

### GASTRIC RUPTURE COMPLICATING INADVERTENT INTUBATION OF THE ESOPHAGUS

Efraim Schwadron, MD; Yoram Moses, MD; Dov Weissberg, MD, FRCSC, FACS, FCCP

Rupture of the stomach complicating resuscitative measures is usually fatal. A 74-year-old man who suffered a myocardial infarction and cardiac arrest had perforation of the stomach when the esophagus was inadvertently intubated, ventilating the stomach. Laparotomy was performed and the gastric perforation sutured. In spite of the extensive trauma, the patient, incredibly, recovered. Although very few cases have been reported in which the esophagus has inadvertently been intubated resulting in gastric perforation, this is a potential possibility and should be borne in mind when intubation is followed by abdominal distension, rigidity and tenderness.

Une rupture d'estomac qui complique des mesures de réanimation est habituellement fatale. Un homme de 74 ans victime d'un infarctus du myocarde et d'un arrêt cardiaque a subi une perforation de l'estomac lorsque l'œsophage a été intubé par inadvertance, ce qui a ventilé l'estomac. On a procédé à une laparotomie et suturé la perforation gastrique. Le patient s'est rétabli malgré le traumatisme étendu, ce qui était incroyable. Même si l'on a signalé très peu de cas d'intubation par inadvertance de l'œsophage provoquant une perforation gastrique, c'est une possibilité dont il faut tenir compte lorsqu'une intubation entraîne une dilatation, une rigidité et une sensibilité de l'abdomen.

Perforation of the stomach complicating cardiopulmonary resuscitation is rare. It has been reported as a complication of mouth-to-mouth resuscitation,<sup>1,2</sup> use of esophageal obturator airway,<sup>3,4</sup> the result of air in the stomach after gastroscopy,<sup>5</sup> and the use of a manual resuscitation bag in a patient with post-extubation laryngeal edema.<sup>6</sup> Only five instances of gastric perforation resulting from inadvertent intubation of the esophagus have been reported.<sup>7-9</sup> The patient described in this report is unusual, not only in being intubated erroneously but also in his amazing ability to survive a myocardial infarction, cardiac arrest, inadvertent intubation of the esophagus with

prolonged ventilation and perforation of the stomach, and exploratory laparotomy.

#### CASE REPORT

A 74-year-old man with suspected myocardial infarction was sent by ambulance to the hospital. On the way, cardiorespiratory arrest occurred and the patient lost consciousness. The electrocardiogram showed ventricular fibrillation. The ambulance team began resuscitative procedures, starting with tracheal intubation and followed by ventilation with a manual resuscitation bag, electric shock and intravenous administration of lidocaine and epinephrine. Ringer's lactate and

bicarbonate solutions were infused. Heart beats were restored with atrioventricular block 3:2, but there were several more episodes of ventricular tachycardia before final restoration of sinus rhythm. The electrocardiogram showed an inferior wall myocardial infarction. On admission to hospital the patient was conscious and complained of severe chest pain. His abdomen was grossly distended and tender. This distension increased markedly over the next 15 minutes. While the patient was ventilated, the admitting physician could not hear breath sounds. This finding led to a disclosure that the tracheal tube was in the esophagus. The tube was removed immediately and another one placed in the

*From the Department of Surgery, Tel Aviv University, Sackler School of Medicine, Tel Aviv, and the Edith Wolfson Medical Center, Holon, Israel*

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**Correspondence and reprint requests to:** Prof. Dov Weissberg, Department of Surgery, Edith Wolfson Medical Center, PO Box 5, Holon 58100, Israel; fax 3-5036408

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trachea. A nasogastric tube was passed into the stomach and 300 mL of brown gastric juice was aspirated. Abdominal radiography showed a large amount of free air in the peritoneal cavity (Fig. 1). An emergency exploratory laparotomy revealed a full-thickness longitudinal laceration, 5 cm long, of the lesser curvature of the stomach close to the cardia. The laceration was sutured in two layers. The postoperative course was complicated by a wound infection treated by débridement and application of Eusol, and eventually by skin grafting. The patient was discharged from the hospital on the 28th postoperative day. Four years later he was well.

## DISCUSSION

Perforation of the stomach, whether spontaneous or traumatic, is uncommon and is usually related to gastric dilatation. According to Anthony and Tattersfield,<sup>10</sup> lacerations of the gastric mucosa are found in up to 12% of patients who undergo cardiopulmonary resuscitation, but full-thickness perforation

of the stomach is much less common.<sup>11-13</sup> The causes include overeating, particularly after prolonged starvation,<sup>14</sup> vomiting, blunt abdominal trauma,<sup>15</sup> ingestion of sodium bicarbonate,<sup>16</sup> administration of oxygen through a nasal catheter,<sup>17</sup> and resuscitative measures, particularly those involving intubation of the trachea or mouth-to-mouth resuscitation.<sup>1</sup>

The finding in our patient that the ventilation tube was in the esophagus throws some doubt on earlier reports in which gastric perforation followed an alleged intubation of the trachea. It seems likely that, at least in some instances, the esophagus rather than the trachea was unintentionally intubated, but the accidents were never noticed and thus went unreported.

Between 70% and 80% of all gastric perforations occur along the lesser curvature. Frankel<sup>18</sup> speculated that the absence of mucosal folds in the lesser curvature contributes to decreased elasticity of this part of the stomach. Another likely factor is relative immobility of this portion of the stomach caused by the hepatogastric

ligament.<sup>19</sup> Thus, when there is excessive gastric dilatation, perforation is most likely to occur at the lesser curvature.

Once perforation has occurred, air and gastric contents escape into the peritoneal cavity, resulting in abdominal distension, tenderness and rigidity. Subcutaneous and mediastinal emphysema may develop, depending on the time lapse from the moment of perforation. The patient may be dehydrated. If not treated promptly, a shock state will develop. Upright or decubitus roentgenograms show free air under the diaphragm. Aspiration through a nasogastric tube is not helpful because from the moment of rupture the stomach decompresses itself into the peritoneal cavity. In case of doubt, an abdominal tap should be performed. This helps to disclose free air in the peritoneal cavity and effects decompression, temporarily alleviating the respiratory embarrassment. Laparotomy and closure of the defect must be carried out promptly, since gastric perforation is a surgical emergency associated with an 80% death rate.<sup>6</sup>

We conclude that inadvertent intubation of the esophagus during resuscitation is probably underreported. Its occurrence is probably more common than is apparent from the paucity of reports. Perforations of the stomach should and can be prevented. After intubation, auscultation of the lungs and of the abdomen must be carried out to confirm the proper placement of the tube. Paramedical personnel on the ambulance team must be instructed accordingly.

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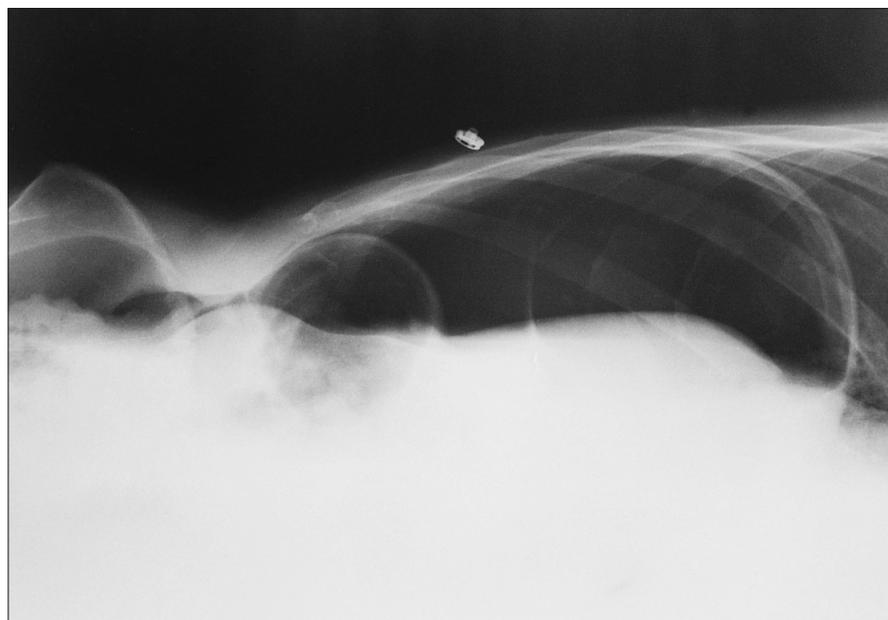


FIG. 1. Decubitus abdominal roentgenogram shows large amount of free air displacing liver.

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## Notices

### Avis

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**Congress on biomedical peer review: call for abstracts**

The *Journal of the American Medical Association*, the *British Medical Journal* and Project HOPE announce The International Congress on Biomedical Peer Review and Global Communication to be held in Prague, Czech Republic, from Sept. 17 to 21, 1997. Abstracts, due by Jan. 15, 1997, are now being accepted on such subjects as editorial peer

review and its role in scientific publication, decision-making and information exchange. Topics of interest include: the mechanisms of peer review and editorial decision-making; authorship and responsibility for published material; Online peer review; quality assurance for reviewers and editors; breakdowns, weaknesses and biases; evaluations of peer review's validity and practicality; peer review of grant proposals; peer review in other disciplines; scientific fraud and misconduct; the history of peer review; models and systems of

peer review from nonwestern cultures; interactive digital information systems and the future of scientific publication. For further information about attending the congress or the abstract submission and selection processes, contact: Annette Flanagin, *JAMA*, 515 N State, Chicago IL 60610, USA. Tel.: 312 464-2432; fax: 312 464-5824; e-mail: [aff@ix.netcom.com](mailto:aff@ix.netcom.com)

**The pediatric esophagus**

The Department of Pediatric Surgery, Faculty of Medicine,

Ege University, Izmir, Turkey, will host an interdisciplinary symposium entitled "The pediatric esophagus" from Apr. 20 to 22, 1998, in Izmir (URL—[http://medicine.ege.edu.tr/pedsurg/ped\\_oesophagus.htm](http://medicine.ege.edu.tr/pedsurg/ped_oesophagus.htm)). The main topic will be gastroesophageal reflux with a special interest in alkaline reflux. For further information contact: Professor Oktay Mutaf, Department of Pediatric Surgery, Ege University Faculty of Medicine, 35100 Izmir, Turkey. Fax: +90 (232) 3 75 12 88; e-mail: [mutaf@bornova.ege.edu.tr](mailto:mutaf@bornova.ege.edu.tr)