Case report

Nil per os except medications order in the dysphagic patient

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Summary

Objectives: To demonstrate why the ‘nil per os except medications’ order is contraindicated prior to dysphagia testing and to recommend ways to prevent aspiration of medications in the dysphagic population.

Methods: A 71-year-old male deemed at-risk for aspiration due to coughing when drinking thin liquids was made nil per os except medications and referred for dysphagia testing. Swallowing was analyzed objectively with trans-nasal fiberoptic endoscopic evaluation of swallowing.

Results: Aspiration on the initial 5 cc puree bolus swallow trial elicited a cough reflex. A 325 mg, 1 cm diameter, enteric coated aspirin pill emerged from the trachea, progressed through the glottis and remained transiently in the laryngeal vestibule before lodging, along with pudding residue, in a mucosal fold of the left vallecula. Neither volitional coughing nor single 5 cc water bolus swallows dislodged the pill. Otolaryngology was called and removed the pill trans-orally under direct visualization with a Kelly clamp. The pill maintained both its enteric coating and integrity for a total of 7.5 h after being aspirated.

Conclusions: The nil per os except medications order is contraindicated in the dysphagic population. When aspiration is suspected, nil per os including medications is recommended until dysphagia testing determines what form of medication can be swallowed safely.

Introduction

An order of ‘nil per os except medications’ is of primary importance to prevent potential emesis and aspiration of gastric contents prior to surgery and other invasive procedures that require general anesthesia or sedating medications. The goal of this instruction is to promote patient safety and, therefore, is medically appropriate and prudent. However, for patients who have been deemed to be at-risk for dysphagia but have not yet been evaluated to determine swallowing and aspiration status, the increasingly frequent use of a nil per os except medications order is potentially dangerous and, therefore, medically inappropriate and imprudent. To wit, the erroneous logic assumes that despite the fact that the patient is a potential aspiration risk the benefits of giving oral medication (usually in pill form) with puree consistency foods outweigh the risks of possible pill aspiration.

Dysphagia is a sentinel symptom encountered frequently in hospitalized patients and associated with numerous common pathologic conditions that require oral ingestion of medications, e.g. chronic obstructive pulmonary disease;1 stroke;2 cardiac surgery;3 trauma;4 and degenerative neurologic conditions including Alzheimer’s dementia,5 Parkinson’s disease,6 amyotrophic lateral sclerosis7
and multiple sclerosis. Importantly, the geriatric population have increased medication requirements and a longitudinal epidemiologic study reported that between 2000 and 2007 the aging of the general population resulted in dysphagia referrals doubling for 80–89 year old and tripling for >90 year old hospitalized geriatric patients. In addition, the consequences of co-morbid dysphagia in all hospitalized patients admitted with other diagnoses, derived from the 2004 to 2005 National Hospital Discharge Survey, found that dysphagia was a bad prognostic indicator. Specifically, hospitalized patients 75 years or older had double the risk of dysphagia, dysphagic patients who required rehabilitation had a 13-fold increase in mortality, and dysphagia was associated with a 40% increase in length-of-stay (2.4 vs. 4.0 days) resulting in an additional 223,027 hospitalization days per year at a staggering cost of $547,307,964. Therefore, avoidance of prandial pulmonary aspiration as a cause of nosocomial infection is an important goal for all acute care hospitalized patients at risk for dysphagia. In an effort to maximize patient care and minimize costs, it is vital to determine dysphagia and aspiration status prior to giving both oral medications and oral alimentation for all hospitalized patients at risk for dysphagia.

Two equally important goals of dysphagia testing are to determine aspiration status and to facilitate safe swallowing by recommending alternate pharmaceutical formulations or delivery methods in order to minimize aspiration risk during oral ingestion of medications. The purposes of this report are to demonstrate the inappropriate and dangerous use of the nil per os except medications order, particularly in pill form, prior to knowing the results of a swallow evaluation in a patient deemed at-risk for dysphagia and to make recommendations on how to administer oral medications as safely as possible in the dysphagic population.

Methods

Trans-nasal fiberoptic endoscopic evaluation swallowing (FEES) was used to coincidently document pre-evaluation pill aspiration in a patient deemed an aspiration risk and, therefore, ordered nil per os except medications. The study was approved by the Human Investigation Committee of Yale University School of Medicine.

The standard FEES protocol with slight modifications was used. Briefly, each naris was examined visually and the scope passed through the most patent naris without administration of a topical anesthetic or vasoconstrictor to the nasal mucosa, thereby eliminating any potential adverse anesthetic reaction and assuring the endoscopist of a safe physiologic examination. The base of tongue, pharynx and larynx were viewed and, in the present case, swallowing was evaluated directly with 1 puree consistency (yellow pudding) food bolus of ~5 cc in volume. This color was reported to have excellent contrast with pharyngeal and laryngeal mucosa. The patient was allowed to swallow spontaneously, i.e. without any command to swallow. Aspiration was defined as entry of material into the airway below the level of the true vocal folds and silent aspiration defined when there were no external behavioral signs such as coughing or choking. A safe and successful swallow was defined as no aspiration during FEES.

Equipment

FEES equipment consisted of a 3.6 mm diameter flexible fiberoptic rhinolaryngoscope (KayPentax, VNL-1170K, Lincoln Park, NJ), light source (KayPentax, EPK-1000, Lincoln Park, NJ), and digital swallowing workstation (KayPentax, Lincoln Park, NJ, DSW, model 7200).

Results

Illustrative case

A 71-year-old male (KL) with past medical history of traumatic brain injury (hit by a bus in 1995) and long-term alcohol abuse (1 pint hard liquor/day × >20 years) fell at home (17 November 2011) and was found on the floor the next day. KL was admitted to a community hospital (18 November 2011) and diagnosed with a myocardial infarction and concomitant rhabdomyolysis. KL was transferred to Yale-New Haven Hospital and a single stent was placed during cardiac catheterization (19 November 2011). KL was prescribed Lorazepam (1 mg IV push every 4 h) for alcohol withdrawal/prophylaxis and placed on a daily aspirin (325 mg) regimen.

An overt sign of dysphagia, i.e. coughing while drinking thin liquids at breakfast, was noted by his nurse and no further eating was permitted. A consult for a swallow evaluation as well as a nil per os except medications order were placed after rounds by the cardiac care team (1105 h on 21 November 2011). Medication, i.e. a 325 mg, 1 cm diameter, enteric coated aspirin pill was given with water (1000 h on 21 November 2011).

A FEES was performed (1430 h on 21 November 2011). KL was alert and oriented to person, place,
and time and with a normal oral mechanism evaluation as characterized by adequate labial closure, adequate lingual range-of-motion both laterally and anteriorly, and symmetrical smile/pucker but inadequate dentition to bite and masticate efficiently. FEES was performed at bedside with the patient sitting upright at 90°. The true vocal folds were mobile bilaterally. There were pooled secretions in the vallecula and pyriform sinuses indicative of a weak pharyngeal swallow and aspiration risk.

One 5 cc bolus of puree (pudding) consistency was given via spoon. KL exhibited a weak pharyngeal swallow with moderate-to-severe residue in the vallecula and pyriform sinuses with laryngeal penetration and tracheal aspiration after the swallow attempt. A cough reflex was elicited, at which time a 325 mg, 1 cm diameter, enteric coated aspirin pill emerged from the trachea, progressed through the glottis, and remained transiently in the laryngeal vestibule before being coughed out and lodging in a mucosal fold along with pudding residue in the left vallecula (Figure 1A–C). Volitional coughing and drinking single 5 cc volume water boluses were unsuccessful in dislodging the pill. Otolaryngology was called and the pill was removed trans-orally under direct visualization with a Kelly clamp (1730 h on 21 November 2011) (Figure 1D). The enteric coated aspirin pill maintained both its enteric coating and integrity for a total of 7.5 h, i.e. 4.5 h in the trachea and 3 h in the pharynx.

**Discussion**

This is the first report of a coincidental finding of previous tracheal aspiration of a pill prior to dysphagia testing. The proof was, literally, in the pudding (Figure 1C). It has been demonstrated, therefore, that the nil per os except medications order in a patient deemed at risk for dysphagia and aspiration is inappropriate, dangerous, and potentially life-threatening. Although both the finding and video documentation of pill aspiration were serendipitous during a FEES, it must be stressed that the likelihood of similar events occurring in other at-risk patients and unbeknownst to clinicians is very likely. Therefore, a nil per os order in a dysphagic patient should be nil per os including medications until results of dysphagia testing are known.

Enteric coatings consist of polymers that resist breakdown in acidic environments. This prevents release of medication, from a pill or capsule, in the highly acidic stomach (pH 1.0–3.0) but allows dissolution in the more alkaline milieu of the small intestine (pH > 7.0); a process aided by both peristaltic action and increased surface area. An enteric coating prevents aspirin’s known local irritant effects

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**Figure 1.** FEES performed after a nil per os except medications order. Shows vallecula, epiglottis, laryngeal vestibule and trachea (A) before pill emerged from the trachea, (B) during pill emergence through the glottis and (C) pill and pudding lodged in a mucosal fold in the left vallecula. (D) Enteric coated, 325 mg, 1 cm aspirin pill gripped by a Kelly clamp.)
to the gastric mucosa. Although tracheal respiratory mucus appears to have adequate alkalinity (median pH 7.3, range 6.5–7.9), the lack of peristalsis, shorter length, and smaller surface area of the trachea did not allow for breakdown of the enteric coating. Pressure from the Kelly clamp, even after 4.5 h in the trachea and an additional 3 h in the pharynx, did not violate the coating or cause the pill to break apart (Figure 1D). Unfortunately, but for obvious reasons there are no data on disintegration rates of enteric coated pills in the trachea and pharynx.

A 1 cm diameter pill can enter and/or lodge in the lower respiratory tract. The transverse diameter of the adult trachea was reported to be 2.2 cm in males and 1.7 cm in females, while the diameter of the right main bronchus was 1.5 cm in males and 1.38 cm in females, and the diameter of the left main bronchus was 1.3 cm in males and 1.18 cm in females. It was fortuitous that in the present case the enteric coating remained intact, thereby preventing the aspirin pill from either dissolving and causing damage to the mucosal lining of the trachea or breaking into smaller particles and potentially migrating deeper into the bronchial tree. Dire consequences of pill aspiration in the lower respiratory tract include morbidity due to respiratory compromise from lobe or lung collapse and mortality due to respiratory failure from obstruction.

Patients with dysphagia often have difficulty taking medications and formulation was found to be an important variable. Alternate methods of medication formulation affecting swallowing success of pills include varying size, shape, and texture. Changing formulation, either to liquid or chewable forms, often results in ease of swallowing medications but taste may be a negative factor. Use of suppositories, when appropriate, is recommended when swallowing oral medications proves unsuccessful. Other methods to improve ingestion of oral medications include the use of viscosities other than water, e.g. nectar-like, honey-like and pudding consistency foods, varying flavors to mask medicinal taste, e.g. different fruit juices, and using liquids of different temperatures, e.g. warm milk or iced coffee/tea.

Conclusions

The serendipitous finding during FEES of pre-evaluation pill aspiration demonstrated the inappropriate, imprudent, and potentially life-threatening use of the nil per os except medications order in a patient who is at-risk for aspiration. When aspiration is suspected, the appropriate and recommended order is nil per os including medications until a dysphagia evaluation has determined the safest manner of both pharmaceutical formulation and delivery route.

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References

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