



## Incorporation of technology in endodontic treatment of a patient with chronic non-progressive encephalopathy: case report

*Incorporação da tecnologia no tratamento endodôntico de paciente com encefalopatia crônica não progressiva: relato de caso*

Lorrayne dos Santos Lara<sup>1</sup>  
Romualdo Prata Vidal<sup>2</sup>  
Lucca Gomes de Paula<sup>3</sup>  
Lorena Alves Souza<sup>4</sup>  
Natalia Garcia Santaella<sup>5</sup>  
Luiz Evaristo Ricci Volpato<sup>6</sup>

### ABSTRACT

**Objective:** This work aims to describe the endodontic treatment performed in a single session in a patient with chronic non-progressive encephalopathy under general anesthesia, using technological devices. **Case Report:** A 31-year-old male patient diagnosed with chronic non-progressive encephalopathy, sought dental treatment due to tooth pain. He presented ataxia, atrophy of the upper and lower limbs and involuntary spasms. In the intraoral examination a generalized excessive occlusal wear and temporary restoration on tooth 46 was seen. Periapical radiograph showed increased periodontal space and periapical bone rarefaction. The indication was for endodontic treatment of tooth 46 under general anesthesia. After surgical risk assessment and pre-anesthetic evaluation, endodontic treatment was performed under general anesthesia, using an apical locator, mechanized instrumentation and digital radiography. The tooth restoration was performed in the same clinical moment, without complications. **Results:** The 8-month follow-up showed absence clinical signs and symptoms and radiographic control without periapical changes. **Conclusion:** In this case, the incorporation of technology in the endodontic treatment of a patient with chronic non-progressive encephalopathy ensured a safe and effective treatment for the patient and the staff,

<sup>1</sup> Bacharel em Odontologia. lorrayneslara@gmail.com, <https://orcid.org/0009-0007-8610-4204>, Universidade de Cuiabá, Cuiabá - Mato Grosso - Brasil.

<sup>2</sup> Bacharel em Odontologia. romualdo\_vidal@hotmail.com, <https://orcid.org/0000-0001-6674-465X>, Centro de Atendimento Odontológico a Pacientes Especiais do Estado de Mato Grosso (CEOPE/SES-MT), Cuiabá - Mato Grosso - Brasil.

<sup>3</sup> Bacharel em Odontologia. lorenaas2@hotmail.com, <https://orcid.org/0000-0002-3872-6427>, Universidade de Cuiabá, Cuiabá - Mato Grosso - Brasil.

<sup>4</sup> Bacharel em Odontologia. ngs.odonto@gmail.com, <https://orcid.org/0000-0002-7020-8697>, Universidade de Cuiabá, Cuiabá - Mato Grosso - Brasil.

<sup>5</sup> Bacharel e doutor em Odontologia. Centro de Atendimento Odontológico a Pacientes Especiais do Estado de Mato Grosso (CEOPE/SES-MT). odontologiavolpato@uol.com.br, <https://orcid.org/0000-0002-2969-1963>, Universidade de Cuiabá, Cuiabá - Mato Grosso - Brasil.

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with case resolution, promotion of oral health and quality of life.

**Keywords:** Brain Damage, Chronic; Cerebral Palsy; Dental Care for Disabled; Dental Service, Hospital; Endodontics.

## RESUMO

**Objetivo:** Este trabalho tem como objetivo descrever o tratamento endodôntico realizado em sessão única em paciente com encefalopatia crônica não progressiva sob anestesia geral, utilizando dispositivos tecnológicos. **Relato de Caso:** Paciente do sexo masculino, 31 anos, com diagnóstico de encefalopatia crônica não progressiva, procurou tratamento odontológico devido à dor dentária. Apresentava ataxia, atrofia de membros superiores e inferiores e espasmos involuntários. No exame intraoral foi observado desgaste oclusal excessivo e generalizado e restauração provisória no dente 46. A radiografia periapical mostrou aumento do espaço periodontal e rarefação óssea periapical. A indicação foi para tratamento endodôntico do dente 46 sob anestesia geral. Após avaliação de risco cirúrgico e avaliação pré-anestésica, o tratamento endodôntico foi realizado sob anestesia geral, utilizando localizador apical, instrumentação mecanizada e radiografia digital. A restauração dentária foi realizada no mesmo momento clínico, sem intercorrências. **Resultados:** O seguimento de 8 meses mostrou ausência de sinais e sintomas clínicos e controle radiográfico sem alterações periapicais. **Conclusão:** Neste caso, a incorporação da tecnologia no tratamento endodôntico de um paciente com encefalopatia crônica não progressiva garantiu um tratamento seguro e eficaz ao paciente e à equipe, com resolução do caso, promoção da saúde bucal e qualidade de vida.

**Palavras-chave:** Dano Cerebral Crônico; Paralisia cerebral; Atendimento Odontológico para Pessoas com Deficiência; Serviço Odontológico Hospitalar; Endodontia

## INTRODUCTION

Chronic non-progressive encephalopathy (CNPE), also known as cerebral palsy, is the most common physical disability of childhood. It comprises a group of disorders that affects an individual's movement, posture, and balance. The clinical findings, which are due to an injury to the developing brain, are permanent and nonprogressive, but they can change over time<sup>1</sup>.

General anesthesia in a hospital setting has traditionally been used to deliver dental treatment for medically compromised patients that cannot cooperate, comprehend, or tolerate treatment with usual techniques, most restricted to tooth extractions. However, at present the necessities for dental care have changed: people with disabilities require restorative, endodontic, and periodontal treatment which need more specific techniques and trained personnel in a GA room setting<sup>2</sup>.

Considering the scarcity of studies on endodontics in CNPE patients, this work aims to describe the case of an endodontic treatment performed in a single session in a CNPE patient under general anesthesia, using technological devices.

## CASE REPORT

A 31-year-old male patient was referred to the Mato Grosso State Special Patients Dental Care Center (CEOPE/SES-MT). The patient was accompanied by his mother, who reported that he had chronic encephalopathy caused by problems during childbirth. She also reported that he was in continuous use of injectable Phenobarbital, regular follow-up by a neurologist and previous hospitalizations due to pneumonia and knee surgery.

The patient had atrophy of the lower and upper limbs, was ataxic and spastic with involuntary movements. His cognitive was preserved, communication was slow, and he had predominantly mouth breathing (Figure 1).



Figure 1. Image showing the patient's condition.

The intraoral examination showed good oral hygiene without gingival alterations, presence of amalgam restorations, absence of mandibular third molars, excessive and

generalized occlusal wear and temporary restoration on tooth 46 (Figure 2A-C). The periapical radiography of tooth 46 showed enlargement in the periodontal space and periapical bone rarefaction (Figure 2D).

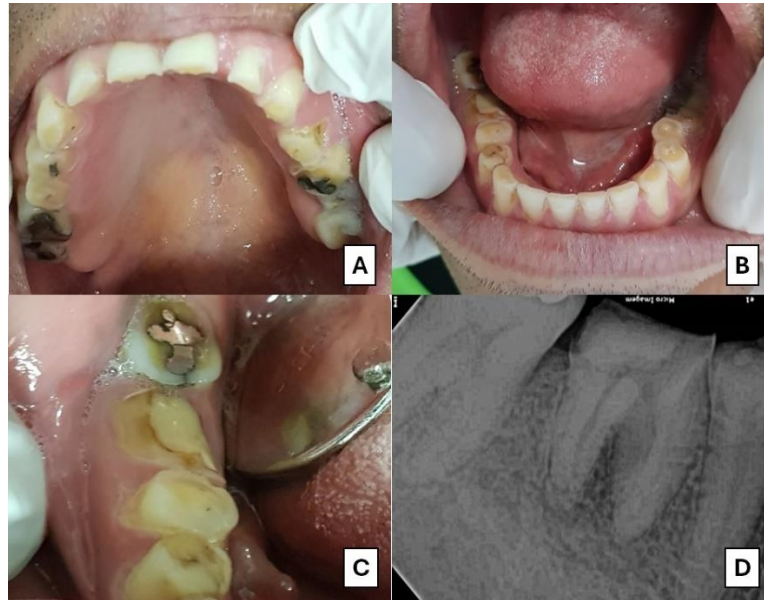


Figure 2. A) Upper arch showing excessive occlusal tooth wear, amalgam restorations and high-arched palate. B) Lower arch with occlusal tooth wear, amalgam restorations, absence of third molars and light lingual coating. C) Provisional restoration with glass ionomer cement on tooth LR6. D) Periapical radiograph of the LR6 tooth showing enlargement of the periodontal space and periapical and interradicular bone rarefaction.

Due to the patient's inability to remain immobile in the dental chair due to muscle spasms and involuntary movements, it was decided to perform the treatment under general anesthesia. Prior to hospital care, laboratory tests were requested and the patient was referred for pre-anesthetic consultation and surgical risk.

General anesthesia was performed with nasotracheal intubation to favour the dental procedure. The procedure started with mandibular stabilization with a non-toxic silicone mouth opener (Indusbello, Londina, Brazil) and anesthesia with 2% Mepivacaine Hydrochloride + Epinephrine 1: 100,000. Then, the temporary restoration of tooth 46 was removed and the coronary opening was performed with spherical diamond #1014 and endo-Z FG drills (Microdont, São Paulo, Brazil) under absolute isolation with a rubber dam and light-cured gingival barrier.

Irrigation with 2.5% sodium hypochlorite solution, location of the mesial and distal root canal entrances and catheterization with 06 Kerr-type steel file (Maillefer, Ballaigues, Switzerland) were performed (Figure 3A). Compensatory wear was performed with 10, 15 and 20 Kerr-type hand files (Maillefer, Ballaigues, Switzerland) and an automated system with X smart electric motor (Dentsply-Sirona, Ballaigues, Switzerland) in the rotational movement with the PROTAPER NEXT nickel titanium file system X1 (Dentsply-Sirona, Ballaigues, Switzerland) in apparent tooth length (12 mm) using the Free Tip technique, alternated with irrigation and aspiration with 2.5% NaOCl solution.

Working length (16mm mesial and distal root canals) was determined with the PROPEX PIXI II foraminal electronic localization system (Dentsply-Sirona, Ballaigues, Switzerland) (Figure 3B). Then, the cleaning and modeling of the root canal system were carried out with foraminal enlargement with the electric motor in the rotary movement with the PROTAPER NEXT X2 nickel titanium file system (Dentsply-Sirona, Ballaigues, Switzerland) at 1mm beyond the work length to promote dilation of the root foramen, under irrigation and aspiration with chlorinated solution (Figure 3C).

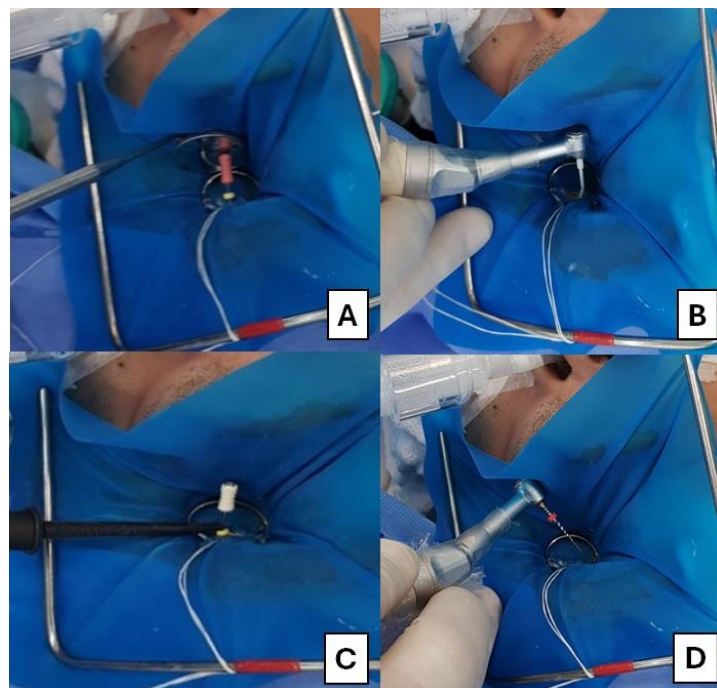


Figure 3. A) Catheterization with a Kerr 06 steel file. B) Electronic foraminal location. C) Biomechanical preparation. D) Stirring of 2.5% NaOCl and EDTA.



The irrigation and final aspiration were alternated with an EDTA trisodium chelating agent at 17% NaOCl 2.5%, for 20 seconds each, three times in a row with shaking with Clean plastic file (EASY, Belo Horizonte, Brazil) under rotational motion to enhance the chemical cleaning of the root canal system (Figure 3D).

After modeling the root canals with PROTAPER NEXT X2 nickel titanium rotary files (Dentsply-Sirona, Ballaigues, Switzerland), it was possible to observe the enlargement of the openings (Figure 4A). Then, the root canals were dried with absorbent paper cones. The canal system was filled with calibrated gutta percha and Sealer Plus MK life bioceramic cement (Medical and Dental Products, Porto Alegre, Brazil) using the single cone technique and thermoplasticization with MacSpadden compactors (Figure 4B). Thereafter the canals were filled and the entrance sealed with a 3M Z100 ESP A3.5 light-curing composite resin (3M ESPE, Maplewood, Minnesota, USA) (Figure 4C). The final radiograph showed a good obturation of the root canals and effective coronary sealing (Figure 4D).

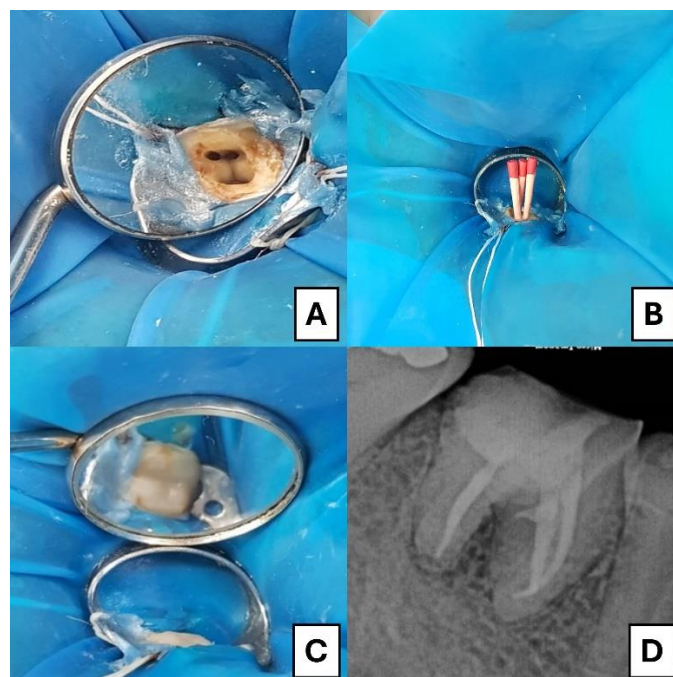


Figure 4. A) Aspect of the openings after modeling the channels. B) Proof of locking of the main cones. C) Coronary sealing with composite resin. D) Final radiography: satisfactory canal filling and effective coronary sealing.

The patient was then referred for post-anesthetic recovery and discharged from the hospital on the same day. After eight months, the patient presented clinically and radiographically with no symptoms (Figure 5).

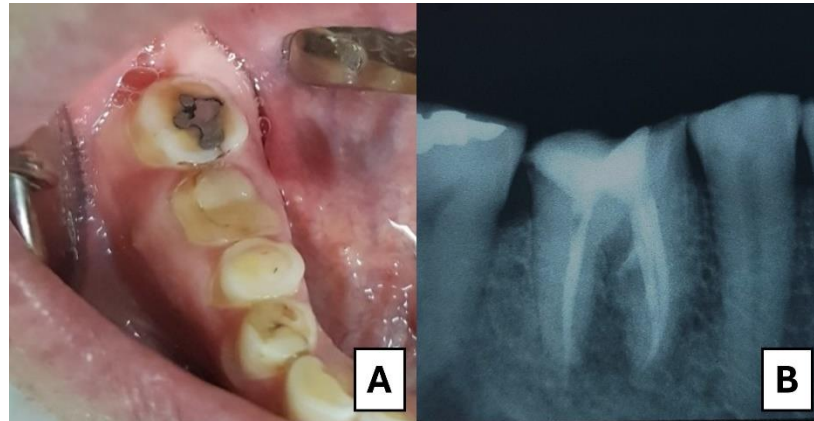


Figure 5. Eight-month A) Clinical follow-up. B) Radiographic follow-up.

## DISCUSSION

This article reports the endodontic treatment of a patient with CNPE with pulp necrosis in a single session under general anesthesia that ensured a good prognosis and comfort during care, in addition to patient and team safety.

Dental care for patients with CNPE is quite limited in clinical practice, either due to the difficulty in communicating during anamnesis, physical examination or treatment due to difficulty in restraining the dental chair to perform a safe procedure<sup>3</sup>. In view of the difficulties, few professionals that feel able to assist this population<sup>4</sup>, with patients having difficulty accessing dental treatment, leading to worsening of their oral health<sup>5</sup>.

It is known that endodontic treatment requires a longer period of time, use of a rubber dam, radiographic shots, among other materials and techniques that are not used in simpler procedures<sup>6</sup>. Given this, endodontics in people with disabilities becomes even more challenging<sup>7</sup>, making it often overlooked by tooth extractions, resulting in tooth loss and consequently impacting patients' quality of life<sup>8</sup>.

In view of the difficulty of care and the impact of early tooth loss in this population<sup>9</sup>, the use of general anesthesia becomes a safe alternative for dental treatment<sup>10</sup>. In the present case, the patient's treatment under general anesthesia allowed the use of materials and

techniques that ensured safety and quality for the patient and the team, in addition to avoiding tooth extraction.

The endodontic treatment of pulp necrosis in a single session is still discussed among professionals<sup>11</sup> as some report that this treatment is not able to reduce the level of microorganisms inside the canals and tissue repair through medication changes<sup>12</sup>. However, the rates of cure and success between treatment in a single session and multiple sessions are quite similar, regardless of the conditions of the pulp and the apex<sup>13</sup>. In the present case, the decision to perform the endodontic treatment in a single session aimed the comfort and safety of the patient and the clinical team, because the involuntary spasms would impair the safety of care, increase the working time, reinforcing that the conduct of the present case occurred in the safest and most effective way. Furthermore, the decision for the treatment in a single session was taken considering the potential risk of morbidity and mortality related to the patient's submission to successive consultations under general anesthesia<sup>14</sup>.

The automated rotary systems provide more comfort to the patient and reduce the working time, being four times faster than the manual instrumentation method. Currently, NiTi files have gained more visibility in the market, as they are flexible, reducing the risk of fracture of the instrument inside the root canals, allowing the instrumentation of curved channels more safely<sup>8</sup>, being extremely important in the realization of this case, since with the efficiency of this system, in addition to decreasing the risk of fracture of the intraoperative file, the surgical time was reduced, reflecting in the reduction of anesthetic drugs for general anesthesia. It is worth mentioning that the use of the apical locator and digital radiography in this case also contributed to the optimization of endodontic treatment with reduced working time, in addition to ensuring less exposure to radiation<sup>15</sup>.

## CONCLUSION

The use of technologies ensured, in this case, a safe and effective dental treatment for the spastic and ataxic adult patient with chronic non-progressive encephalopathy and the clinical team, resulting in the resolution of the case with promotion of oral health and quality of life. Therefore, dentists shall considerate these possibilities to improve the provision of oral health for people with disabilities.



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**Conflict of interest:**

The authors have no conflicts of interest related to this study.

**Acknowledgment:**

The authors deny any financial affiliations related to this study or its sponsors.

**Consent:**

This case report was approved by the Research Ethics Committee of the Universidade de Cuiabá (approval number 69440723.1.0000.5165) with the written consent of the patient and his guardians for publication of the case with its related information, including photographs and other data.

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