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CASE REPORT

# One-year follow-up of endodontic retreatment in a patient with severe Hemophilia A


## ABSTRACT

***Aim:*** *To describe the clinical management of a patient diagnosed with severe Hemophilia A presenting an endodontically treated tooth (ETT) with a persistent periapical radiolucent lesion.*

***Summary:*** *This case report has been written according to Preferred Reporting Items for Case reports in Endodontics (PRICE) 2020 guidelines. Inherited bleeding disorders (IBDs) are a heterogeneous group of genetic conditions in which missing or defective clotting factors prevent normal blood clotting from occurring. Among those conditions, Hemophilia A (deficiency of factor VIII) is the most prevalent, representing about 85% of all inherited bleeding disorders. A 21-years-old male was referred to our service to retreat a left mandibular first molar. At clinical examination, the ETT showed signs of persistent symptomatic apical periodontitis, confirmed by the radiographic exam. After reviewing the risks and benefits, written informed consent was obtained from the patient, and then, non-surgical root canal retreatment was performed on the tooth under dental operating microscopy. Reciproc R25 NiTi file was used to remove the previous fillings and reprepare the root canal system, and Bio-C Sealer was the chosen sealer to obturate the root canals. The entire retreatment procedure was performed in a single-visit. At the subsequent follow-up visits one year later, the periapical radiograph suggests a successful outcome with periapical repair, a substantial improvement in bone density, and the patient reported that he was free of symptoms and using the tooth as usual.*

***Key learning points***

- *Although no complications or excessive bleeding was observed, proper multidisciplinary planning must be carried when treating patients with inherited bleeding disorders.*
- *All efforts should be made to avoid intraoperative complications or multiple sessions that also require multiple clotting factor infusions, and*
- *further clinical investigations should focus on the need for prophylactic protocols in order to safely perform endodontic treatment on patients diagnosed with different severity levels of IBDs.*



**Lucas Peixoto de Araújo**[1]

**Mateus de Azevedo Kinalski**[2]

**Lucas Pinto Carpena**[3]

**Caio Cézar Randi Ferraz**[1]

**Mateus Bertolini Fernandes dos Santos**[3*]

[1]*Department of Restorative Dentistry, Division of Endodontics, Piracicaba Dental School, State University of Campinas (UNICAMP), Piracicaba, SP, Brazil*

[2]*Faculty of Dentistry, Community University of Chapecó Region (UNOCHAPECÓ), Chapecó, SC, Brazil*

[3]*School of Dentistry, Federal University of Pelotas (UFPEL), Pelotas, RS, Brazil*



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**Corresponding Author**

Mateus Bertolini Fernandes dos Santos | School of Dentistry, Federal University of Pelotas, Pelotas, RS, 457 Gonçalves Chaves street, room 502, Pelotas, RS | Brazil.

Phone: +55 53 999349134 | Email mateus.santos@ufpel.edu.br



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## Introduction

Inherited bleeding disorders (IBDs) are a heterogeneous group of genetic conditions in which missing or defective clotting factors prevent normal blood clotting from occurring (1). Among those conditions, Hemophilia A (deficiency of factor VIII) is the most prevalent, representing about 85% of all inherited bleeding disorders (2). Accordingly to the severity, this condition can be divided into mild (up to 5% of FVIII in the blood), moderate (1-5%), or severe (<1%). In this way, a proper diagnose and severity classification is important since such a condition is directly related to an increased number of spontaneous or traumatic bleeding episodes (3).

Endodontic treatment is considered a non-invasive dental procedure (4). Although the risk of excessive bleeding during treatment is not common, it can sometimes occur during apical enlargement, removal of reminiscent of vital pulp, or during apical patency establishment. When treating hemophilic patients, a higher risk of bleeding is expected, with also an increased risk of postoperative complications (5). Therefore, root canal treatment should be performed with caution and under previous medical advice in order to avoid any further complications. In this perspective, a previously published Australian hospital-based dentists consensus reported that root canal procedures in mild and moderate hemophilic patients could be performed under regular dental office settings (4); however, this very consensus also suggested that adults with severe hemophilia must have endodontic treatments performed at hospital settings (6). Such recommendation is based on the assumption that excessive bleeding in severe hemophilic patients might impose the necessity of additional replacement therapies. Also, some studies reported complications as minor discomforts to acute swelling (7, 8)

When planning an endodontic intervention in a hemophilic patient, the dentist should consider some important challenges: (1) to reduce or eliminate the risk of bleeding during the procedure and post-treatment, and (2) to achieve hemostasis and root canal dryness in order to properly fill the root canal (9). Likewise, the scientific literature about root canal procedures in hemophilic patients is still scarce. Therefore, the aim of the present case report was to describe the planning and treatment of a patient with severe Hemophilia A at a dental office setting, with a multi-professional approach to, including hematological advice and clotting factor replacement therapy, and to report specific endodontic considerations.

## Report

This case report has been written according to *Preferred Reporting Items for Case reports in Endodontics* (PRICE) 2020 guidelines (10).

A 21-years-old caucasian male patient diagnosed with severe congenital hemophilia A was referred by the Regional Blood Center of Pelotas (HEMOPEL) to the School of Dentistry of the Federal University of Pelotas. The patient's chief complaint was pain and tenderness on the left mandibular first molar. The patient also reported that he remembers undergoing an endodontic procedure in the referred region a few years ago.

The visual inspection of the patient identified restorations in multiple teeth and the clinical examination of the tooth with referred pain presented moderate sensitivity to vertical percussion, with no discomfort at palpation or extra-oral abnormalities as described in Table 1. The intraoral periapical digital radiographic (CDR Elite size 2, Dentsply Sirona, Charlotte, NC, USA) image showed a previous endodontic treatment with insufficient root canal fillings, persistency of periapical radiolucency, and an apical widening of the periodontal ligament space characterizing a periradicular pathological condition due to the failure of the previous root canal treatment (Figure 1). Based on these pieces of information, the pulpal and periapical diagnosis of a previously treated tooth with symptomatic apical periodontitis was made to the left mandibular first molar,

**Table 1**
**Diagnostic assessment results**

| Tooth number | Cold | Heat | Percussion | Palpation | Mobility | Extra-oral |
|---|---|---|---|---|---|---|
| #36 | No response | No response | Moderate | No abnormalities | Within normal limit | No abnormalities |

**Table 2**
**Hematology tests**

| Blood assay | Result | Reference values |
|---|---|---|
| Activated partial thromboplastin time | 103.3 seconds | 34.3 seconds |
| Prothrombin time | 13.5 seconds | 13.4 seconds |
| Factor VIII activity (FVIII:C) | Less than 0.01 IU/ml | At least 0.25 IU/ml |
| von Willebrand factor activity (FvW:Ag) | 1.19 IU/ml | 0.90-1.20 IU/ml |
| Anti-factor VIII inhibitor antibody | 1.3 UB/ml | At least 0.6 UB/ml |

and root canal retreatment was indicated. The periapical index (PAI) scoring system (11) was used to register the intervention outcome, and the initial PAI score was '4'. After reviewing the risks, benefits, and treatment options, written informed consent from the patient was obtained for the proposed treatment and followed the ethical principles of the World Medical Association's Declaration of Helsinki. The patient was referred back to the Blood Center for medical assessment and a prophylactic treatment plan. The results of the blood tests are presented in Table 2.

The prophylactic protocol consisted of infusion of 3000 UI/dL recombinant factor VIII concentrate (Hemo-8R, Hemobrás, Federal District, Brazil) one hour before the root canal treatment due to the necessity of alveolar nerve block anesthesia and to reduce the risk of intraoperative bleeding or complications.

The alveolar nerve block was performed using 1.8 mL of 2% lidocaine with 1:100.000 epinephrine (Alphacaine 2%, Nova DFL, Rio de Janeiro, Brazil), and supplementary anesthesia was carried out with a buccal infiltration of 1.8 mL of 4%

**Figure 1**
Initial radiographic assessment of the left mandibular first molar. validation test.

**Figure 2**
Access opening and canal location.

**Figure 3**
Root canal fillings removal with the Reciproc R25 file.

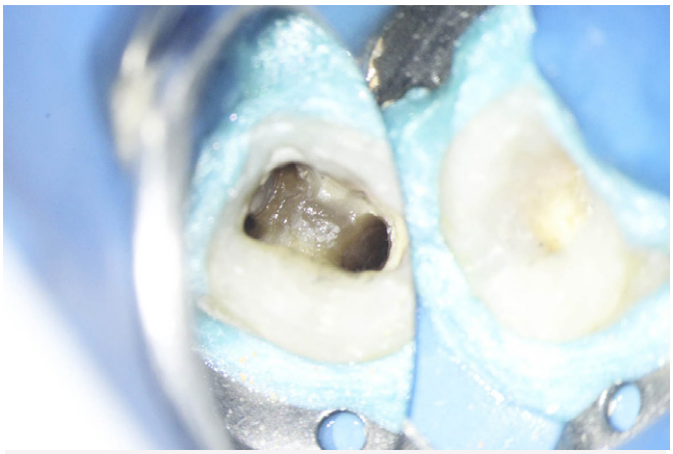


**Figure 4**
Reprepared tooth prior to filling procedures.

articaine with 1:100.000 epinephrine (Nova DFL). After that, a rubber dam was placed to isolate the operating field. The access cavity was opened with high-speed diamond burs (Figure 2) and refined under magnification provided by a dental operating microscope (OPMI Pico, Zeiss, Oberkochen, Germany) using an E6D pear diamond ultrasonic tip (Helse Ultrasonics, Sao Paulo, Brazil) to carefully remove interferences and previous restorative materials. Initial root fillings removal (Figure 3) was performed using a Reciproc R25 file (VDW GmbH, München, Germany), and apical patency was achieved in all root canals with small size C-Pilot files (VDW GmbH) and was maintained at a size 15 K-file (VDW GmbH). Chlorhexidine gluconate gel at 2% (LenzaFarm, Minas Gerais, Brazil) was used as a chemical auxiliary substance associated with 0.9% sterile saline solution as an irrigation substance. The root canals length measures were determined electronically by a RomiApex A-15 apex locator (Romidan LTD, Kiryat Ono, Israel) and were as follows: mesiolingual 21mm; mesiobuccal 21mm; and distal 22mm. Working length was established at the "0.0" reading of the electronic apex locator, and the glide path was conducted in all canals with an R-Pilot reciprocating file (VDW GmbH) prior to the apical enlargement using a Reciproc R25 file. At the end of the root canal repreparation (Figure

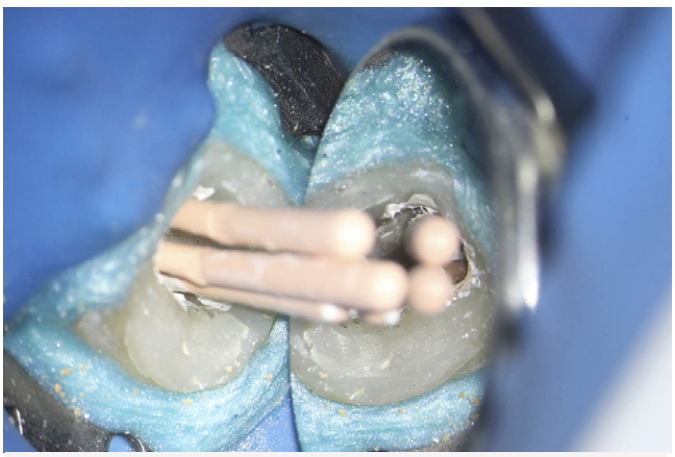


**Figure 5**
Fitting assessment of the gutta-percha cone and Bio-C Sealer.

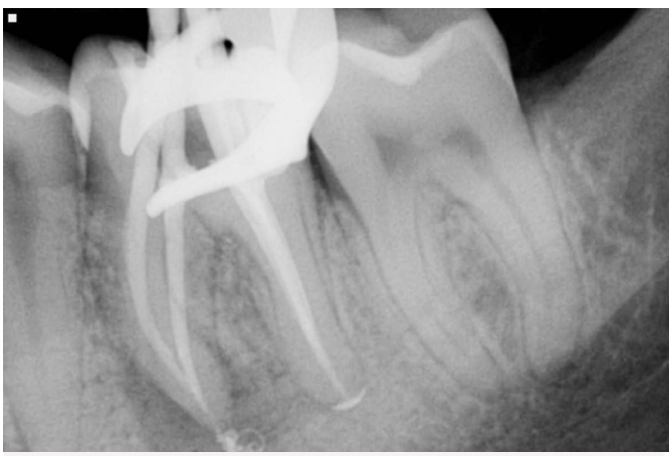


**Figure 6**
Quality radiographic assessment of the root canal filling.

**Figure 7**
Immediate postoperative periapical radiograph.

**Figure 8**
One-year follow-up periapical radiograph of the root canal retreatment.

4), three cycles of passive ultrasonic irrigation were performed in each canal using an E1 Irrisonic ultrasonic tip (Helse Ultrasonic) associated with 1mL of EDTA 17% (Biodinamica, Parana, Brazil), renewing this substance at the end of each cycle. A final flush of 0.9% sterile saline solution was carried out to remove any trace of the previous substances, and the canals were dried with sterile paper points. The root canals were filled with the single-cone obturation technique using a calibrated gutta-percha point in each canal, associated with Bio-C Sealer (Angelus, Parana, Brazil), a tricalcium silicate-based root canal sealer (Figure 5). Before cutting and condensing the gutta-percha points, a quality radiographic assessment was performed to evaluate the root filling apical sealability (Figure 6). The tooth received an immediate coronal restoration with Opus A2 (FGM, Santa Catarina, Brazil) bulk-fill resin-based composite. Afterward, a final radiograph was taken to assess the quality of the root canal retreatment (Figure 7).

No complication occurred during or after the procedure, and a telephone inquiry was made with the patient after 48 hours and three months as an initial follow-up method to evaluate the patient's comfort and symptom conditions.

The patient was then recalled after twelve months for periapical healing assessment, and the one-year clinical and radiographic follow-up showed periapical healing with a reduction of the PAI score to '2' (Figure 8). Also, no sensitivity on percussion or palpation was observed, and the patient reported adequate function of the tooth with no pain. Figure 9 is a schematic flowchart that summarizes the steps involved in this case report and its clinical outcome, and Table 3 represents the treatment timeline.

## Discussion

The present study reports a case of persistent apical periodontitis resolved with root canal retreatment on a severe hemophilia A patient. There is still a lack of studies reporting endodontic therapy in IBDs patients. In this way, the present case report provides important information regarding root canal retreatment and the radiographic assessment of one year of follow-up with adequate periapical bone repair without the presence of any signs or symptoms.

According to a case-control study, hemophilic patients present a 2.2 higher odds ratio of presenting teeth with apical periodontitis but about 70% less prevalence of endodontic treated teeth when compared to patients without IBDs (12). In this perspective, another survey on IBDs patients in hemophilia treatment centers across the United States identified that financial barriers, lack of skilled providers, and patient anxiety contribute directly to less

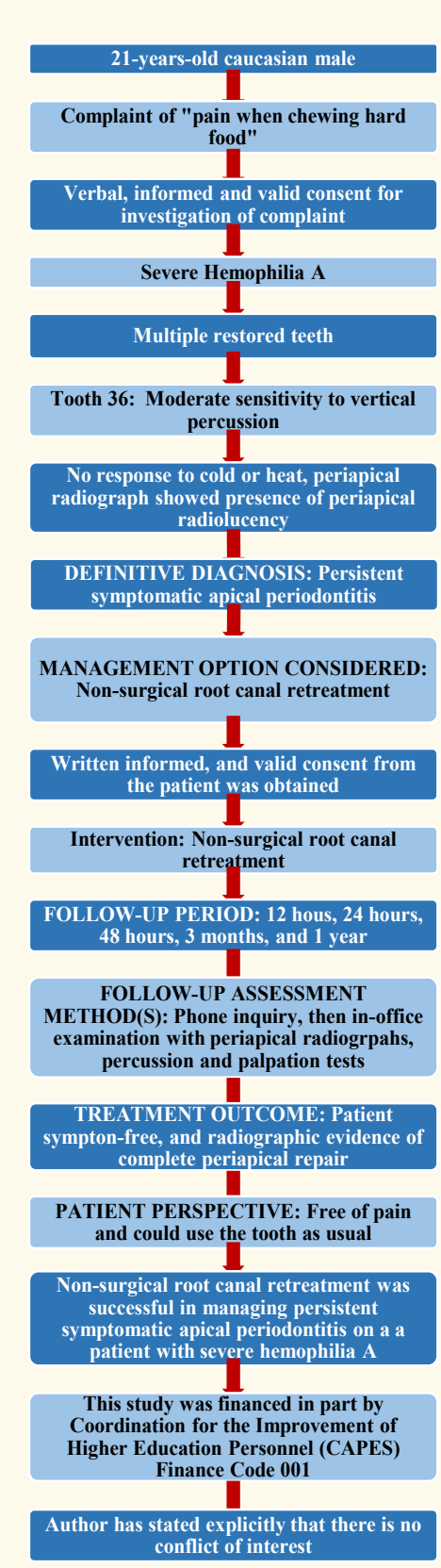
**Table 3**
**Timeline of the patient planning, treatment, and follow-up**

| Time | Event | Symptons |
|---|---|---|
| 0 | Patient visited the clinic, history, clinical and radiographic examination. | Moderate pain at vertical percussion in the left mandibular first molar |
| +24 hours | Factor XIII prophylactic treatment | - |
| +1 hour | Endodontic retreatment of tooth #36 | - |
| +12 hours | 1st Follow-up (Phone inquiry) | No pain, no swelling (sympton free) |
| +12 hours | 2nd Follow-up (Phone inquiry) | No pain, no swelling (sympton free) |
| +24 hours | 3rd Follow-up (Phone inquiry) | No pain, no swelling (sympton free) |
| +3 months | 4th Follow-up (Phone inquiry) | No pain, no swelling (sympton free) |
| +9 months | 5th Follow-up (clinical and radiographic assessment) | No pain, no swelling (sympton free) Radiographic evidence of periapical repair |

access to oral health care (13). On the other hand, it is well-known that root canal treatment is a conservative technique that reduces the need for tooth extractions, providing high long-term survival rates (14). The maintenance of teeth in IBDs patients is extremely important once it reduces the need for more invasive procedures such as tooth extraction and dental implant placement, which are more prone to intra and postoperative complications. Importance should be given to the adequate management of IBDs subjects, especially those with high severities due to the increased risk of bleeding episodes during their lifetime (2). Considering the possible implications of IBDs, dental professionals might be afraid of providing invasive procedures in IBDs patients, such as anesthetic nerve block and other specific endodontic procedures. A consensus statement by hospital-based dentists suggests that endodontic therapy in patients with IBDs could be considered a low-risk procedure and can be performed routinely (4). On the same perspective, a recent scoping review on invasive oral procedures (e.g. tooth extraction and anesthesia) highlighted the importance of a multidisciplinary team when treating patients with IBDs to reduce complications and provide a safe treatment (15). In this sense, dentists willing to perform endodontic therapy on IBD patients should be aware of some particularities in order to reduce the risk of bleeding-related complications. In this way, it can be suggested that infiltrative anesthesia and the maintenance of the working length within the root canal region should be preferred in IBDs subjects, unless clotting factor replacement therapy has been previously administrated.

It has been suggested that a single dose of 0.1 mg desmopressin acetate tablet associated with 250 mg tranexamic acid could be used as a prophylactic protocol to perform inferior alveolar nerve block in IBDs patients (16). However, considering the severity of our patient and the increased risk of complications, our multi-professional team decided to prescribe the infusion of clotting factor VIII one hour prior to the dental appointment; Also, 2% chlorhexidine gluconate gel was chosen as the preferred irrigation substance instead of sodium hypochlorite due to the necessity of avoiding intraoperative accidents in patients with this special healthcare need, since there is no difference regarding clinical and radiographic outcomes when

**Figura 9**
Schematic PRICE 2020 flowchart.




comparing those two irrigation substances (17).

The root canal retreatment was conducted following the gold standard endodontic procedures with apical patency achievement in all root canals. The reciprocating file used was an *M-Wire* nickel-titanium alloy that has been widely investigated in the literature (18-21), presenting adequate performance on root canal filling removal due to the file design allied with the kinematic motion, allowing greater resistance to cyclic and torsion fatigue with excellent shaping efficacy. Moreover, the chosen root canal sealer may present a bioactivity and biomineralization potential (22-24), and although no significant difference has been observed in recent clinical trials that evaluated the outcomes of this sealer (25, 26), its use in teeth with apical periodontitis is supported by the current literature. In the present case report, apically extrusion of the sealer happened during the endodontic treatment; however, a cohort study showed that although calcium silicate-based sealers have a high extrusion rate, this unintentional overfilling has no significant effect on the treatment outcome (27), and it is expected that such material extrusion would resorb in the future follow-up assessments since this sealer has a considerable solubility in the periapical tissues (28).

Considering that adequate hemostasis and dryness in the root canal were obtained, the treatment was performed in a single session to avoid the need for a second appointment and, consequently, the need for another clotting factor infusion. A cost-analysis study revealed that the treatment of hemophilia patients is very expensive and may also affect public policies adopted by health systems (29). For this reason, it is important to correctly administrate the clotting factor replacement therapy in order to reduce the occurrence of complications during and after the procedures, impacting the patient's health positively and reducing the costs to the public health systems.

Although IBDs are considered rare, it is important to highlight that dental professionals must consider inquiring all patients

about their health condition and signs of abnormal or excessive bleeding, including family background assessment and, whenever treating patients with diagnosed or suggestive signs and symptoms of IBDs, these patients must be referred to hematologists or blood centers with a multi-professional team prior to any dental therapy in order to assess the specific patient's conditions as well as to plan the need of prophylactic measures and the performance of the treatment in a dental office setting.

## Conclusions

The present study reports a non-surgical endodontic retreatment of a left mandibular first molar of a patient with severe hemophilia A with one year of follow-up and radiographic images suggesting a successful periapical repair and no report of symptoms. Although no complications or excessive bleeding was observed, proper multidisciplinary planning must be carried when treating patients with inherited bleeding disorders. Further clinical investigations should focus on the need for prophylactic protocols in order to safely perform endodontic treatment on patients diagnosed with different severity levels of IBDs.

## Clinical Relevance

Clinical and radiographic outcomes after 1-year of endodontic treatment in a patient with Hemophilia A were adequate and compatible with those expected when treating healthy patients. However, when treating patients with such condition a multidisciplinary assessment and planning must be made in order to avoid intraoperative complications.

## Conflict of Interest

None.

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