



## CASE REPORT

# An Iatrogenic Foreign Body in the Maxillary Sinus: Report of an Unusual Case

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## Abstract

Dental practitioners frequently encounter with instrument fracture during root canal treatment. However, these fractures generally occur inside the root canals. It is not usual that high speed rotary instruments snap and go further to important anatomical landmarks. In our case report, a high-speed Gates-Glidden drill perforated the root and was introduced into the left maxillary sinus during a routine root canal treatment. The dental and surgical management of the case are described and the possibly more serious sequelae are discussed. Practitioners must take great care during dental treatment and endodontic treatment in particular, not to accidentally introduce foreign bodies into maxillary antrum.

## Keywords

Foreign body, Gates glidden, Maxillary sinus, MTA, Perforation

## Introduction

Foreign bodies are occasionally found in the paranasal sinuses [1]. Causes include the escape of material through an oroantral fistula, from facial trauma, and iatrogenic causes [2]. Most foreign bodies are pieces of metal, wood or glass and they are detected by plain radiography, xeroradiography, computed tomography, magnetic resonance imaging and Ultrasonography [3]. Rarely, they occur as a complication of a dental procedure [4]. However, practitioners must take great care during dental treatment and endodontic treatment in particular, not to accidentally introduce foreign bodies into maxillary antrum. Because antral perforation is

frequently associated with dental procedures involving apical surgery of the maxillary molar teeth, these procedures often create a pathway for foreign bodies to enter the maxillary sinus [5]. Fortunately, displaced dental instruments in the maxillary sinus are rare [4]. A literature search revealed reports of displaced teeth [6], oral implants [5,7], gutta-percha points [8], dental burs [4,9], dental amalgam [10,11], impression material [12] as iatrogenic causes. There are also reports of a sewing needle which was inadvertently pushed into the maxillary sinus by the patient while attempting to drain a dental abscess [13], and a wooden toothpick [14] which was introduced into the maxillary sinus after an upper second molar extraction which caused an oroantral fistula. A gates-glidden drill in the maxillary antrum has not been reported before.

In this case a Gates-Glidden drill which was introduced into the left maxillary antrum during a routine endodontic treatment for an upper first molar was presented. The endodontic and surgical management of the case are also described.

## Case Description

A 40-year-old female patient was referred to Department of Endodontics after pulp exposure during prosthodontic preparation of her upper left first molar. The patient was immediately referred to the undergraduate clinic for root canal treatment.

Enquiry into the patient's medical history revealed she was healthy and currently not using any medication.



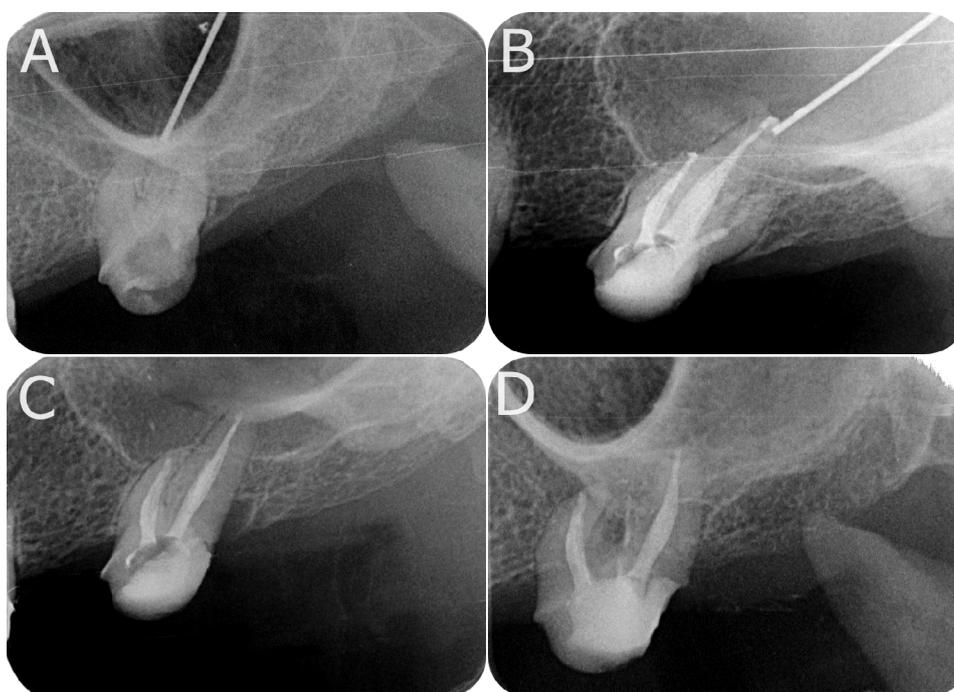
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**Figure 1:** The panoramic radiograph clearly shows the extent of the Gates Glidden drill inside the left maxillary sinus.



**Figure 2:** Periapical radiographs show A) A broken Gates-Glidden drill inside the left maxillary sinus during a routine endodontic treatment for an upper first molar; B) The drill after root canal treatment; C) The trace of the removed distal root is still visible 7-days post-operation; D) Asymptomatic tooth at the 2-year recall.

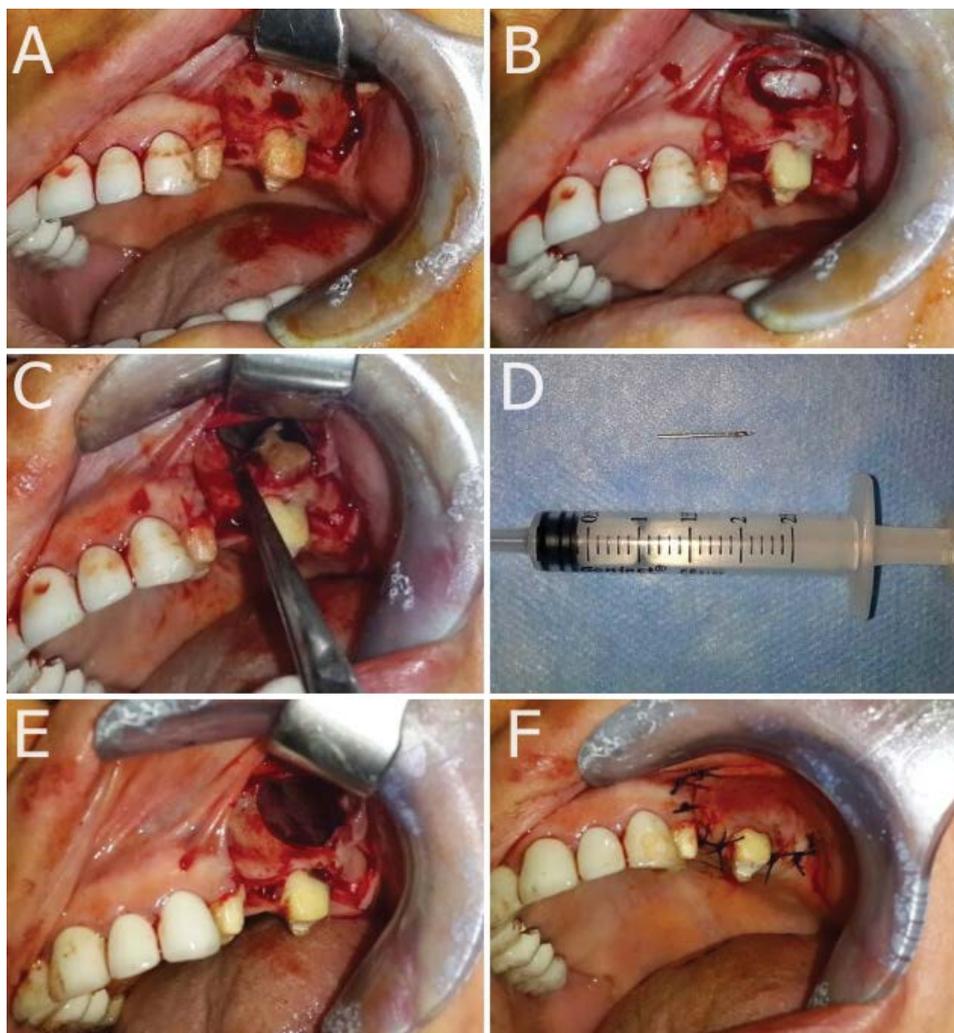
After taking an initial periapical radiograph, an access cavity was formed and root canals were identified. During the shaping of the root canals, the student was suddenly aware that the Gates-Glidden drill she used, to enlarge root canal orifices, had been broken. A panoramic radiograph (OPTG) (Figure 1) and a periapical radiograph (Figure 2A) were taken to ensure the position and the extent of the broken drill.

The radiographs confirmed that a Gates-Glidden drill was fractured. However, the broken piece was located in maxillary sinus cavity. It was assumed that the student perforated the floor of the pulp chamber in between the distal and the palatal root canal access cavities, mistook it for the entry of the distal canal and enlarged the perforation site by using a high-speed Gates-Glidden drill until the drill was broken. The drill

extended to the maxillary sinus with its rotational speed. The patient was commenced on a course of amoxicillin clavulanate and ibuprofen and was transferred to the professors' clinic.

The perforation site was covered by ProRoot MTA (Dentsply, Maillefer, USA), the canals were obturated and the tooth was restored (Figure 2B). However, it was not possible to enter the distal canal as the perforation site and the distal root canal entry were collided. The patient was later transferred to the Department of Oral and Maxillofacial Surgery for the removal of Gates Glidden drill and hemisection of the distal root (Figure 2C).

The left maxillary sinus was entered through a Caldwell-Luc approach (Figure 3A and Figure 3B). The Gates Glidden tool was visualized and removed with the



**Figure 3:** Surgical removal of the Gates Glidden drill A,B) Through a Caldwell-Luc approach; C) The Gates Glidden drill was surrounded with purulent secretions; D) Removed with the help of a forceps; E) The maxillary sinus was irrigated and distal root was removed; F) The mucoperiosteal flap was sutured.

help of a forceps (Figure 3C and Figure 3D), the maxillary sinus was irrigated with saline solution and antral polyps were removed. Distal root was also removed. Oral cavity was checked for an oroantral fistula during surgery (Figure 3E). There was no interruption in the oral mucosa which may suggest a fistula. The mucoperiosteal flap was closed with 4/0 silk suture (Doğsan, Turkey) (Figure 3F).

The patient was given antibiotics and topical decongestants for a week following surgery. At post-operative review 7 days later the surgical site was seen to be healing well and there was no evidence of any oro-antral communication. Subsequent follow-up appointments at 6-month, 1-year and 2-year (Figure 2D) revealed the patient to be both radiographically and clinically asymptomatic. The patient's physical examination and radiological investigations were normal.

## Conclusions

The anatomical relationship of the maxillary sinus and the roots of maxillary molars, premolars and in some instances canines, can lead to numerous

complications. The bone of the maxillary sinus floor can be very thin and in some individuals the roots of the posterior teeth project through this bone [8]. In this case, a Gates-Glidden drill was accidentally introduced into the maxillary sinus. There have been case reports of displaced teeth [6], oral implants [5,7], gutta-percha points [8], dental burs [4,9], dental amalgam [10,11], impression material [12], a tooth pick [14] and a sewing needle [13], all caused during or after dental treatments.

Foreign bodies in the paranasal sinuses should be removed, even when they are asymptomatic in order to prevent tissue reactions [1]. The exact mechanism of how foreign bodies cause sinusitis remains unknown. It has been suggested that foreign bodies may cause tissue reactions, produce chronic irritation of the mucosa, leading to a degree of ciliary insufficiency [1].

In addition, small foreign bodies may be transported by the cilia of the epithelial lining in the maxillary sinus in the mucus-containing fluid against the influence of gravity, up the nasal wall of the sinus and out into the nose via the ostium [8]. Small foreign bodies may be silently inhaled causing a potential for the development of pneumonia, bronchiectasis or lung abscess [8].

A case in which carcinoma of the maxillary sinus developed in a patient with a metal foreign body in the antrum for 48-years has been reported [15]. Also another case which was misdiagnosed as an ethmoid tumor but caused by a foreign body reaction to an amalgam filling was reported [11]. Thus, it is generally accepted that prompt surgical intervention to remove the foreign body is desirable to prevent the possible sequelae of sinusitis, mucosal cyst formation, foreign body granuloma and persistent oro-antral communication [2,8].

The classic surgical technique for foreign body removal from maxillary sinuses is the Caldwell-Luc procedure, which involves opening the anterior wall of the maxillary sinus [1]. Nasal and sinus endoscopic surgery is another approach for the removal of a foreign body from the maxillary sinus. If the foreign bodies are large enough then their removal may not be easy by routine Endoscopy [2]. In our case, Caldwell-Luc procedure was applied for better visualization of the antrum.

This case is interesting because, a Gates Glidden drill in the maxillary sinus, is the first in the literature to our knowledge; also, this is a dramatic example of how a simple root canal treatment could turn into a surgical procedure if the practitioner, a dental student in this case, is lacking the knowledge of root canal morphology.

Foreign bodies in the maxillary sinus are rare issues. They generally occur during or secondary to dental procedures. Whatever the foreign body is, it must be removed to prevent chronic infections even if it is asymptomatic. Great care must be taken during dental procedures and endodontic procedures in particular, not to accidentally introduce foreign bodies into the antrum.

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The authors deny any conflicts of interest related to this study.

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