

Petroleum Jelly–Based Foreign Body in the Nasopharynx: A Case Report

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Nasotracheal intubation can reveal unexpected findings like a foreign body in the airway. In such instances, expeditious decision-making is crucial to achieve ideal outcomes. This case report describes a petroleum jelly–based foreign body discovered in the nasopharynx during nasotracheal intubation and the subsequent airway management. A 64-year-old man with no prior history of adverse anesthetic events presented to an oral surgery office for extraction of teeth and placement of implants. While video laryngoscopy for nasotracheal intubation was performed, a blue foreign body was discovered inside the tip of the nasal endotracheal tube. Subsequent attempts to locate the source of the foreign body revealed in the nasopharynx a strip of blue gelatinous foreign body which was removed with suction. Due to the persistent presence of foreign body residues in the nasopharynx, orotracheal intubation was performed. Nasopharyngeal foreign bodies may elude even the most thorough preoperative medical history review and airway assessment. Therefore, it is reasonable for practitioners to ask explicitly about any foreign bodies in the nasal passages. Practitioners should become familiar with cognitive aids for relevant airway emergency management techniques and equipment for expeditious decision-making when unexpected foreign bodies are found.

Key Words: Foreign body; Petroleum jelly; Nasopharynx; Intubation; Airway management.

Nasal foreign bodies (NFBs) and associated complications are well documented in the medical literature. NFBs tend to be uncommon and occur in both adult and pediatric populations worldwide to varying degrees of prevalence.^{1–7} A wide variety of materials have been found as NFBs, including teeth, small foods (eg, a mouth refreshener candy, piece of chocolate, pea, rice, raisin, corn, cereal), small items (eg, a bead, button battery, plastic block toy, marble, hair clip, plastic calculator key, tree bark), and even a leech.^{1,3–12} More recently, there have been multiple documented cases of a retained nasal swab tip following a SARS-CoV-2 test.^{13,14} Signs and symptoms of an NFB usually consist of unilateral nasal discharge with offensive odor, epistaxis, rhinitis, and nasal obstruction, although most affected individuals are asymptomatic.^{2–5,7,12,15} Discovery of NFBs often involves incidental findings via radiographs, bronchoscopy, or otolaryngologic surgeries, and, in pediatric populations, a high index of clinical suspicion after

physical examination prompted by strange behaviors or caregivers' observation.^{1,2,5,6}

Asymptomatic NFBs can pose significant challenges in nasotracheal intubation due to the possibility of aspiration and subsequent complications. Semisolid or gelatinous NFBs may behave differently than hard-object NFBs, presenting airway problems similar to those associated with mucus plugs if aspirated or lodged in the nasotracheal tube. This case report describes the event in which a petroleum jelly–based NFB was discovered during nasotracheal intubation, discusses intranasal application of petroleum jelly products and subsequent potential complications, and suggests associated prevention and management strategies relevant to the practice of anesthesiology.

CASE PRESENTATION

A 64-year-old male patient (height, 178 cm; weight, 75 kg; body mass index, 23.7 kg/m²) presented to a private oral surgery office for extractions of mandibular teeth and implant placement for an immediate complete denture. The patient's medical history was significant for hypertension, diabetes mellitus type 2, gastroesophageal reflux disease, chronic lower back pain, and liver and colon cancer (both in remission).

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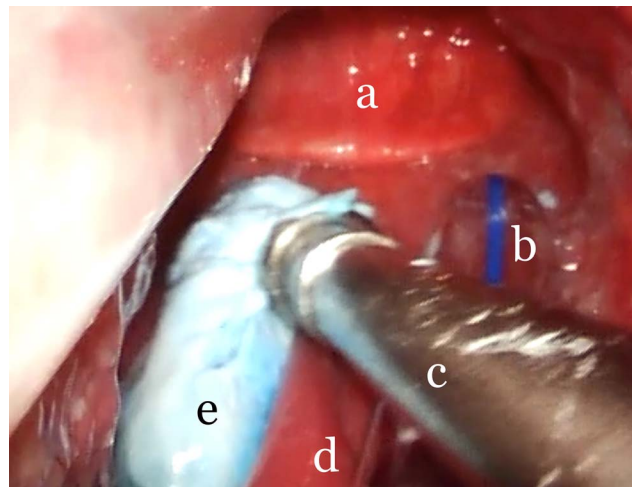
His medications included alprazolam, aspirin, atorvastatin, cyclobenzaprine, empagliflozin, folic acid, insulin glargine, lisinopril, metformin, pioglitazone, repaglinide, and zolpidem. The patient reported negative personal and family history of adverse reactions to anesthesia and indicated no known drug allergies. He also reported quitting cigarette smoking approximately 3 weeks prior to the surgery date. Physical examination revealed full range of motion of the neck and a Mallampati class II airway. Inspection of the oral cavity and oropharynx was unremarkable. Auscultation revealed regular rate and rhythm without any heart murmur and clear and equal lung sounds bilaterally. Preoperative vitals were normal with systolic and diastolic blood pressures of 110 mm Hg and 80 mm Hg, respectively, heart rate of 97 beats per minute, respiratory rate of 14 breaths per minute, and pulse oximetry of 98% on room air.

General anesthesia was planned based on patient preference and anesthetic need for a secure airway during the proposed surgery. Intravenous (IV) induction and total IV anesthetic maintenance with propofol and remifentanyl were planned. No appreciable contraindications were noted for video laryngoscopy using a C-MAC D-Blade (Karl Storz) and nasal endotracheal tube (ETT). Patient's adherence to preoperative fasting guidelines was confirmed.

In the operating room, standard American Society of Anesthesiologists (ASA) monitors including a 3-lead electrocardiogram, pulse oximeter, noninvasive blood pressure cuff, capnography, and skin temperature probe along with bispectral index monitor were placed. The patency of 20-gauge IV access in the right antecubital fossa was confirmed with normal saline, and propofol 180 mcg/kg/min and remifentanyl 0.1 mcg/kg/min infusions were initiated. After several minutes of preoxygenation (100% fraction of inspired oxygen) via mask, IV induction medications were administered, consisting of boluses of fentanyl 50 mcg, midazolam 2.5 mg, and propofol 150 mg. Then, preoxygenation was continued with end-tidal oxygen of at least 90% while we confirmed adequate bag-mask ventilation without difficulty. The patient's eyes were taped, and oxymetazoline nasal sprays were administered bilaterally. The nasal passages were dilated with lubricated 26- to 30-gauge nasopharyngeal airways. A prewarmed, lubricated, cuffed, preformed 7.5-mm nasal ETT (Parker Flex-Tip, Parker Medical) was inserted and advanced into the nasopharynx. Atraumatic video laryngoscopy was then performed and a Cormack-Lehane grade 1 view was observed along with the distal end of the ETT.

At this time, a blue foreign body resembling some type of paste material was visualized inside of the ETT approximately 1 cm from its distal tip. After 1 failed attempt to suction out the foreign body, the ETT was removed and examined, revealing a slimy, blue, gelatinous foreign body. Once a new nasal ETT was inserted and visualized in the oropharynx, additional blue gelatinous foreign bodies were visualized inside the tip of the replacement ETT and on the posterior wall of the

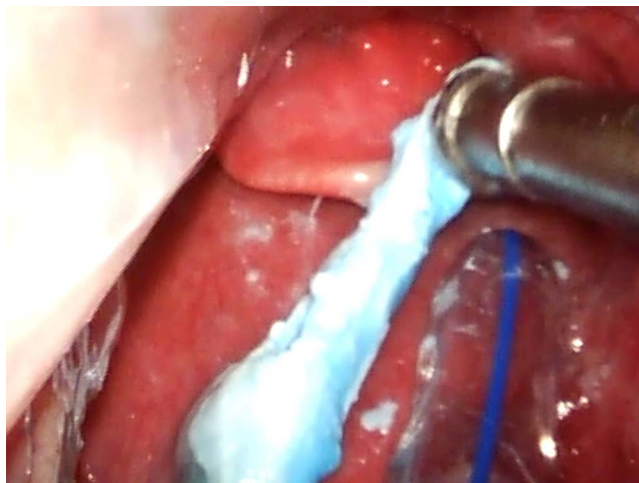
Figure 1. Foreign Body in the Oropharynx



A still image from video laryngoscopy demonstrating the discovery of a blue petroleum jelly–based foreign body. The following parts are marked in the image: (a) epiglottis; (b) distal tip of the nasal endotracheal tube; (c) Yankauer suction tip; (d) uvula; (e) foreign body.

oropharynx. While we attempted to remove the foreign bodies with a Yankauer suction tip, the soft palate was repositioned cephalad, and a larger foreign body of approximately 10 mL by visual estimation resembling a strip of toothpaste was visualized in the nasopharynx (Figure 1). The suction tip was used to gently remove the foreign body in its entirety from the nasopharynx, with difficulty due to its consistency resembling heavy, viscous phlegm and adherence to the nasopharyngeal mucous membrane (Figure 2). Nasotracheal intubation was attempted again from the contralateral naris, but additional foreign body residues were visualized inside the ETT tip and the nasopharynx (Figure 3).

Once it became apparent that the foreign bodies could not be removed completely from the nasopharynx to preclude any residues inside the ETT, orotracheal intubation was prepared with a cuffed 7.5-mm oral ETT (Hi-Contour, Mallinckrodt Pharmaceuticals). After a second IV bolus of propofol 150 mg, video laryngoscopy revealed laryngospasm with completely closed vocal cords. IV succinylcholine 50 mg was administered, and reopening of the vocal cords was visually confirmed. Ororotracheal intubation was performed successfully without complications. In between laryngoscopy attempts, the patient received adequate bag-mask ventilation and had stable vital signs. Pulse oximetry was maintained over 95% with blood pressure within 20% of preoperative readings. Once the patient was placed on volume-control ventilation, the oral ETT was secured with tape and the head wrapped in an appropriate manner. Anesthetic maintenance was uneventful, and the surgery was completed as planned. The patient resumed adequate spontaneous ventilation, and extubation and emergence occurred without incident.

Figure 2. Suctioning of the Foreign Body

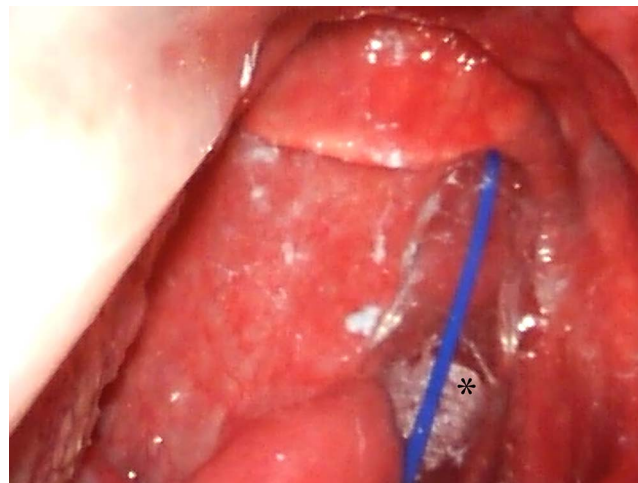
A still image from video laryngoscopy demonstrating the gelatinous nature of the blue foreign body, mimicking a heavy, viscous phlegm. Residual foreign body pieces are visualized on the posterior wall of the oropharynx behind the foreign body and nasal endotracheal tube.

Upon inquiry after adequate recovery, the patient revealed that he had been using a nasal lubricant called Boroleum (Reliable-1 Laboratories), an external analgesic and skin protectant with active ingredients camphor and menthol in white petroleum jelly. The patient indicated that the nasal lubricant was used for relieving seasonal dryness as well as prevention of COVID-19 per his belief. The patient explained that the blue color came from inhaling blue acrylic dust in the air after heavy grinding in his garage the night before surgery. The patient denied any perioperative symptoms or unusual airway sensations in the nasal cavity and nasopharynx.

DISCUSSION

Practice of good anesthetic techniques encourages vigilance from practitioners to expect the unanticipated. Nasotracheal intubation may sometimes reveal an unexpected nasopharyngeal foreign body. Dilation of the nasal cavity with nasopharyngeal airways and insertion of the nasotracheal tube most likely dislodged the unsuspected petroleum-based NFB into the nasopharynx in this case. To the best of our knowledge, this case report is the first on the discovery of petroleum jelly-based nasopharyngeal foreign body during nasotracheal intubation.

Petroleum jelly, also known as petrolatum or soft paraffin, is a common base for many nasal lubricants. Besides Boroleum, other well-known over-the-counter products, including Vaseline (Unilever) and Vicks VapoRub (Procter & Gamble), are applied intranasally to provide relief for

Figure 3. Residual Foreign Body in the Endotracheal Tube (ETT)

A still image from video laryngoscopy demonstrating presence of a blue foreign body residue inside the distal tip of nasal ETT. The residue (*) is visualized behind the blue line of the nasal ETT in the lower right quadrant of the image.

weather-related dried and cracked nasal mucosa, rhinitis, soreness, etc.

Although petroleum jelly does not irritate the mucosa or stimulate the gag reflex due to its inert properties,^{16,17} it can cause lipid pneumonia with specific radiographic and clinical manifestations.^{16–19} In acute lipid pneumonia caused by aspiration of large amounts of petroleum jelly, clinical presentations include coughing, dyspnea, fever, pneumatoceles, pneumomediastinum, and, in rare instances, pneumothorax and pleural effusion. Radiographic findings include bilateral segmental or lobar ground glass or consolidative appearance. Chronic lipid pneumonia often occurs in older populations who are frequent users of petroleum jelly-based nasal lubricants. It is often asymptomatic and discovered incidentally in radiographs with bilateral segmental or lobar ground glass or consolidative appearance. Treatment options for lipid pneumonia include discontinuing the offending material, corticosteroids, antibiotics, oxygen therapy, therapeutic bronchoalveolar lavage, and, in severe situations, surgical resection.^{16–18,20–23} In summary, although popular and well tolerated, petroleum jelly-based nasal lubricants have the potential to cause significant morbidity and should not be regarded as harmless. Unfortunately, patients tend to disclose their use of nasal lubricants only after the diagnosis of lipid pneumonia.¹⁶

This combination of incidental discovery and retrospective identification only upon directed history based on high clinical suspicion poses a particular set of challenges that extends to the practice of anesthesiology. Without patient disclosure, even the most thorough preoperative medical history and airway assessment may be futile in detecting the presence of nasal lubricants. A detailed intranasal

examination would not be prompted in an asymptomatic chronic user without pathology or abnormal function. For the patient described in this case, there was no reason to suspect any nasal or nasopharyngeal foreign body based on preoperative medical history review and airway assessment. Additionally, it is difficult to say whether the patient's disclosure would have prompted an intranasal examination. It may be more typical to assume that the amount of nasal lubricant used would be in small quantities in smear layers rather than in an amount approaching 10 mL as seen in this case.

The nasopharyngeal foreign body presented in this case could have caused significant morbidity and even mortality. Given that the consistency was similar to that of heavy, viscous phlegm, this foreign body could have been lodged inside the ETT without detection and behaved like a mucus plug after endotracheal intubation.²⁴ In such case, the subsequent ball-valve effect would have allowed inspiration without expiration. In both spontaneous and mechanical ventilation, sufficient inspiratory airway pressures would have been generated to let air past the blockage. However, the more passive act of expiration may not have exerted enough pressure to let air out of the lungs. This would have led to autospontaneous end expiratory pressure, increased peak inspiratory pressure, and pulmonary hyper-expansion, culminating in an acute right heart failure from increased intrathoracic pressure or pneumothorax from rupture of the pleura. Increasing airway pressure from the buildup of air could have also exceeded the sealing capacity of the ETT cuff, at which time a major leak would likely have been noted.

If the ball-valve obstruction were suspected, any attempts to remove the obstruction with suction by passing a suction catheter would have been futile given the foreign body's consistency. Alternatively, the suction catheter might have simply passed through the obstruction without resistance,²⁵ thereby delaying appropriate response and culminating in a devastating outcome. If the ETT were removed after timely identification of obstruction, orotracheal intubation would have been performed to secure the airway in the quickest manner possible.

In another scenario, the nasopharyngeal foreign body could have been displaced further distally during nasopharyngeal airway placement or initial insertion of the nasal ETT, leading to aspiration. Although unlikely due to its adherence to the mucous membranes, the foreign body could also have been displaced by mask ventilation with significant and vigorous squeezing of the bag. In such scenario, a main stem blockage could have occurred, resulting in decreased pulse oximetry from worsening ventilation-perfusion mismatch, increased peak inspiratory and plateau pressures, and asymmetric lung sounds on auscultation. Even if aspiration of this unknown nasopharyngeal foreign body were somehow suspected, it would have been difficult to remove it in an oral surgery office without the proper equipment for bronchoscopy and bronchoalveolar lavage.

Changing the anesthetic plan from nasotracheal to orotracheal intubation and proceeding with the case without waking up the patient was based, first and foremost, on stable vital signs indicative of adequate circulation, ventilation, and oxygenation throughout this unexpected encounter. The patient's stable condition afforded ample time to thoroughly assess the situation, which was also aided by adequate visualization via video laryngoscopy. A good view of the airway enabled visual confirmation that there were no residual foreign bodies on or around the immediate vicinity of the glottis. This confirmation then led to discussion of the situation with the surgeon, who was amenable to performing the surgery with an oral ETT. A laryngeal mask airway was not considered for securing the airway after the nasopharyngeal foreign body was discovered because it would have obscured the view of the entire laryngeal structure, precluding visual inspection for any residual foreign bodies around the glottis. Without a good view, it would have been difficult to justify the continuation of general anesthesia. The patient's stable condition combined with excellent visualization of the airway enabled the airway to be safely secured and subsequent completion of the surgery.

In retrospect, it was an extraordinary stroke of luck that the foreign body presented with an easily detectible blue color due to the patient's exposure to the blue acrylic dust from the night before. Otherwise, the opaque white color of Boroleum might very well have been overlooked in the mixture of normal nasopharyngeal secretions and saliva, resulting in acute deterioration of ventilation and oxygenation. Regardless of the scenario, familiarity with cognitive aids, such as the ASA Difficult Airway Algorithm,²⁶ the Stanford Emergency Manual,²⁷ and the DOPE mnemonic (displacement of the ETT, obstruction in the ETT, pneumothorax, equipment failure),²⁸ would be invaluable in determining the next critical steps expeditiously.

This case highlighted a unique type of nasopharyngeal foreign body that was unsuspected during preoperative medical history review and airway assessment due to asymptomatic presentation. It cannot be certain that the foreign body, which most likely was in the nasal cavity prior to intubation attempts, could have been visualized during a preoperative intranasal inspection. Therefore, it may be reasonable to ask questions regarding the use of nasal lubricants along with frequency, duration, and amount, tailored to seasonal and geographical variations. These preoperative screening questions would certainly be appropriate in the Northeastern winter season. Furthermore, as indicated by the patient in this case, there may be a colloquial use of nasal lubricants to prevent COVID-19. Although a precursory search did not yield any substantial evidence, such colloquial use may be entirely possible given the plethora of nonscientific COVID-19 prevention methods. Hence, preoperative screening questions regarding the use of nasal lubricants for any reason would be appropriate.

CONCLUSION

This case report described an unsuspected encounter with a petroleum jelly–based foreign body in the nasal ETT and nasopharynx during nasotracheal intubation and subsequent airway management. The common use of petroleum jelly–based nasal lubricant highlights the relevance of patient education regarding potential risks, including lipoid pneumonia and airway complications during anesthesia. Significant morbidity and mortality may occur due to the unique consistency of a petroleum jelly–based nasopharyngeal foreign body. Familiarity with pertinent cognitive aids for airway emergency management techniques and equipment is crucial in the event of an unsuspected airway foreign body. As part of the preoperative medical history review and airway assessment, practitioners should ask explicitly about any foreign body in the nasal passages, including nasal lubricants.

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