Aspiration of radiolucent dentures in facial trauma: Case report

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Abstract

Foreign body aspiration is a serious problem that may lead to complications or even death. People who sustain major maxillofacial trauma can often damage their teeth or oral prostheses, and aspiration can occur. Detection of this type of aspiration can be difficult, especially in elderly people wearing dental appliances, since many dental prostheses are not radiopaque and the aspiration is not always recognized at the time of injury. We report a specific case of extensive maxillofacial trauma from a self-inflicted gunshot wound leading to aspiration of large, radiolucent denture fragments, delayed diagnosis, and complications. The possibility of denture fragment aspiration must always be part of the differential diagnosis in an elderly trauma patient presenting with dyspnea, hypoxia or, eventually, pneumonia. This is especially so when radiologic evaluation does not reveal a foreign body, since much dental prosthesis material is radiolucent. Delayed complications of radiolucent dental prosthesis aspiration could be avoided by the inclusion of some radiopaque material within the acrylic material of the prosthesis.

Introduction

Aspiration and ingestion of teeth and/or dental prostheses can occur in association with dental procedures, ethanol intoxication, dementia, or neurologic disorders, resulting in impaired airway protective mechanisms.[1] People who sustain major maxillofacial trauma often damage their dentition, and aspiration can occur. Detection of this type of aspiration can be difficult because many dental prostheses are not radiopaque and the aspiration is not always recognized at the time of injury.[2] We report a specific case of extensive maxillofacial trauma from a self-inflicted gunshot wound leading to aspiration of large, radiolucent denture fragments, delayed diagnosis, and complications.

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Case report

A 73-year-old right-handed man sustained severe right-sided facial trauma following a self-inflicted gunshot wound to the face from a 12-gauge shotgun. The barrel of the gun was placed in his mouth, and the man's pulling the trigger with his thumb resulted in a rightward deviation of the barrel, which caused massive destruction of half of his face. In the field, an esophageal-oral airway device (Combitube) was inserted. Upon the patient's arrival at the local community Emergency Department, his vital signs were as follows: heart rate, 74; respirations, 21; and blood pressure, 115/64. The Combitube was removed, and the patient was orally intubated via video-assisted laryngoscopy with great difficulty.

The patient was then transferred via helicopter to Memorial Hospital, South Bend, Indiana, a level II trauma center. The chest x-ray showed minimal atelectasis or infiltrate in the left perihilar region. An endotracheal tube was noted on the x-ray. Computed tomography (CT) of the head and neck revealed intracranial pneumocephalus with radiopaque shot at the level of the inner table of the right frontal lobe (figure 1). A complex midfacial injury with enucleation of the right orbit, complex maxillary fracture, and orbital fracture was observed. A mildly depressed left contralateral maxillary sinus fracture was also seen.

The patient was taken to the operating room for definitive airway management, wound inspection, debridement, and repair. His extensive injuries included a 12 × 12-cm right facial wound with extensive skin, soft tissue, and bone loss. Multiple facial fractures were present, including

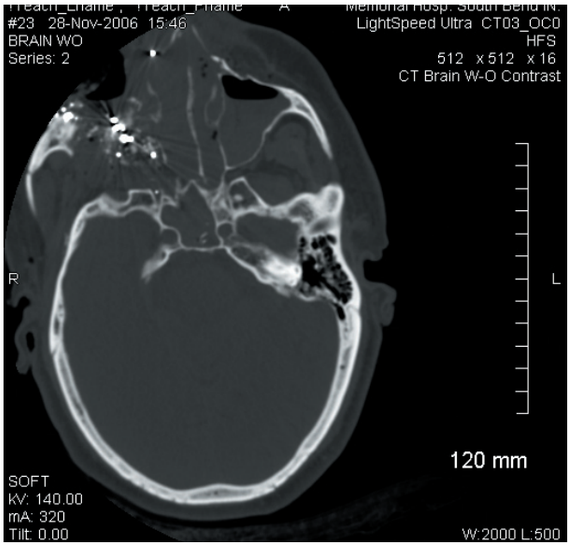

Figure 1. CT scan of the head and neck reveals an intracranial pneumocephalus with radiopaque shot at the level of the inner table of the right frontal lobe.

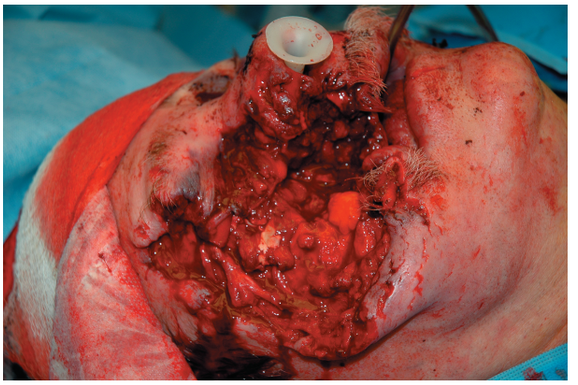

Figure 2. The extensive injuries of the patient include a 12 × 12-cm right facial wound with extensive skin, soft tissue, and bone loss. Multiple facial fractures are present, including a Le Fort III fracture with a split palate. A 6-cm complex laceration of the right upper lip and a 5-cm oral cavity laceration are present. A through-and-through avulsion of the right lateral nasal wall and a through-and-through lower lip laceration measuring 4 cm are present. Orbital trauma is also severe, resulting in loss of the right globe.

a Le Fort III fracture with a split palate. A 6-cm complex laceration of the right upper lip and a 5-cm oral cavity laceration were present. A through-and-through avulsion of the right lateral nasal wall and a through-and-through lower lip laceration measuring 4 cm also were present. Orbital trauma was severe, resulting in loss of the right globe (figure 2).

In addition to the surgery to repair the complex lacerations, the patient had a tracheostomy and nasopharyngeal stent placed. Postoperatively, the patient was admitted to the intensive care unit (ICU). On the day after ICU admission, the patient was waking up and following commands. He then underwent a tracheoscopy because of apparent hemoptysis, which proved to consist of small venous bleeds near the tracheostomy site upon Valsalva maneuvering and coughing. On day 5, the patient underwent bronchoscopy because of hypoxemia and the presence of bilateral infiltrates on the chest x-ray (figure 3).

The patient was developing pneumonia, and a foreign body was identified via bronchoscopy in the left endobronchial system. Subsequent bronchoscopy on day 6 revealed various foreign bodies consisting of denture material. The fragments were too large to pass through the tracheostomy, with the exception of an individual prosthetic tooth that was removed through the trachea via the bronchoscopy (figure 4, A). The patient required a brief period of CPR and was resuscitated successfully.

In addition to traditional bronchoscopy to remove the denture fragments, a combination of transoral and transtracheostomy approaches was used with great difficulty to remove three additional large fragments, all consistent with denture material. The fragments too large to fit through the trachea stoma (figure 4, B) were carefully passed through the vocal folds with success.

The patient became unresponsive to verbal and painful stimuli on day 7, with signs of multisystem organ failure. The family elected to withdraw care. With only supportive measures in place, the patient was extubated and expired soon after.

Discussion

Foreign body aspiration is a serious problem that may lead to complications or even death.[3] Moreover, swallowed or inhaled dentures can present a diagnostic challenge.[4] In the event of severe trauma, when clinical attention may be focused on other critical issues, delayed diagnosis of aspirated foreign bodies is common.[2]

An unresponsive patient poses a challenge to the clinician in severe facial trauma cases, since the patient cannot give a history of the aspiration or swallowing of dentures. If the facial trauma is such that teeth are missing, the possibility of an aspirated or swallowed denture must be included in the differential diagnosis.[4]

Dentures made solely of radiolucent plastics, such as those worn by our patient, cannot be detected by traditional radiography. Research has been done regarding the inclusion of radiopaque additives to prosthetic acrylic resins in the form of microbeads, salts, or metal powders or wires in otherwise radiolucent denture polymers.[5] However, most dentures are still made of radiolucent

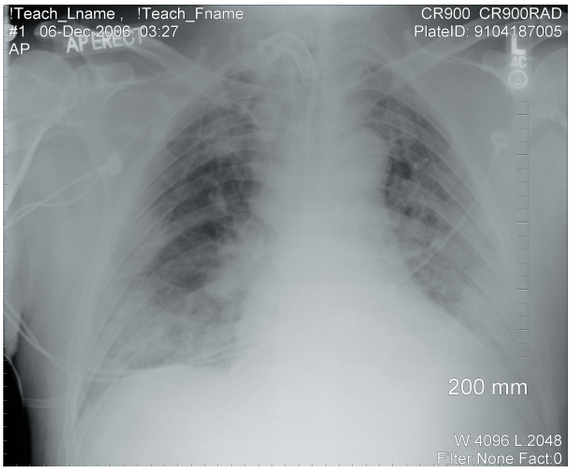

Figure 3. Chest x-ray obtained on day 5 shows bilateral infiltrates indicative of the developing pneumonia in the patient from the aspirated foreign body.

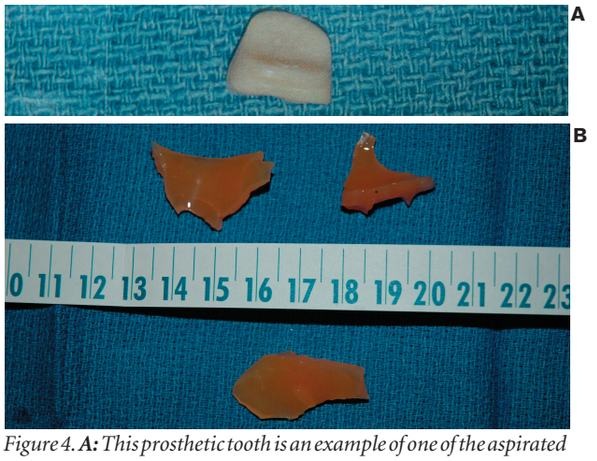

Figure 4. ***A:*** *This prosthetic tooth is an example of one of the aspirated foreign bodies. It was small enough to be removed through the stoma of the tracheostomy site.* ***B:*** *Other denture material fragments were too large to be passed through the stoma.*

material that is notoriously difficult to locate by conventional radiography.[6] Acrylic dentures are more likely discernible by CT, which is more sensitive to small changes in x-ray attenuation than plain radiography.[4] Chest CT performed in patients who present with recurrent infiltrates or cough may detect the presence of a foreign body within the airways by revealing variable density caused by inflammatory changes surrounding the plastic foreign body.[2] In acute trauma, however, inflammatory changes have not yet taken place, and foreign bodies can remain undetectable for days.

Most patients with tracheobronchial foreign bodies have a history of choking followed by intractable cough.[3] Other symptoms include fever, wheezing, and breathlessness.[3] If retained foreign bodies remain undetected, patients typically present with persistent cough or recurrent pneumonia.[2]

Our patient was alert, with clear breath sounds and without cough, immediately after surgery. However, as the days progressed he became more dyspneic, his cough worsened significantly, and he produced large quantities of thick, yellow sputum from the tracheostomy tube. Dyspnea and hypoxia progressed, and multiple x-rays showed a progressive increase in the pneumonia (figure 2). A decision was made to perform flexible bronchoscopy to search for radiolucent dental fragments that might have caused postobstructive pneumonia.

Often, a denture fragment identified in dental prosthesis aspiration is large and difficult to grasp, or it can be entrapped within the lung tissue.[7] In our patient, bronchoscopy revealed the presence of the dental fragments but was unsuccessful in removing them because of their large size. Without using the dual transoral transtracheostomy approach, it would have been extremely difficult to remove these fragments.

Much of the literature regarding denture aspirations is published in dentistry journals and describes accidental aspiration while the dentist is working in the mouth. This case report, however, emphasizes the importance of being aware of the possibility of radiolucent denture aspiration for otolaryngologists, emergency and critical care physicians, and anesthesiologists following severe maxillofacial trauma. This possibility must always be part of the differential diagnosis in a trauma patient presenting with dyspnea, hypoxia and, eventually, pneumonia. Moreover, retained foreign bodies still need to be considered even though traditional radiography might rule out this possibility, since many dentures are radiolucent. Delayed complications of radiolucent dental prosthesis aspiration could be avoided by the inclusion of some radiopaque material within the acrylic material of the prosthesis.

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