Case Report

Gastric rupture after awake fibreoptic intubation in a patient with laryngeal carcinoma


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An 86-yr-old man with recurrent laryngeal carcinoma developed gastric rupture after awake fibreoptic intubation before induction of general anaesthesia. Early clinical signs included a distended, tense and tympanic abdomen with pain and massive pneumoperitoneum (chest radiograph). Laparotomy revealed a 4-cm longitudinal perforation along the lesser curvature of the stomach. This case represents a rare but severe complication that may occur during fibreoptic intubation in the awake patient.

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Awake fibreoptic intubation is recommended in the difficult airway algorithm of the American Society of Anesthesiologists, and its complications are well known. Gastric rupture is a rare complication of fibreoptic intubation. To our knowledge, iatrogenic gastric rupture from oxygen insufflation during placement of a fibrescope into the proximal oesophagus during intubation has been reported only once. Here we describe a patient with recurrent laryngeal carcinoma who developed gastric rupture after awake fibreoptic intubation.

Case report

An 86-yr-old man (height 161 cm, weight 55 kg) was well until emphysema and laryngeal carcinoma developed. Five years after a curative radiotherapy, he presented with difficulties in swallowing and progressive dyspnoea. Flexible naso-pharyngo-larynoscopy showed a bulging laryngeal mass growth over the left vocal cord with partial upper airway obstruction and left vocal cord fixation. The subglottic area was invisible. The patient was scheduled for excision of this mass under laryngoscopy, with awake fibreoptic intubation planned because of his potentially difficult airway.

In the operating room, electrocardiography, pulse oximetry, non-invasive arterial blood pressure monitoring, and several minutes of preoxygenation were begun before intravenous glycopyrrolate 0.2 mg, midazolam 2 mg and fentanyl 50 μg were administered. After cotton-tipped application of 4% cocaine on the nasal mucosa and spraying with 10% lidocaine in the upper airway, the distal end of a fibrescope (FI-10RBS, diameter 3.5 mm; Pentax, Tokyo, Japan) was advanced into the pharynx through the right nostril. Oxygen (5 litre min⁻¹) was delivered via an auxiliary supply from the anaesthesia machine (Narkomed GS; North American Dräger, Telford, PA, USA) and insufflated intermittently through the fibrescope suction channel. After two attempts, the narrowed glottic opening was visualized and the tip of the fibrescope was advanced into the trachea. Subsequently, the lubricated 7-mm cuffed tracheal tube (Hi-Contour; Mallinckrodt Medical, Athlone, Ireland) was threaded into the trachea via the shaft of the fibrescope after identification of the carina. Because of difficulties in withdrawing the fibrescope, the fibrescope with the tracheal tube was withdrawn. At the same time, the patient became agitated and bucked suddenly. Five minutes later, another attempt was made, and thiaramyl 180 mg, fentanyl 100 μg and atracurium 25 mg were administered for induction of general anaesthesia. Although three attempts at intubation took about 20 min, we estimated that the total cumulative time during which the fibrescope was in the pharynx with oxygen delivered was approximately 3 min. A distended, tense and tympanic abdomen was noted. Immediate insertion of
a nasogastric tube did not produce any improvement. The surgery was uneventful and finished within 2 h. The patient’s trachea was not extubated because of abdominal distension. He was sent to a postanaesthesia care unit for observation. In the unit, the patient became irritable and severe abdominal pain was noted. A semi-erect chest X-ray (Fig. 1) revealed a massive pneumoperitoneum. Emergency laparotomy was performed for suspected perforated hollow viscus. When the abdominal cavity was opened, large volumes of gas escaped and the stomach and small intestine collapsed. A 4-cm full-thickness longitudinal tear along the lesser curvature of the stomach close to the cardia was identified and repaired in two layers. Ten days later, wound disruption and a suspicious leakage were found. Emergency laparotomy revealed leakage of the previous primary closure with many localized abscesses, and total gastrectomy and Roux-en-Y oesophagojejunostomy were done. In the surgical intensive care unit, prolonged, assisted ventilation was required because of deteriorating pulmonary function. The patient died from multiple organ failure after 58 days of hospitalization.

**Discussion**

Gastric rupture after awake fibreoptic intubation is a rare but serious complication. In our patient, we believe the major contributing factors were inadvertent oxygen distension and bucked abdomen compression. Possible aetiologies for iatrogenic gastric rupture may be classified into two major categories: inadvertent oxygen administration and external compression. Inadvertent oxygen administration includes mouth-to-mouth resuscitation, bag-mask resuscitation, nasal catheter insertion and inadvertent oesophageal intubation.

An inflation pressure of 15–25 cm H$_2$O is needed to open the lower oesophageal sphincter and to force oxygen into the stomach. A flow of oxygen at 5 litre min$^{-1}$ in combination with glycopyrrolate and fentanyl, which both decrease the oesophageal sphincter tone, may have been sufficient to blow oxygen into the stomach. Although the cardia and pylorus are sites of potential decompression because of fixation by the hepatogastric ligament, different degrees of gastric distension (along the lesser and major curvatures) may change the anatomy and configuration of the stomach to prevent outlet of oxygen.

External cardiac massage and the Heimlich manoeuvre are possible sources of external compression. Intragastric pressure of roughly 50–100 cm H$_2$O is required for gastric rupture in a post-mortem cadaver. Thus, forcing oxygen into the stomach and compressing the abdominal wall both play important roles. In our patient, oxygen insufflation from the suction channel of the fibrescope coupled with an agitated and bucking patient could have caused increased intra-abdominal pressure and a critical intragastric pressure, leading to gastric rupture. As in the previously reported case, nasogastric suctioning was not helpful because the stomach on rupture decompressed itself into the peritoneal cavity.

Because the upper part of the lesser curvature contains fewer mucosal folds and becomes less elastic, it is the most common gastric rupture site. McDonnell and colleagues presented the catenoidal configuration model and Barker and Karagianes employed Laplace’s law to explain why wall tension in the stomach during gas inflation is greatest along the lesser curvature. Increased intragastric tension elevates intraluminal tension more here, dragging the mucosa of the lesser curve over the catenoidal segment.

Fibreoptic intubation, retrograde intubation and transtracheal jet ventilation are all established techniques for the management of the difficult airway. Among these, fibreoptic intubation is the preferable management for an anticipated difficult airway. Retrograde intubation is performed blindly and is an alternative when fibreoptic intubation is precluded or fails, or is unavailable. Transtracheal jet ventilation is relatively contraindicated in patients with an obstructed upper airway and may cause barotraumas. However, transtracheal jet ventilation is considered an alternative when conventional methods are unsuccessful. Therefore, fibreoptic intubation was adopted as the approach in our patient.

In conclusion, although oxygen insufflation to assist fibreoptic intubation is commonly recommended for directing secretions, defogging the lens and oxygenating the patient, we present this unusual case to emphasize...
that gastric rupture is a potential complication of fibreoptic intubation in the awake patient with partial upper airway obstruction.

References

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