

■ CASE REPORTS

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Gastric Distention and Rupture from Oxygen Insufflation during Fiberoptic Intubation

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SINCE its introduction in 1986,^{1,2} the use of oxygen insufflation during fiberoptic intubation is recommended by nearly all authorities on airway management.^{3,4,‡,§,||} The beneficial effects of oxygen administration through the fiberscope include (1) supporting the patient's oxygenation, (2) clearing secretions from the tip of the instrument, and (3) defogging the viewing channel's optics. We report a case in which gastric distention and rupture complicated this technique.

Case Report

A 75-yr-old, 60-kg woman underwent an uneventful right carotid endarterectomy. During the following 48 h, a slowly increasing neck mass developed. She was scheduled for exploration and evacuation of her neck wound. Preoperatively, she was alert, but had difficulty speaking, was dyspneic, and had audible stridor. Airway evaluation revealed a Mallampati class IV airway, some limitation to neck extension, and a large anterior neck hematoma. The larynx could not be identified by palpation or inspection.

In the operating room, standard monitors were applied, and the patient was given 0.2 mg glycopyrrolate and 0.5 mg midazolam intravenously. Her upper airway was then sprayed with 4% lidocaine. She vomited small volumes twice during the lidocaine administration. These episodes of vomiting were brief and not unusually forceful. The upper airway was then examined with a Macintosh laryngoscope,

and a large, bulging retropharyngeal hematoma was noted. No recognizable structures other than her palate and uvula were visualized.

We prepared to perform fiberoptic intubation. The channel inlet of a Pentax FI-10P bronchoscope (Pentax Instrument, Orangeburg, NY) was attached to an oxygen flowmeter that delivered 3 l per minute to provide oxygen insufflation during the intubation. The fiberoptic examination demonstrated grossly distorted and ecchymotic upper airway anatomy. The fiberscope briefly entered the proximal esophagus on several occasions during the procedure. We estimate that the cumulative total time during which the fiberscope was in the esophagus was approximately 60 s. The fiberoptic procedure was initially well tolerated by the patient, but after 20 min, ineffective ventilatory efforts developed, and her oxygen saturation abruptly decreased to less than 50%. With considerable effort, direct laryngoscopy and intubation was then performed by following the "trail of bubbles" leading to the glottic opening. A 6.5-mm cuffed endotracheal tube was inserted, and its position was verified by capnography.

After oxygenation and ventilation had stabilized, it was noted that her abdomen was severely distended and tympanic. An orogastric tube was inserted. Scant gastric contents were obtained, and the distention persisted. The stomach tube was repositioned, with similar results. The surgeon then evacuated the neck hematoma uneventfully and the trachea remained intubated postoperatively.

Chest and abdominal x-rays immediately after surgery showed massive pneumoperitoneum, with elevation of both hemidiaphragms. She was returned to the operating room, and a laparotomy was performed. This revealed a 3-cm tear of the lesser curvature of the stomach, which was oversewn. She was taken to the intensive care unit, and her lungs were mechanically ventilated for 3 days, at which time the trachea was uneventfully extubated. Her course was further complicated by bleeding at the perforation site, subsequently requiring partial resection of the lesser curvature. She was discharged in good condition on the 13th postoperative day.

Discussion

We believe that the oxygen insufflated into the pharynx and esophagus acutely distended the stomach, causing gastric rupture, massive pneumoperitoneum, and respiratory decompensation in this elderly woman with preexisting partial upper airway obstruction.

Iatrogenic gastric distention and rupture has been reported in several clinical settings, including mouth-to-mouth resuscitation⁵ and accidental esophageal intubation.⁶ There are also numerous case reports that associate this complication with the therapeutic administra-

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‡ Patil VU: Oral and nasal fiberoptic intubation with a single lumen tube. *Anesthesiology Clinics of North America* 1991; 9:84.

§ Kraft M: Ancillary fiberoptic equipment. *Anesthesiology Clinics of North America* 1991; 9:46.

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tion of oxygen through nasopharyngeal catheters.⁷⁻¹² The insufflation of oxygen *via* the fiberscope is similar to the administration of oxygen with nasopharyngeal catheters, and, therefore, associated with the same hazards. In our case, administration of oxygen in the pharynx and the proximal esophagus both contributed to distention of the stomach. Although the introduction of the fiberscope into the esophagus was not intentional, it is not a completely unforeseeable event in cases of gross airway distortion.

In this case, and in the previously reported cases of iatrogenic gastric rupture,⁵⁻¹² the gastric defect is typically identified in the lesser curvature of the stomach (the area of least elastance) at laparotomy or autopsy. Like us, several authors also noted that attempts at gastric decompression with a nasogastric tube failed to relieve the abdominal distention.^{6,8,13} This finding may help distinguish simple gastric distention from rupture, in which free intraperitoneal air is unaffected by gastric suction.

In less acute circumstances, overdistention of the stomach is prevented by the escape of gas through the gastroesophageal junction (vomiting or eructation) or through the pylorus into the duodenum. Albo *et al.*¹⁴ postulate that very rapid gastric distention results in compression of the right diaphragmatic crus by the cardia, causing the gastroesophageal junction to behave as a one-way valve. At the same time, pyloric outflow is prevented by a change in angulation or spasm.

Although our patient vomited during preparation for tracheal intubation, we think it unlikely that this caused the gastric rupture. The vomiting was brief in duration and unremarkable in strength. In addition, gastric injury associated with violent retching, such as a Mallory-Weiss tear, is typically located high on the lesser curve at the gastroesophageal junction.¹⁵

Our method of insufflating oxygen may have contributed to the gastric overdistention and rupture. The Pentax FI-10P fiberscope has a single working channel with two access ports—the channel inlet and the suction port inlet. Attaching the oxygen source to the channel inlet, as we did, provides *continuous* oxygen delivery in the absence of any action by the operator, such as activation of the suction control valve. An alternative arrangement (and the only possible arrangement using instruments equipped with a single access port), introduces the oxygen through the suction port. This requires the active process of depressing the suction control valve to deliver oxygen. This arrangement may be

less likely to produce unwanted gastric insufflation, but the risk of this complication under any circumstances demands the operator's attention.

Complications from the administration of oxygen through the working channel of the fiberscope appear to be rare. Richardson and Dooley¹⁶ reported subcutaneous emphysema resulting from oxygen insufflation during fiberoptic laryngoscopy. We add gastric rupture to the potential hazards of this technique and specifically call attention to the features of a commonly used fiberoptic instrument that may have bearing on the risk of this complication.

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