

# Uncommon fractures of Gates Glidden bur

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## ABSTRACT

**Introduction:** Gates Glidden bur, used for preparation of cervical and middle root canal has a weak point on its stem, far from the active point where fractures usually occur, which facilitates its removal. **Objective:** To present a case of Gates Glidden bur fracture near its active portion, an unusual fracture site for this instrument. **Clinical case:** A 21-years old patient was submitted to endodontic treatment of tooth #37. During preparation of the cervical canal and middle thirds, a fracture occurred in the active tip of the Gates Glidden bur, with its active portion getting trapped in the middle third of the mesial buccal canal.

The fractured fragment was removed through the use of a CVDent 1000 (CVDentus) ultrasonic device with a TOS-P1 tip. The fractured bur was removed and the treatment successfully completed. At one year radiographic control, the periapical tissues presented a normal aspect. **Conclusion:** According to this present case study, it is possible to say that Gates Glidden bur may suffer an unusual fracture, which makes very difficult their removal from root canal; so, it is advisable to follow always the usage recommendations.

**Keywords:** Endodontics. Root canal therapy. Fracture zone.

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## Introduction

During endodontic treatment, in the chemomechanical preparation of root canal, the clinician may encounter difficulties related to canal system anatomy, which can lead to accidents of technical procedure. One of these accidents, which sometimes gets out of operator control and can compromise the treatment success, is the instrument fracture within root canal.

The use of endodontic instruments may result in stress and strain conditions that, occasionally, exceed their resistance capacity; so, these instruments sometimes fracture. These fractures could result from the application of slow loads, such as bur bending and twisting, the fatigue of the instrument itself or prolonged application of low intensity loads.<sup>1</sup>

Defects on instruments' surface finish resulting from manufacturing process, especially during machining process, are also important factors conditioning the occurrence of fracture, as these defects are stress concentrators.<sup>2</sup>

The Gates Glidden bur is commonly used in endodontic treatment for preparation of the cervical and middle thirds of root canals.<sup>3</sup> It is found in different brands in the specialized trade, presenting 32 mm and 28 mm lengths, with its typical flame-shaped active portion.<sup>4</sup>

This bur is manufactured by machining and presents two cylindrical bars of different diameters. The bur stem is formed by the larger diameter bar, and the body is constituted by the one of smaller diameter.<sup>1</sup>

Its use should be careful because its stem presents a weakness point near the body, which is usually the region of fractures occurrence. When the fracture occurs in this region, the removal is facilitated by the bur design itself.<sup>3</sup> To ensure the canal shape maintenance, Gates Glidden bur can be taken lightly against the canal wall, being then removed.<sup>5</sup>

Its active part has three cutting blades, semi-spiraled, which allow the passage of small diameter files.<sup>4</sup> However, when using Gates Glidden bur, fractures may occur in unusual areas, leading to difficulties for removal of fractured fragment.

The successful removal of fractured instrument depends on several factors, such as canal anatomy, alloy type, fragment location within the canal, fractured instrument length and root canal diameter.<sup>6</sup>

The aim of this study was to present a case of Gates Glidden bur fracture occurring near the active portion, which is an uncommon site for instrument fracture, as well as the respective fragment removal.

## Case report

The patient of male gender, 21 years old and referred by a general practitioner to perform endodontic treatment of tooth #37. Clinical and radiographic examination (Fig 1) determined the diagnosis of pulp necrosis.

After the rubber dam, cavity access and exploitation of the root canal with a K-type hand file #10 (Maillefer, Ballaigues, Switzerland) using a #2 Gates Glidden bur (Maillefer, Ballaigues, Switzerland) in the mesial buccal canal, a slight click and a sudden change of direction were perceived. By removing the bur from the root canal, its tip break was observed (Fig 2). A radiographic evaluation showed the fractured bur tip retained in the canal middle third (Fig 3).

Initially, we tried to remove the bur tip with a K type file #10 followed by Headstroem files, but without success. Using a #10 K file it was possible to pass by the fragment. Then, we decided by using a CV-Dent 1000 (CVD Vale, São José dos Campos, Brazil) ultrasound, with the T0S-E1 tip, indicated for removal of fractured instruments. Before using them, an anti-wear curve was developed with a LA Axess #35 (SybronEndo, Orange, CA, USA) bur, improving the access to mesiobuccal canal. The ultrasound power was set at 50%, at endodontics function, working around the bur tip for a few minutes. Developing a radiographic confirmation of the working length, it was possible observe the fragment removal (Fig 4).

The root canal obturation was performed with Sealer 26® (Dentsply, Petrópolis-RJ, Brazil) and gutta percha cones by Tagger hybrid technique (Fig 5). The X-ray control was performed after one year (Fig 6).

Scanning electron microscopy with an increase of 150X was performed on the fractured bur (Fig 7).

## Discussion

The fractured instruments removal from the root canal is, at times, difficult; especially in curved or markedly atretic canals, since other instruments progression is embarrassed.<sup>7</sup> It is, therefore, of paramount importance to create a straight path up to fragment in all cases,<sup>4</sup> allowing better visibility and adequate access.<sup>4,7</sup>



Figure 1. Initial X-ray.

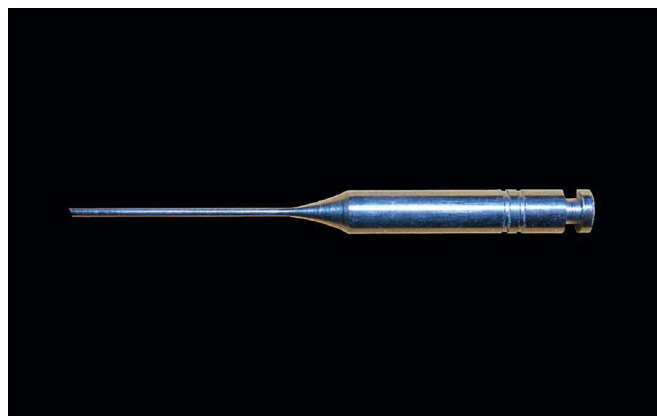


Figure 2. Fractured Gates Glidden bur.



Figure 3. Fractured bur tip, retained in the canal middle third.

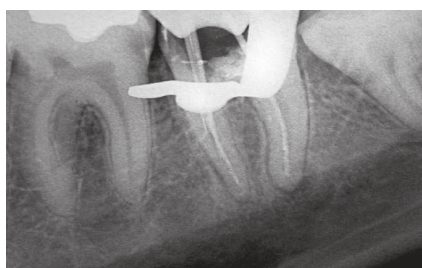


Figure 4. Working length.



Figure 5. Root canal obturation.



Figure 6. Control X-ray after 1 year.

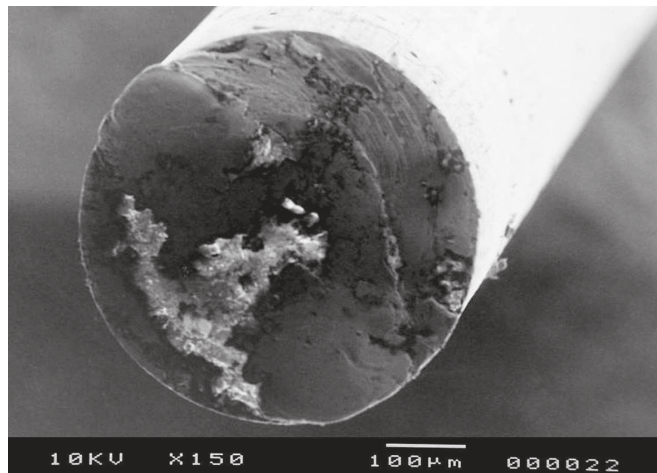


Figure 7. Scanning electron microscopy (150x).

However, the access to fractured fragment should be careful, because the excessive dentine wear could cause other complications, such as perforation and radicular fracture.<sup>6</sup>

The fact of Gates Glidden bur to fracture close to its active portion, an unusual location, is due to

tension generated in the bur, within the canal.<sup>6</sup> This bur is constantly submitted to torsion and bending, which may cause normal and shearing stresses, which are concentrated in a region where fractures usually occur.<sup>1</sup> In most cases, the instruments fracture is due to incorrect or excessive use.<sup>8</sup> In order to avoid the

occurrence of instruments fracture, it is always necessary to respect the instruments' kinematics of use, avoiding sudden movements inside root canal. The instrument fracture caused by fatigue presents high occurrence rates and could be avoided by professionals.<sup>4,8</sup> In this case, it was evidenced that the fracture resulted from fatigue and torsion of the instrument, as noted in the scanning electron microscopy (Fig 7). It should be also noted that there was no previous preparation of the cervical third, which became another stressing factor on the bur, as seen in Figure 3.

Once occurred a fracture, the provider should use some resources to successfully remove the fragment.

Although a number of different techniques are currently available for removal of fractured instruments from root canals, the use of ultrasound has been shown to be an effective and safe procedure.

## Conclusion

Gates Glidden bur may fracture in an unusual way, near their active portion, which becomes the fragment removal very difficult; so, it is always necessary to follow the respective use recommendation. The removal of fractured instruments is always a challenge for the dental surgeon; but with the use of adequate techniques and tools, such removal can be successful.

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