

Case Report

Inadvertent Placement of Naso-Enteral Tube at the Base of the Skull: Unusual Presentation in Patients who had Cerebrovascular Accident

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Abstract

A rare case of inadvertent placement of naso-enteral tube (NGT) at the base of the skull in a 74-year-old masculine patient, with impact on the sphenoid sinus without a history of trauma that had an acute ischemic stroke is reported. Despite the extensive and recognized benefits of naso-enteric tube feeding, complications resulting from malpositioning of the naso-enteral tube are often described. Currently, naso-enteral intubation can be directly visualized. The endoscopy nasoendoscopy and fluoroscopy pathways can be used in the placement of the naso-enteral tube in sedated or anesthetized patients where blind intubation is difficult or contraindicated. It is concluded that Naso-enteral intubation should only be initiated by professionals who recognize difficult introduction and the degrees of complications that may result from trauma or malposition of the naso-enteral tube. It is recommended not to insert, in daily routine, tubes through the noses of critically ill patients, with severe decline in the level of consciousness, victims of ischemic cerebral vascular accident, without confirmation of proper placement or visualization of its path during installation.

ABBREVIATIONS

ENT: Enteral Nutrition Therapy; NGT: Naso-Enteral Tube; CVA: Cerebrovascular Accident; ICVA: Ischemic Cerebral Vascular Accident; CT: Computed Tomography

INTRODUCTION

Enteral nutrition therapy (ENT) is common among hospitalized patients to help those unable to feed themselves [1]; especially elderly patients who had cerebrovascular accident (CVA) [2]. Enteral feeding is the first choice for prevention of hospital malnutrition [3-5]. According to the Food Trial Collaboration [2], the victims of ischemic cerebral vascular accident (ICVA) should start feeding as soon as possible, because a poor nutritional status is associated to higher mortality and poor prognosis within six months after ischemic stroke.

The naso-enteral tube can be inserted through the mouth or nose. Typically, the nasal route is more often used in conscious patients, because they can be at risk of reflux or intense vomiting with the use of oral feeding. For those patients in need of therapy

for a prolonged period, the percutaneous route or surgical approach is commonly used [5-7].

The most frequent procedure is the so-called method of "blind" intubation because it does not require the use of sophisticated equipment. With the patient in the seating position, the tube is passed through the nose while the patient is instructed to swallow [8]. If the patient has cough reflex, the tube must be removed for this is an indication of obstruction of the airways [5].

Some complications are described during the use of naso-enteral therapy, which can be classified into gastrointestinal, mechanical, metabolic, infectious, respiratory and psychological. They can be caused by predisposing factors that slow nasoenteric feeding or even iatrogenic complications. Even though these complications are well known, they can be prevented or treated when properly monitored in patients [9].

This paper describes a rare case of inadvertent placement of a nasoenteric tube at the base of the patient's skull, with impact on the sphenoid sinus in elderly patient without a history of trauma that had an acute ischemic stroke.

CASE PRESENTATION

74-year-old male patient was admitted to hospital with symptoms of apathy and motor deficit in the left hemibody. At clinical examination, the patient was sleepy, hypoactive, unresponsive to verbal commands, isochoric and photo reagent pupils, and eyes moving preferably in the right direction and left hemiparesis.

The findings of high-resolution CT (computed tomography) scan show hypodensity in the right temporo-occipital region, with the appearance of acute lesion (Figure 1), as well as left hypodensities in the frontal parietal pre and post central rotation) and frontal (head of the caudate nucleus) regions that look like chronic lesions (Figures 2,3).

In view of the clinical and CT findings diagnosis of acute ischemic stroke was confirmed. The patient had leukocytosis, satisfactory blood control and pressure, being able to move the four limbs asymmetrically and with more active movements in the right direction. Intravenous antibiotic therapy (Ceftriaxone) was administered.

Since oral feeding was impossible because of the patient's debilitated condition and somnolence, a nasal tube had to be placed for enteral nutrition, with the patient in supine position. However, at the time of confirmation of placement of the probe, through posterior-anterior (PA) chest x-ray images, it was found that the probe had taken an upward path. Another CT scan of the region was requested, which showed impact of the probe tip into the sphenoid sinus (Figure 4).

In the attempt to remove the probe, significant resistance was observed. Therefore, the operating room was prepared for removal by nasal 30 degree fiber optic nasal endoscopy, due to bleeding risk and CSF fistula, since the fistula was very near the carotid artery. However, the intervention, since the patient, agitated, inadvertently removed the nasal tube. Therefore, another naso-enteral tube was introduced, through endoscopy, with correct placement confirmed.

DISCUSSION

Despite the extensive and recognized benefits of nasoenteric tube feeding, complications resulting from malpositioning of the naso-enteral tube are often described. The most frequent complications are classified as gastrointestinal, mechanical, metabolic and pulmonary [5,7], including severe comorbidities such as submucosal fistulas in the nasopharyngeal region [10], intracranial placement in patients with fractures or recent facial surgery [11-15]; esophageal perforation [16]; bronchopulmonary intubation, pneumothorax, mediastinitis and empyema [17-22]. In the present study, a rare case of incorrect placement of nasoenteric tube is reported, causing impact in the sphenoid sinus.

The mechanical complication is related with the handling of the naso-enteral tube, the different gauges, the devices used, the administration of drugs and patient handling. Its incidence in adult patients with chronic illness may vary from 3% to 41% [22]. The study of Parrish [23], indicates an incidence between 0.14% and 62% in hospitalized adult patients. Rodriguez et al.



Figure 1 CT (computed tomography) scan show hypodensity in the right temporo-occipital region.



Figure 2 Left hypodensities in the frontal parietal pre and post central rotation.

[23], observed that 11% of the 37 ICU patients had mechanical complications. Lipman et al. [24], reported that 60% of the cases of pneumothorax after the installation of the naso-enteral tube were assisted by an endotracheal tube or tracheostomy, and 36% of the patients had experienced change in the mental status [25]. In general, these events are related to an altered level of consciousness and cause mechanical and pulmonary problems in the patient.

The use of "blind" intubation is often successful in conscious patients. However, those patients who are sedated or unconscious are not able to cooperate with the procedure, by sitting, swallowing or indicating malposition during passage. Besides, patients with pre-existing endotracheal tubes have a distorted anatomy of the larynx, such as expansion of the glottic opening. Some studies suggest that the probability of a successful blind intubation on the first attempt of placement of a tube of small diameter in the gastrointestinal tract of a patient lying under general anesthesia with a pre-existing endotracheal tube is only 40% and 68% [7,26,27]. This is because the NGT is soft



Figure 3 Frontal (head of the caudate nucleus) regions that look like chronic lesions.

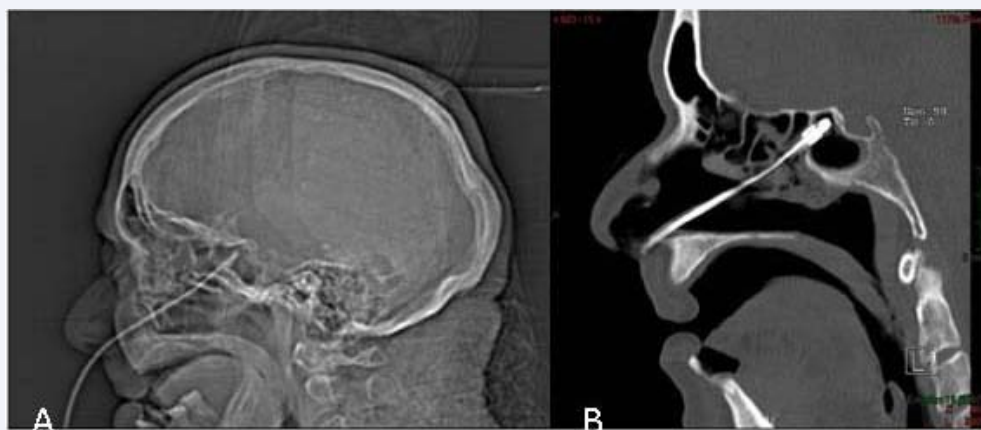


Figure 4 CT scan of the region showed impact of the probe tip into the sphenoid sinus.

and made of flexible materials. Repeated attempts can make the NGT softer because of the patient's body heat, and, hence, make insertion more difficult and increase the risk of coiling, kinking, or knotting. Furthermore, the occurrence of complications, such as nasal mucosal bleeding, laryngeal bleeding, hypertension, tachycardia, and arrhythmia, may increase [7,28].

Currently, naso-enteral intubation can be directly visualized. The endoscopy [29,30], nasoendoscopy [31,32] and fluoroscopy [33] pathways can be used in the placement of the naso-enteral tube in sedated or anesthetized patients where blind intubation is difficult or contraindicated. The tube can be also directed to the esophagus under direct laryngoscopy using a laryngoscope and Magill forceps in patients under general anesthesia [34].

The study conducted by Sorokin et al. [35], evaluated more than 2,000 placements of naso-enteral tubes. 50 tubes were malpositioned, which was radiographically confirmed, representing a global incidence from 1.3% to 2.4%. More than half of these patients had previous endotracheal intubation and only 2 patients showed normal mental status. Thirteen had complications directly attributable to malposition of the naso-enteral tube, including 2 deaths. Obviously, an altered mental status, a pre-existing endotracheal tube and severe illness

increase the risk of malposition of the naso-enteral tube and complications.

The accidental introduction of a small diameter probe at the base of the skull is more common with nasogastric tube (NG) [20-22], commonly used for gastric emptying in patients suffering from traumatic brain injury (TBI). Many of these patients are exposed to high impact accidents causing fractures in the skull base, which favors the inadvertent insertion of the NG inside the skull (Genu, 2004; Pandey, 2004; Rahimi-Movaghar, 2005; Ferreras, 2000) [11,13-15]. This explains the rarity of the case presented, since there is no prior history of trauma and yet the naso-enteral tube penetrated the sphenoid sinus.

The consequences of malpositioning of the naso-enteral tube within the cranial cavity are serious. Fletcher et al. [36], reports a mortality rate of 64%, describing hemiparesis, intracranial bleeding, decerebrate posturing respiratory arrest, aspiration of brain parenchyma, blindness, meningitis and cerebrospinal fistula as the most frequent complications [37].

To prevent the introduction of small diameter tubes, Sliwa et al. [38], recommend that nasal tubes are placed perpendicular to

the face. Lipov et al. [39], report the use fiberoptic bronchoscope for naso-enteral tube placement as a very useful tool in patients with major facial trauma and fractures in the skull base [40].

Kim et al. [7], concluded in their study about the insertion of nasogastric tubes using an airway tube exchanger in an anesthetized and intubated patients that the success rate of NGT insertion in anesthetized and intubated patients can be increased by using a catheter as a Stiletto With a catheter, the time required for NGT Insertion was lower, and complications such as folding and bleeding occurred less frequently. In general, considering the success rate, the time required for insertion and the rate of complications, we conclude that the use of a catheter during NGT insertion is a simple and effective technique that presents a higher success rate and a lower rate of complications than the conventional technique.

In view of these aspects, it is highly recommended to confirm the position of the tube, through posterior-anterior (PA) chest x-ray images, before enteral feeding or administration of drugs [41]. Auscultation and aspiration can also be used to confirm the position of the tube, but are often inaccurate [42,43]. Neumann et al. [44], demonstrated that insufflated air and auscultation over the epigastric region were specific in only 6.3% of the cases compared to PA chest x-ray images. In the same study, the contents aspirated from the common naso-enteral tube (pH<4) was highly specific for the intra gastric positioning, but can be obtained in only 15% of the patients. This can minimize the morbidity and potential mortality in the cases of mal positioning of these tubes [42-45].

An innovative and innovative way of inserting nasogastric tubes into anaesthetized patients with intubation was proposed by Sahu et al. [11], they describe a new and innovative Sahu's three-in-one technique with the use of Glide Scope and direct tracheal intubation external laryngeal maneuver.

It is a consensus that enteral nutrition therapy helps reducing morbidity and mortality in hospitalized patients unable to feed themselves [45]. However, the lack of knowledge and the inability to handle the tube may cause risks and complications. Special care should be taken with patients who had CVA, unconscious or unable to cooperate with enteral nutrition therapy. Therefore, the professionals responsible for naso-enteral tubes placement should be familiar with the appropriate techniques to prevent accidents and possible complications.

CONCLUSION

Naso-enteral intubation should only be initiated by professionals who recognize difficult introduction and the degrees of complications that may result from trauma or malposition of the naso-enteral tube. It is recommended not to insert, in daily routine, tubes through the noses of critically ill patients, with severe decline in the level of consciousness, victims of ischemic cerebral vascular accident, without confirmation of proper placement or visualization of its path during installation. If blind intubation is required, special precautions should be taken such as radiographic confirmation of tube position in order to reduce morbidity and mortality rates caused by malposition of the enteral tube.

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