Radiology Case Reports 20 (2025) 2408–2411

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Silent threat: A case on dental drill head aspiration ☆,☆☆

Marco De Chiara, MD[a,b,*], *Ludovica Attanasio, MD*[a], *Francesca Boccadifuoco, MD*[a], *Alessandra Panico, MD*[a], *Diego Sandro Giordano, MD*[b], *Giuseppe Russo, MD*[a]

[a] *Radiology Unit, Ospedale Accreditato Villa dei Fiori, 80011 Naples, Italy*
[b] *Department of Precision Medicine, University of Campania "L. Vanvitelli", 80138 Naples, Italy*

ARTICLE INFO

Article history:
Received 11 November 2024
Revised 29 January 2025
Accepted 4 February 2025

Keywords:
Foreign body
Aspiration
Dental procedures
Dental drill
Dental drill head

ABSTRACT

Dentistry is a relatively safe medical field, but it carries the risk of rare yet potentially severe complications like accidental foreign body aspiration. While literature on patient safety in dentistry remains limited, this case underscores the importance of promptly recognizing and managing such incidents. A 76-year-old patient arrived at the emergency room with concerns of having ingested a dental drill head during a procedure. Despite lacking typical symptoms, imaging revealed a foreign body in the right airways, highlighting the necessity of advanced diagnostics even when signs are lacking. This case underscores the critical need for preventive measures and comprehensive diagnostic evaluation in dental practice to mitigate such risks and improve patient safety.

Introduction

Dentistry is a branch of medicine commonly perceived as safer when compared to other, more invasive, medical fields. This has led to limited interest in developing patient safety related literature and, therefore, to a scarcity of peer-reviewed knowledge; however, complications, although rare, do occur and can be serious [1,2]. Accidental foreign body aspiration and ingestion may be rare, with an incidence ranging from less than 1%-12% of all the dental procedure complications but they can escalate into emergency situations and, in rare cases, be life-threatening [3–7]. To guarantee higher safety standards, dental practitioners should focus on preventing accidental foreign body aspiration by identifying, before the procedures, high-risk patients and being aware of commonly aspirated or ingested objects. These objects include endodontic instruments, orthodontic materials, and dental implant components [8–11]. Aspiration is influenced by factors such as patient age, medical conditions, and the type of dental procedure [12,13]. This case provides an educational opportunity for dental practitioners and radiologists, emphasizing the importance of recognizing and managing foreign body aspiration promptly.

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
☆☆ Acknowledgments: This research received no external funding.
* Corresponding author.
E-mail address: marc.dechiara93@gmail.com (M. De Chiara).
https://doi.org/10.1016/j.radcr.2025.02.015

Case

In March 2024 a 76-year-old patient presented to our emergency room with concerns of having ingested a dental drill head during a dentistry procedure. The patient reported feeling the sensation of ingestion but did not exhibit any symptoms typically associated with foreign body ingestion or aspiration, such as abdominal pain, regurgitation, dysphagia, coughing, choking, or respiratory distress. Upon clinical examination, the patient's vital signs were stable, and no abnormalities were detected. Blood tests, including a complete blood count and basic metabolic panel, were within normal limits. Additionally, an electrocardiogram (ECG) showed no signs of cardiac abnormalities.

Given the patient's history and concern, a chest x-ray was performed as the initial diagnostic modality. The radiograph revealed the presence of a metallic foreign body, approximately 2 cm in maximum length, within the right airways. The object was consistent in size and shape with a dental drill head, suggesting that it had been aspirated, not ingested, during the dental procedure (Fig. 1).

To obtain a precise localization and to assess the extent of the foreign body's migration within the respiratory tract, a computed tomography (CT) scan of the chest was immediately performed, since it's higher spatial resolution power. The CT scan provided a detailed visualization of the drill head's position, confirming its presence within the intermediate bronchus. Additionally, the scan revealed that part of the drill head extended into the inferior bronchus on the right side. The detailed imaging allowed for accurate assessment of the foreign body's location and its relationship with the surrounding anatomical structures (Fig. 2). Given the confirmed presence of a foreign body in the bronchial tree, the patient was advised to undergo an urgent bronchoscopy for retrieval.

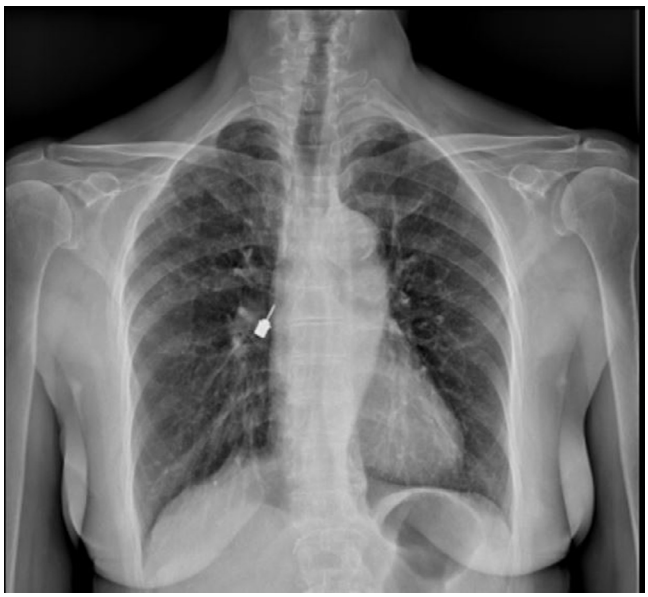

Fig. 1 – Posteroanterior chest X-ray. A metallic foreign body (the drill head) is visible near the right hilum, supposedly located in the right airways.

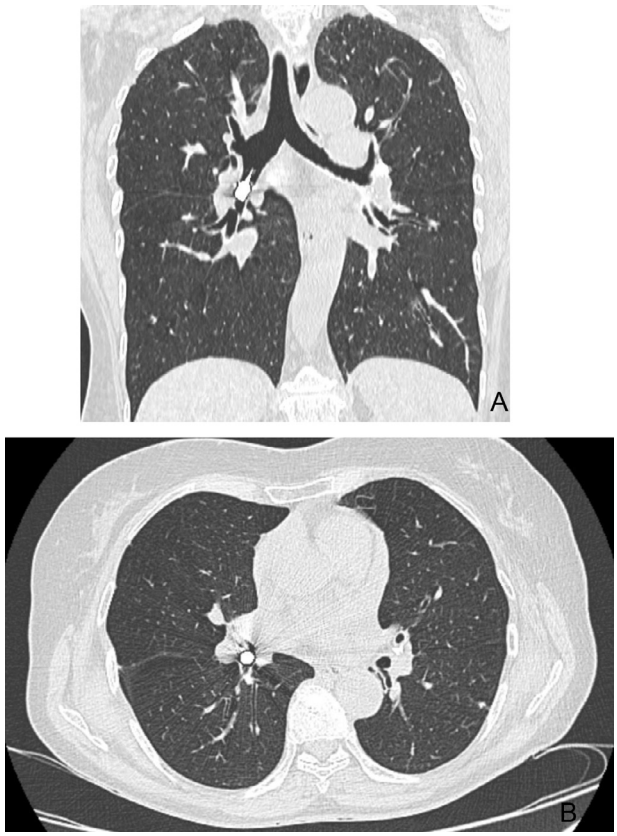

Fig. 2 – Thoracic CT scan showing the drill head located in the right intermediate and right lower bronchi. (A) coronal view (B) axial view.

After discussing the risks and benefits of the procedure, the patient consented to immediate intervention. A flexible bronchoscopy was performed under mild sedation, revealing the drill head lodged within the intermediate bronchus with partial extension into the inferior bronchus. Multiple attempts were made to retrieve the object using biopsy forceps; however, due to the object's smooth and metallic surface, initial grasping was challenging. Consequently, a rigid bronchoscopy under general anaesthesia was performed to facilitate removal. During rigid bronchoscopy, the drill head was successfully extracted without causing significant mucosal trauma. Postprocedural inspection of the bronchial tree confirmed no residual fragments or mucosal lacerations. The patient was monitored in the hospital for 24 h to assess for potential complications, including pneumothorax, haemoptysis, airway oedema, or secondary infections.

Despite the smooth extraction of the foreign body, the patient developed mild postprocedural cough and transient hoarseness, which resolved spontaneously within 48 h. No signs of infection, aspiration pneumonia, or significant bronchial injury were noted. The patient was discharged with instructions to monitor for any delayed respiratory symptoms, such as persistent cough, wheezing, or fever, which could indicate postobstructive complications. At a scheduled 2-week follow-up, the patient reported complete resolution of symptoms with no residual respiratory distress. Pulmonary

function tests were within normal limits, and repeat imaging showed no evidence of residual inflammation or airway obstruction. Given the successful intervention and the absence of long-term complications, the patient was advised to maintain routine follow-up with their primary care provider and to inform future dental care providers of this incident to prevent recurrence.

This case highlights the importance of prompt imaging and bronchoscopic intervention in managing airway foreign bodies, even in asymptomatic patients. Early diagnosis and timely intervention prevented serious complications such as airway obstruction, pneumonia, or lung collapse.

Discussion and conclusions

Foreign body aspiration is a relatively rare but potentially serious medical event, particularly in older adults who may have diminished protective airway reflexes due to age-related physiological changes, sedation, or neuromuscular conditions [14]. Although aspiration of dental instruments is rare, studies estimate an incidence of approximately 0.004%-0.007% during dental procedures, with drill heads, endodontic files, and implant screws being the most frequently aspirated objects. The risk is heightened in patients undergoing procedures in a reclined position, those with impaired airway reflexes, and individuals with preexisting respiratory conditions [15]. Early recognition and accurate diagnosis are critical to preventing complications such as airway obstruction, pneumonia, atelectasis, or chronic inflammation leading to bronchiectasis. However, diagnosis can be challenging, particularly in asymptomatic patients or when symptoms are nonspecific. Initial assessment typically involves chest radiography, which is useful for detecting radiopaque foreign bodies, but computed tomography offers superior sensitivity and spatial resolution. CT imaging not only provides precise localization of the object but also delineates its relationship with surrounding anatomical structures, facilitating appropriate treatment planning. The management of foreign bodies aspiration depends on the location, size, and nature of the foreign body, as well as the patient's clinical status. In rare cases where the object is small, nonobstructive, and the patient remains asymptomatic, conservative management with close monitoring may be considered. However, retrieval is generally recommended to prevent delayed complications. Flexible bronchoscopy is the first-line intervention due to its minimally invasive nature, high success rate, and ability to evaluate airway integrity. If flexible bronchoscopy is unsuccessful—often due to an object's size, shape, or slippery surface—rigid bronchoscopy under general anaesthesia is the preferred alternative. Rigid bronchoscopy provides superior airway control and facilitates the use of specialized retrieval tools. In rare cases where bronchoscopic techniques fail or if significant airway damage occurs, surgical intervention such as thoracotomy may be necessary [16].

This case underscores the importance of thorough diagnostic evaluation and the use of precise imaging modalities in patients with suspected foreign body aspiration, even in the absence of symptoms. It also highlights the need for preventive measures in dental practice to mitigate such risks. Key strategies include the use of rubber dam isolation, high-volume suction, and protective gauze barriers to prevent accidental displacement of instruments into the oral cavity. Patients, particularly those at higher risk, should be positioned in a semi-upright posture when possible, to minimize aspiration risk. Additionally, dental practitioners should maintain a high index of suspicion for foreign bodies aspiration in cases of sudden coughing or unexplained intraoperative events and should be prepared to manage such incidents effectively. By integrating improved preventive strategies, rapid diagnostic techniques, and effective retrieval methods, healthcare professionals can significantly reduce the risks associated with foreign body aspiration and ensure optimal patient outcomes.

Patient consent

Informed consent was obtained from all subjects involved in the study.

IRB approval

The study was conducted in accordance with the Declaration of Helsinki.

REFERENCES

[1] Thusu S, Panesar S, Bedi R. Patient safety in dentistry–state of play as revealed by a national database of errors. Br Dent J 2012;213:E3.
[2] Ensaldo-Carrasco E, Suarez-Ortegon MF, Carson-Stevens A, Cresswell K, Bedi R, Sheikh A. Patient safety incidents and adverse events in ambulatory dental care: a systematic scoping review. J Patient Saf 2021;17:381–91.
[3] Walji MF, Yansane A, Hebballi NB, Ibarra-Noriega AM, Kookal KK, Tungare S, et al. Finding dental harm to patients through electronic health record-based triggers. JDR Clin Trans Res 2020;5:271–7.
[4] Hill EE, Rubel B. A practical review of prevention and management of ingested/aspirated dental items. Gen Dent 2008;56:691–4.
[5] Kim E, Noh W, Panchal N. Mortality from an aspiration of dental crown during extraction. Gerodontology 2017;34:498–500.
[6] Reginelli A, Santagata M, Urraro F, Somma F, Izzo A, Cappabianca S, et al. Foreign bodies in the maxillofacial region: assessment with multidetector computed tomography. Seminars in ultrasound, CT and MRI. Volume 2015;36(Issue 1):2–7.
[7] Abusamaan M, Giannobile WV, Jhawar P, Gunaratnam NT. Swallowed and aspirated dental prostheses and instruments in clinical dental practice: a report of five cases and a proposed management algorithm. J Am Dent Assoc 2014;145:459–63.
[8] De Chiara M, Grimaldi D, Cristiano MR, Grassi F, Giordano N, Parrella P, et al. When radiologists plays detective: uncovering surgical foreign body in the Abdomen. J Radiol Case Rep 2024;18(3):33–7.

[9] Milton TM, Hearing SD, Ireland AJ. Ingested foreign bodies associated with orthodontic treatment: report of three cases and review of ingestion/aspiration incident management. Br Dent J 2001;190:592–6.
[10] Susini G, Pommel L, Camps J. Accidental ingestion and aspiration of root canal instruments and other dental foreign bodies in a French population. Int Endod J 2007;40:585–9.
[11] Cameron SM, Whitlock WL, Tabor MS. Foreign body aspiration in dentistry: a review. J Am Dent Assoc 1996;127:1224–9.
[12] Tiwana KK, Morton T, Tiwana PS. Aspiration and ingestion in dental practice: a 10-year institutional review. J Am Dent Assoc 2004;135:1287–91.
[13] Cossellu G, Farronato G, Carrassi A, Angiero F. Accidental aspiration of foreign bodies in dental practice: clinical management and prevention. Gerodontology 2015;32:229–33.
[14] Lin L, Lv L, Wang Y, Zha X, Tang F, Liu X. The clinical features of foreign body aspiration into the lower airway in geriatric patients. Clin Intervent Aging 2014;9:1613–18. doi:10.2147/CIA.S70924.
[15] Folch E, Majid A. Foreign body aspiration in the elderly patient. Curr Geriatr Rep 2015;4:192–201.
[16] Batra H, Yarmus L. Indications and complications of rigid bronchoscopy. Exp Rev Respirat Med 2018;12(6):509–20.