration probe attached to the endodontic aspiration tip. D) Tracheal aspiration probe inserted into swelling.

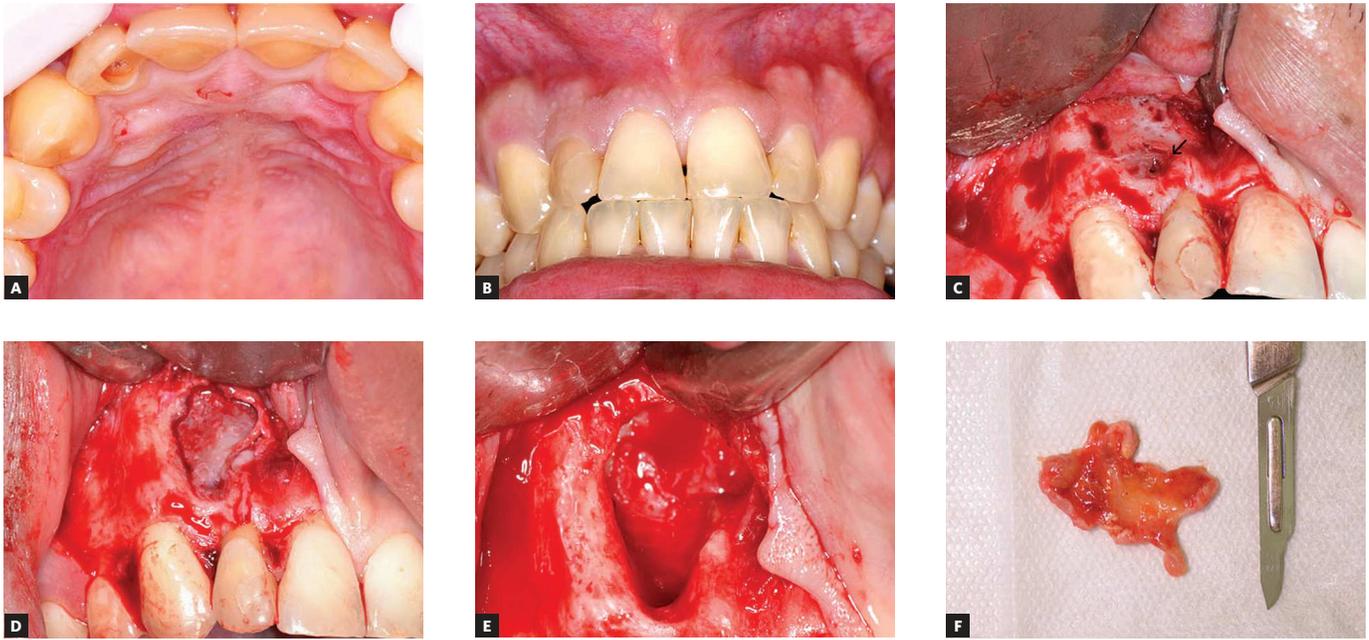


Figure 3. A) Clinical case after 7 days. B) Buccal access. C) Elevation flap and buccal surface exposition of the cyst-like periapical lesion membrane. D) Osteotomy. E) Surgical site. F) Cyst-like periapical lesion membrane excised.

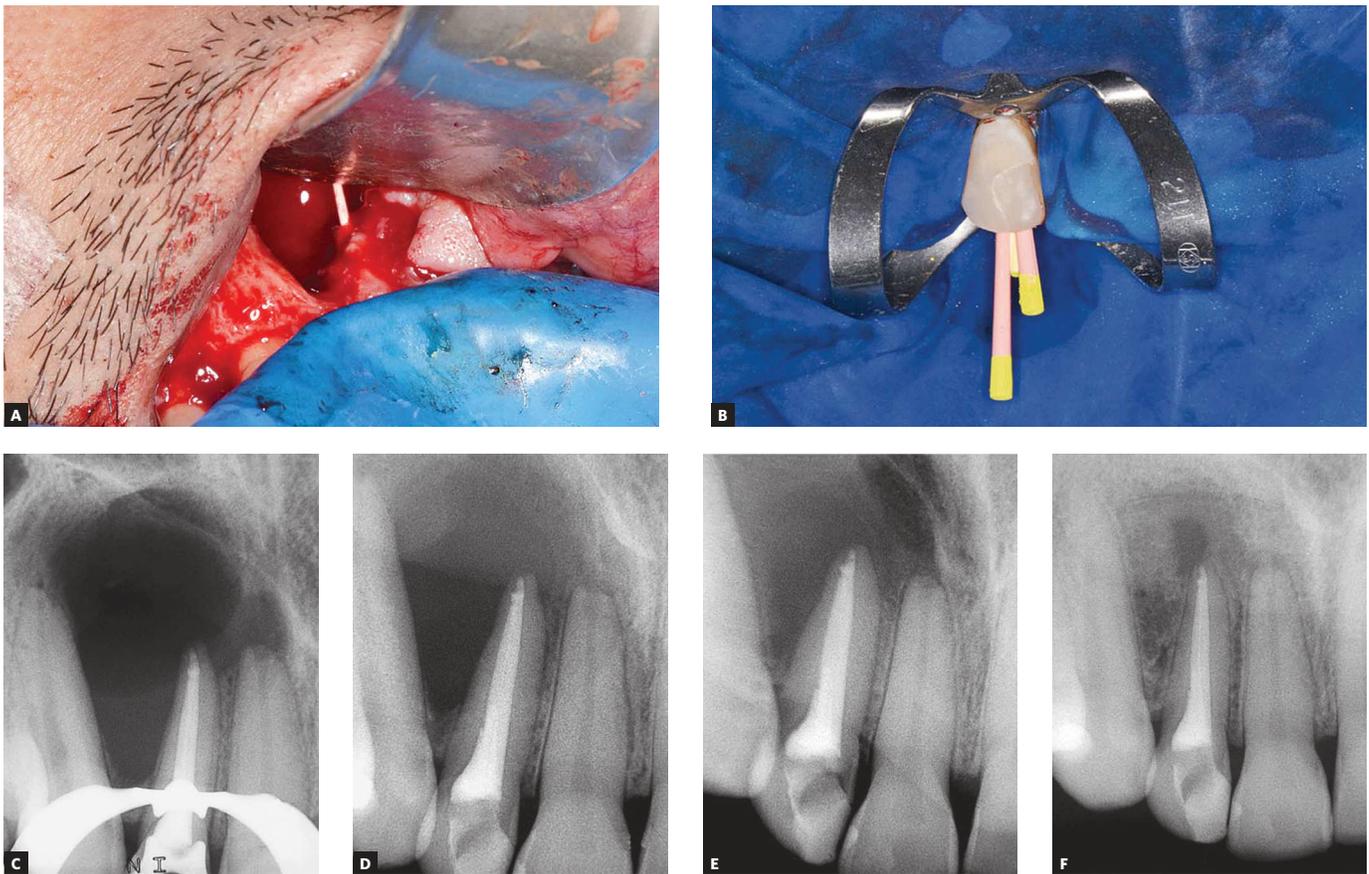


Figure 4. A) Master gutta-percha point beyond root apex. B) Gutta-percha lateral condensation. C) Root canal filling immediate final radiograph. D) Radiographic image after one-week. E) Radiographic image after 3 months. F) Radiographic image after 6 months.

However, in the technique proposal with vacuum negative pressure aspiration, the drainage is painless and it is necessary only a small incision. Additionally, this procedure facilitates local tissue healing because may enhance angiogenesis and collagen synthesis in wounds, restoring the extracellular matrix.²⁰ The purulent exudate diffusion limitation in oral cavity and/or to other locations is another advantage of this technique, preventing the infection to spread.²¹

Endodontic surgery with simultaneous root canal filling is indicated when there is constant drainage of purulent exudate to root canal, as occurred in the present clinical case.¹⁶ This technique shows high clinical success index.²² The technical principles following during all surgical procedures were similar to those described by Magro et al.¹⁸ Partial thickness gingival flap was chosen to avoid damage to the marginal gingival tissue and provide adequate access to surgical area.^{16,18,22}

Osteotomies created with piezoelectric device shows greater osteocyte viability and reduce cell death, as well as, the bone grafts harvest demonstrate greater short-term cell viability than those showed by a bur.²³ However, the choice to osteotomy with bur and saline irrigation was due to bone destruction previously presented, not requiring more invasive devices for cortical bone removal.

The root canal instrumentation and irrigation were performed as described by Kuga et al.²⁴ In root canal filling, an epoxy-based sealer (AH Plus) was chosen, due to its good physic-chemical properties, mainly in a surgical situation.²⁵ The case outcome after 6 months did not presented changes in periodontal probing depth, gingival recession, height of the interproximal mesial and distal papilla, and revealed slowly radiolucent periradicular image reduction, according to parameters described by Lui et al.²⁶

Therefore, the use of tracheal aspiration probe attached to endodontic aspiration tip previously connected to vacuum suction device is a good alternative to a minimally invasive technique for acute periapical lesion drainage, being possible early regression of swelling and allowing the endodontic surgical complementation.

Conclusion

The tracheal aspiration probe associated with negative pressure is an adequate and minimally invasive technique for acute periapical lesion drainage, enabling early endodontic surgical intervention.

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