Anesthesia for a Patient With Excessive Supragastric Belching

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Excessive supragastric belching is rarely described in the anesthesia literature. Anesthesia planning of a 26-year-old patient with excessive supragastric belching, history of superior mesenteric artery syndrome (SMAS), and dental anxiety requires preoperative assessment. This case report outlines the anesthetic considerations and the management to facilitate comprehensive dentistry. Key anesthetic considerations include anxiolysis, aspiration risk reduction, total intravenous anesthesia (TIVA), and postoperative nausea and vomiting (PONV) prophylaxis.

Key Words: Anesthetic management; Belching; Superior mesenteric artery syndrome; Dentistry.

A patient presents with excessive supragastric belching that impedes dental procedures. Supragastric belching is a phenomenon when air is sucked in the esophagus and then rapidly expelled via the oral cavity. Furthermore, this patient historically had the rare entity of superior mesenteric artery syndrome (SMAS, also known as Wilkie's syndrome or cast syndrome), which is an acquired disorder where the acute angle of the superior mesenteric artery (SMA) causes compression of the third portion of the duodenum between the aorta and the SMA. The incidence of SMAS is 0.13 to 0.3%.¹ This case report outlines the anesthetic considerations and management of a patient with excessive supragastric belching and history of SMAS.

CASE REPORT

A 26-year-old female patient (weight 66 kg, height 155 cm), who presented with excessive supragastric belching, previously diagnosed with SMAS, was electively scheduled for general dentistry procedures including scaling, restorations, and extractions under intravenous deep sedation/nonintubated general anesthesia at a hospital outpatient ambulatory dental clinic.

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At preoperative evaluation, she demonstrated frequent spontaneous eructation with dry heaving at rest, without triggers. She had previously underwent an uneventful intubated general anesthetic for duodenojejunostomy at age 22 to surgically treat SMAS but now experienced these involuntary behaviors, which are not expected postsurgical sequelae. She exhibited dental anxiety and increasing difficulty with dental procedures given her eructation reflexes. She reported never concurrently actively vomiting or regurgitating, but explained that she had a low caloric intake and usually had small meals that were higher in liquid content so her stomach was rarely full but she experienced satiety.

Her comorbidities included pernicious anemia (hemoglobin 12.5 g/L, hematocrit 37%), mild childhood asthma, gastroesophageal reflux disorder (GERD), anxiety disorder, depression, which were well-managed with vitamin B₁₂ injections, ranitidine, alprazolam, and bupropion. She was not prescribed asthma medications as an adult. She was taking acetaminophen-codeine-caffeine for dental pain. She had no known drug allergies.

In preparation for her dental procedure under intravenous deep sedation-general anesthesia, the patient adhered to an extended fasting time of 12 hours with exception of 30 mL of water for taking premedication regimen of: (a) temazepam 30 mg by mouth 1 hour before dental appointment, (b) dimenhydrinate 50 mg by mouth 30 minutes before dental appointment. She was adherent to taking her ranitidine regularly as prescribed by her family physician leading up to the early morning appointment. Standard monitors were placed (3-lead electrocardiogram, noninvasive blood

pressure cuff, pulse oximeter, capnometer by nasal cannula). Baseline blood pressure (BP 113/75 mm Hg), heart rate (HR 90 bpm), normal sinus rhythm on lead II, respiratory rate (RR 26 bpm), and oxygen saturation (SpO₂ 99%) were recorded with delivery of 100% fraction of inspired oxygen (FiO₂ 100%) by nasal hood before induction of anesthesia. A registered nurse was present at all times to assist the dental anesthesiologist in monitoring. A 22-gauge cannula was inserted into a vein on the dorsum of the right hand, and Lactated Ringers solution (500 mL) was initiated.

Premedication was effective for anxiolysis, and the frequency of eructations was visibly reduced. Induction agents: glycopyrrolate 0.1 mg, midazolam 3 mg, and delivery of propofol 0.5 mg/kg with remifentanyl 0.125 mcg/kg was given. Propofol-remifentanyl mixture, prepared as 2.5-mcg remifentanyl:10 mg propofol, was delivered by infusion pump set at a propofol rate of 130 mcg/kg/min (thus remifentanyl infusion was delivered at 0.0325 mcg/kg/min) and titrated to achieve a deep sedation state. Dexamethasone 6 mg was given at induction for antiemetic and anti-inflammatory effects postextraction. There were no episodes of eructation, gagging, or coughing, and the patient maintained a patent airway, spontaneous ventilation, and saturation with supportive neck and shoulder rolls to achieve head-tilt/chin-lift positioning. The dental chair was positioned with a slight reverse Trendelenburg to minimize the risk of gastric secretions passively moving cephalad. Dental procedures were achieved after placement of a Molt mouthprop and two 4 × 4 in² gauze folded lengthwise with a long floss ligature tied at its midsection. This gauze throat shield was tucked in a U-shape configuration from the left sublingual fossa to right sublingual fossa, shielding the anterior pharynx with its midsection contacting hard palate, the glossopalatine arches, thus positioning the dorsal base of the tongue forward to allow unobstructed breathing. With this protective barrier in place, fluids were actively removed by high-volume suction and saliva ejector simultaneously. On 2 occasions, the throat shield was replaced to maintain moisture control. A total of 5 mL of lidocaine 2% with 1:100,000 epinephrine was administered for maxillary infiltration anesthesia, greater palatine block, and inferior alveolar nerve blocks in anticipation for 2 maxillary and 1 mandibular dental extractions. At t = 45 minutes, the patient demonstrated tachycardia of 120 bpm, and inadequate anesthetic depth was diagnosed. Additional boluses of midazolam 2 mg, midazolam 2.5 mg, fentanyl 25 mcg, along with an increase in propofol infusion rate to 150 mcg/kg/min (thus, remifentanyl infusing at 0.0375 mcg/kg/min) was delivered. The patient remained stable thereafter. The duration of procedure and anesthesia was 110 minutes. The patient

recovered uneventfully and comfortably upon discontinuation of propofol-remifentanyl infusion with vital signs returning to baseline: BP 109/68 mm Hg, HR 100 bpm, RR 20 bpm, SpO₂ 97% on room air. No episodes of gagging or eructation occurred in recovery, and the patient was subsequently discharged home 30 minutes after anesthesia end-time. Follow-up phone call determined the patient recovered uneventfully at home.

Two subsequent restorative appointments, both of which were performed under intravenous deep sedation/nonintubated general anesthesia, were uneventful. The second and third procedures varied slightly from the first procedure where the patient did not take temazepam, but only dimenhydrinate. An initial dose of midazolam 5 mg was given once intravenous was established. Fentanyl was not required intraoperatively in these procedures. Ketamine 25 mg was added to the anesthetic regimen of the third procedure, which eliminated the need for increasing the infusion rate, as well as eliminating the need for midprocedure supplemental boluses of midazolam and fentanyl. This modification created a smooth intraoperative and recovery anesthetic profile.

DISCUSSION

Preoperative evaluation of rare medical conditions such as SMAS and supragastric belching behavior requires review of the medical conditions, thorough patient interview, and physical examination. Further literature search on these rare entities in addition to reviewing existing documented practices helped to form the clinician's judgment that this patient's aspiration risk was relatively low.

There was limited literature pertaining to anesthetic considerations and management of SMAS. There were 2 case reports found in the literature that briefly discussed anesthesia considerations. Jung and Koo³ described a case of a 14-year-old male patient admitted for an emergency appendectomy who suffered pulmonary aspiration and Acute Respiratory Distress Syndrome (ARDS) after induction of general anesthesia. Diagnostics later determined he had SMAS.³ In this case, however, the patient likely had a full stomach. The case report by Hussan⁴ suggested preoperative preparation to include assessment of acid base disturbances, fluid, and electrolyte status, as well as aspiration prophylaxis, but details of management were excluded in the report.⁴

After curative duodenojejunostomy for SMAS 4 years ago, the patient was considered stable given that she had no residual acute symptoms of partial or complete bowel obstruction, such as pain, nausea, vomiting, regurgitation, or acid reflux. She had no further follow-up with

her gastroenterologist or surgeon who had discharged her to the care of her family physician. Her family physician had previously prescribed a proton pump inhibitor, pantoprazole, before switching to ranitidine, a H₂-antagonist. The patient reported no symptoms of acid reflux, which signified adequate control of GERD. Perioperative management included maintaining her medication regimen. Supplemental premedication of dimenhydrinate (H₁-antagonist) was prescribed to increase sedation, and the mild anticholinergic effect may have aided in postoperative nausea and vomiting (PONV) prophylaxis.

Clearly, the supragastric belching behavior would be considered by many to be a risk factor for pulmonary aspiration. Interestingly, supragastric belching originates in the esophagus and not from the stomach. In contrast, a gastric belch occurs when there is physiological escape of intragastric air upon relaxation of the lower esophageal sphincter and subsequent reflex relaxation of the upper esophageal sphincter, a process that could release gastric contents and pose risk to pulmonary aspiration. Kessing and Bredenoord⁵ state that in a subgroup of patients with GERD, supragastric belches can induce reflux episodes; however, more research is required to determine likelihood. The patient stated that she “never had sour tastes in her mouth” and that she “never vomited after belching.” Repeated observation of her behavior and repeated listening to her sounds by 4 clinicians including a nurse, a dentist, and 2 dental anesthesiologists seemed to provide confidence that the observed belches originated in the esophagus and not the stomach. Her physician made no distinction regarding the origins of her behavior, but stated she was optimized for dental procedure under sedation. Definitive diagnosis would require referral to a gastroenterologist who would perform intraluminal esophageal impedance monitoring as described by Kessing and Bredenoord.⁵

The mechanism of supragastric belching is behavioral.⁵ The diaphragm creates negative pressure in the thoracic cavity and esophagus resulting in rapid inflow of air, which is immediately expelled via the pharynx. Another mechanism is the simultaneous contraction of muscles of the base of the tongue and pharynx, then subsequently expelling the air. Patients who demonstrate excessive supragastric belching may belch up to 20 times per minute and the process is involuntary.⁵ This was observed during the patient’s preoperative consultation. There is high prevalence of anxiety disorders in patients who exhibit this behavior. This behavior increases during times of stress or anxiety. Supragastric belching has been described in patients with obsessive compulsive disorder, bulimia nervosa, and anxiety

disorders. Supragastric belches do not occur during speaking or sleeping. The patient’s family corroborated that the belching did not occur while she slept at home. It has been shown that a distracted patient will have decreased frequency of supragastric belching. The premedication combination of dimenhydrinate and temazepam (antihistamine and benzodiazepine for sedation and anxiolysis) demonstrably alleviated the patient’s preoperative anxiety and also effectively reduced the frequency of supragastric belching behavior.

Perioperative planning further reduced aspiration risk by prolonging fasting time and maintaining the patient on her usual diet of light soft food and thin liquid prior to 12 hours before the elective procedure. She was permitted clear liquids up to 2 hours before surgery, which does not adversely affect gastric volume or pH and any regurgitated clear liquids are likely to represent little risk of aspiration morbidity.⁶ Furthermore, aspiration requires something in the proximal gastrointestinal tract.⁶

Given that this patient had surgically cured SMAS, behavioral supragastric belching reduced by anxiolytics, controlled GERD, and prolonged fasting time, it was decided that she could undergo the nonintubated total intravenous anesthesia (TIVA) deep sedation routinely practiced at this hospital outpatient ambulatory dental clinic. Endotracheal intubation would be another airway management strategy. However, this modality was not supported at this site of practice, and the patient would need to be referred to another hospital clinic where wait-times were stated to be greater than a year leading to further deterioration of the patient’s dentition. Although general anesthesia with endotracheal intubation is widely suggested in patients with aspiration risk, aspiration can still occur at induction, although a rapid sequence oral intubation could have been considered.⁶ After adequate depth of anesthesia was established, a nasotracheal tube could have been exchanged, and the patient extubated fully awake. The risks versus benefits were weighed for this patient. The clinical judgment was made that her dental treatment could be achieved safely with a nonintubated airway TIVA technique. Overall, aspiration is an extremely rare event.^{6,7} Overall incidence is reported to be 1:3420 from the general anesthesia literature.⁶ In this case, there were good patient outcomes with the selected technique.

To further assist this patient in her comprehensive care, suggestion was made to her primary physician to consider referral to a gastroenterologist to distinguish excessive supragastric belching versus GERD. Referral to psychiatrist is also recommended to address the psychiatric etiologies and to help her cope with social isolation due to this behavioral disorder.

CONCLUSION

Rare medical conditions pose challenges for planning safe anesthesia. Review of the pertinent literature and case reports aids in the formulation of an appropriate anesthetic plan. Depending on resources available at the anesthetizing location, a decision for referral to a center that is differently equipped with personnel and resources may be appropriate. In this case, we successfully managed this patient at a hospital ambulatory clinic that was not credentialed for endotracheal general anesthesia. The importance of planning all phases of the anesthetic including the preoperative, intraoperative, and postoperative periods is key to patient safety as well as treatment success. Premedication with temazepam and dimenhydrinate reduced the patient's dental anxiety—the etiology of the patient's eructation behavior. Her dental treatment was successfully facilitated by a TIVA technique with propofol and remifentanyl utilizing a nonintubated technique.

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