

Tooth Aspiration in a Patient with Traumatic Brain Injury

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Abstract

Tooth aspiration is a rare issue in the course of patients with trauma and may remain undiagnosed for a long period, resulting in delayed complications, such as atelectasis and recurrent infections. Flexible bronchoscopy is considered the preferred primary procedure for the management of airway foreign bodies in adults. However, it may cause intracranial hypertension in trauma patients with concomitant head injuries. We herein report a case of a patient with traumatic brain injury who underwent tooth aspiration using flexible bronchoscopy, with continuous monitoring of intracranial pressure (ICP). The importance of a thorough review of radiographs and chest computed tomography for foreign body aspiration in trauma patients was highlighted, particularly in a maxillofacial trauma, as tooth aspiration may remain undiagnosed for extended periods. Moreover, the difficulty in maintaining the ICP within normal limits during bronchoscopy in patients with traumatic brain injury was reinstated, and the need for continuous monitoring of the cerebral hemodynamics and harmonization was emphasized, with recommendations for bronchoscopy via an endotracheal tube.

KEYWORDS: Aspiration, bronchoscopy, tooth, traumatic brain injury

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INTRODUCTION

Tooth aspiration into the tracheobronchial tree in trauma patients is a known complication, but it is uncommon and often overlooked, particularly if not accompanied by acute respiratory distress [1,2]. Flexible or fiberoptic bronchoscopy is considered the preferred initial procedure for managing airway foreign bodies in adults [3]. In intubated and mechanically ventilated patients, it is considered a safe procedure provided that a list of recommendations is followed [4]. However, fiberoptic bronchoscopy might lead to intracranial hypertension in trauma patients with concomitant head injuries [5].

Several relevant cases have been reported, mainly in maxillofacial trauma patients [1,2], but a concurrent brain injury was present only in a few of them [6,7]. We report a patient with a severe traumatic brain injury and tooth aspiration in the right tracheobronchial tree, which was successfully removed using fiberoptic bronchoscopy.

CASE PRESENTATION

A 35-year-old man was admitted comatose to the emergency department of our tertiary care hospital after a road traffic accident. Due to a low Glasgow coma scale (GCS) of 6/15, the patient was immediately intubated for airway protection and mechanical ventilation was initiated. A brain computed tomography (CT) scan revealed a traumatic subarachnoid hemorrhage, multiple cerebral contusions, and a mandibular fracture. A chest CT scan revealed right lower lobe atelectasis. The laboratory values were within normal limits. His medical history was unremarkable. The patient was subsequently transferred to the intensive care unit (ICU). He was hemodynamically stable. Lung auscultation revealed decreased breath sounds at the right lung base. Arterial blood gases were within normal limits. An intra-parenchymal catheter (Camino Laboratories, San Diego, California, USA) was inserted for continuous monitoring of intracranial pressure (ICP). In a routine chest X-ray performed in the ICU on the following day, a radiopaque shadow in the right lung was observed near the inferior right hilum (Figure 1). A meticulous examination of the emergent chest CT scan revealed a previously overlooked, well-calcified foreign body in the right lung (Figure 2). Fiberoptic bronchoscopy performed by pulmonologists–intensivists who were experienced with bronchoscopy revealed purulent secretions and a tooth wedged in the right subsegmental bronchus of the right laterobasal segmental bronchus (RB9; Figures 3, 4). After several attempts, the tooth was finally removed using alligator forceps (Olympus FB-15/36, Olympus Optical, Tokio, Japan). The complete procedure lasted

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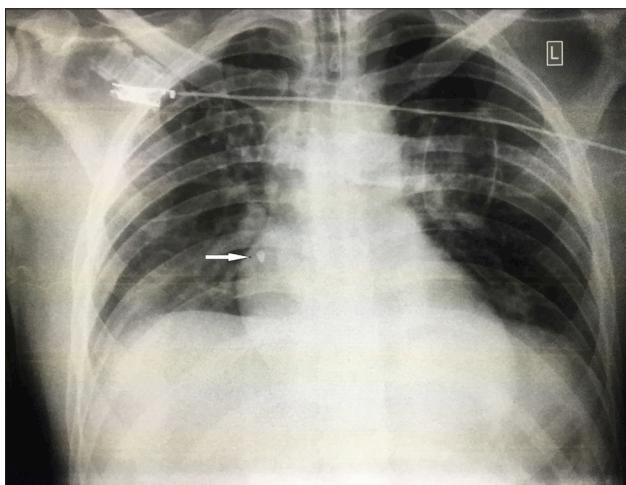


Figure 1. Chest X-ray showing the tooth in the right lung (arrow)



Figure 3. Bronchoscopic view of the foreign body visible in the right subsegmental bronchus of RB9 (arrow)



Figure 2. Chest computed tomography showing a well-calcified foreign body in the right lung and the collapse of the lower lobe



Figure 4. Close-up of the foreign body

DISCUSSION

In the present case, mandibular trauma, altered consciousness, and intubation in an emergency setting represent risk factors for foreign body aspiration. Aspiration of a tooth must always be treated immediately because it may traumatize the lining mucosa or cause airway obstruction, atelectasis, bronchiectasis, obstructive pneumonia, or lung abscess [8].

The aspirated tooth may remain undetected, particularly in patients with severe trauma, and lead to delayed complications [6]. Notably, in comatose and mechanically ventilated patients following a foreign body aspiration, the most common signs and symptoms of cough, dyspnea, stridor, or wheezing are usually absent. Furthermore, a foreign body, such as a tooth, may be missed in chest X-rays because of the superimposition of other radiolucent structures. Hence, a delay in the diagnosis has been noted in several cases of particularly tooth aspiration among those reported, indicating the need for a high level of suspicion [1,6,7]. In the present case, right lower lobe collapse and ipsilateral decreased breath sounds were the only findings, which are nonspecific.

The initial misdiagnosed chest CT scan was also not surprising in the setting of an emergent evaluation of a severely injured patient, focusing mainly on the life-threatening vital organ injuries.

Rigid or flexible fiberoptic bronchoscopy is preferred for the diagnosis and removal of foreign bodies from the tracheobronchial tree [9]. However, in trauma patients, rigid bronchoscopy is not feasible because of the need of a secure airway and cervical spine safety. In contrast, in intubated and mechanically ventilated patients with brain injury, flexible fiberoptic bronchoscopy either via an orotracheal tube or tracheostomy performed for this purpose in more complicated cases can induce a rise in the ICP [4,5,10-12]. The insertion of a flexible bronchoscope into the endotracheal tube results in elevated airway pressures that may be transmitted to the thoracic space and therefore increase the ICP (raising both systolic blood pressure and impairing venous return) [10]. Additionally, any hypercapnia due to hypoventilation during the procedure may at least partly contribute to the increase. Therefore, a small cross-sectional area remaining in the endotracheal tube when the bronchoscope is in place must be avoided to minimize the effect on airway resistance and its deleterious consequences on the ICP. An adequate cross-sectional area is strictly mandatory for a safe execution of the procedure.

To our knowledge, this is the first case that reports the use of flexible bronchoscopy to remove a tooth from a traumatic brain injury patient with an ICP monitor in place. Although we used additional sedation, analgesia, muscle relaxation, hypertonic solutions, and topical tracheal anesthesia, as suggested by previous studies in which bronchoscopy was performed in traumatic brain injury patients to aid in the diagnosis of nosocomial pneumonia or to resolve lobar atelectasis, the increases in ICP were not fully prevented; we had to remove the scope and increase ventilation several times [11]. Thus, if the procedure is expected to extend for a longer time, similar to in our case, ICP monitoring seems to be vital.

This case highlights the importance of a careful review of chest CTs and radiographs by radiologists and clinicians with detailed knowledge of the clinical course. Also, the removal of the scope must be expected when bronchoscopy performed in case of a foreign body wedged in the subsegmental bronchus is estimated to extend, thereby causing elevations in ICP, and the bronchoscopy must be performed with caution in patients with diminished cranial compliance.

Informed Consent: Written informed consent was obtained from the parents of the patient who participated in this case.

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