

## Gastric Perforation, An Anesthesia-induced Hazard in Laparoscopy

ROBERT C. REYNOLDS, M.D.,\* AND ALFREDO L. PAUCA, M.D.\*

For the diagnosis and treatment of numerous gynecologic problems, laparoscopy has enjoyed considerable popularity in Europe and England for more than a decade; moreover, in the past few years, enthusiasm for the procedure has rapidly spread throughout this country. The procedure involves the establishment of pneumoperitoneum via the insufflation of carbon dioxide through a needle inserted into the peritoneal cavity through the abdominal wall. The patient is then placed in a head-down position and a cannula through which a laparoscope can be introduced is inserted with a trocar through a small incision just below the umbilicus. The abdominal distention and steep Trendelenburg position can produce sufficient respiratory embarrassment that these patients can be managed most comfortably with general, endotracheal anesthesia with controlled ventilation.<sup>1</sup> The following case report illustrates a complication of laparoscopy attributable to the technique of intubation.

### REPORT OF A CASE

A healthy 26-year-old woman (height 69 inches, weight 166 pounds) was brought to the operating room for pelvic laparoscopy as a part of an infertility investigation. The patient had been premedicated with diazepam, 10 mg, morphine, 5 mg, and atropine, 0.4 mg, approximately an hour prior to induction of anesthesia. Anesthesia was induced with thiopental, 250 mg, followed by *d*-tubocurarine, 30 mg, iv. Ventilation was controlled with a mixture of 70 per cent N<sub>2</sub>O and 30 per cent O<sub>2</sub> for 10 minutes, after which time thiopental, 75 mg, was given, and endotracheal intubation was accomplished with difficulty. After a few moments of intermittent positive-pressure ventilation, it became clear that the endotracheal tube had inadvertently been placed in the esophagus. The tube was removed and positive-pressure

ventilation was reinstated with a face mask. The patient's abdomen was not noticeably distended. Additional muscle relaxant (gallamine, 40 mg) was given, and a few minutes later relaxation was sufficient to permit successful endotracheal intubation. Even though the abdomen was not obviously distended, manual gastric decompression was attempted.

Anesthesia was maintained with 70 per cent nitrous oxide and 30 per cent oxygen with controlled respiration. After the patient had been positioned and the skin prepared, the procedure began with the insertion of the Verres needle into the abdomen just below the umbilicus. Carbon dioxide insufflation was started at a rate of 1.5 l/min. The abdomen did not become distended, and after about a minute the patient began to eruct considerable amounts of gas. A 22-inch, no. 14 French suction catheter was passed through the patient's mouth and down the esophagus. The end of this catheter was connected to a Godart capnograph, and it was found that the gas coming from the stomach was more than 10 per cent CO<sub>2</sub>. It was obvious then that the Verres needle had perforated the stomach. In spite of this, there was no change in pulse or blood pressure.

The needle was removed, the stomach was decompressed with mild suction, and the procedure was resumed without incident. Laparoscopic examination disclosed some subserosal emphysema of the stomach, but there was no bleeding.

At the end of the examination, the effect of *d*-tubocurarine was reversed with prostigmine and atropine, and the patient was taken to the recovery room, where she was awake, oriented, and did not complain of discomfort. During the remainder of the day she was given fluids intravenously, with no oral intake. Four hours postoperatively she experienced more nausea than is usually associated with laparoscopy. This was relieved with a single injection of 10 mg compazine. The following morning, the patient was completely free of symptoms.

### DISCUSSION

Numerous complications, usually associated with insertion of the trocar or insufflation of carbon dioxide, have been reported in association with laparoscopy. These include puncture of blood vessels, perforation of intra-abdominal viscera, emphysema, embolism, and cardiorespiratory embarrassment.<sup>2,3</sup> Most of

\* Assistant Professor of Anesthesia.

Received from the Department of Anesthesia, University of Pennsylvania, School of Medicine, Philadelphia, Pennsylvania 19104. Supported in part by USPHS Grant 5-P01-GM-15430-05 from the National Institute of General Medical Sciences, National Institutes of Health.

the complications of laparoscopy reported have been associated with inexperience of the operator and/or the physical status of the patient. On the other hand, gastric perforation in our case could be attributed only to the inexperience of the anesthesiologist. Had the stomach not been inflated secondary to the inaccurate placement of an endotracheal tube, the complication probably would not have occurred.

A similar episode of gastric perforation has recently been reported by Whitford and Gunstone.<sup>4</sup> In their case the insufflated carbon dioxide remained in the patient's stomach and the situation was not diagnosed until the laparoscope was in place and the operator observed gastric rugae. Laparotomy was necessary to repair a perforated anterior gastric wall. In contrast, laparotomy was not necessary in our case because the diagnosis of gastric perforation was made prior to the insertion of the 10-mm laparoscope and the 14-gauge Verres needle, fortunately, had passed through an avascular area of the stomach.

Such a complication of laparoscopy need never occur if the proper precautions are ob-

served. Whitford and Gunstone urged that whenever the stomach of a patient has been inflated by the placement of an endotracheal tube in the esophagus, a large-bore nasogastric tube should be passed before the laparoscopic procedure is started. We have found that a no. 14 French suction catheter threaded down the esophagus is sufficient to empty the stomach of gas. We recommend that whenever there has been any difficulty with the management of the airway of a patient for laparoscopy, the stomach always should be emptied by a technique more effective than manual decompression.

#### REFERENCES

1. Alexander GD, Noe FE, Brown EM: Anesthesia for pelvic laparoscopy. *Anesth Analg (Cleve)* 48:14-18, 1969
2. Fear RE: Laparoscopy: A valuable aid in gynecologic diagnosis. *J Obstet Gynecol* 31:297-309, 1968
3. Steptoe PC: *Laparoscopy in Gynaecology*. London, Livingstone, 1967
4. Whitford JHW, Gunstone AJ: Gastric perforation: A hazard of laparoscopy under general anaesthesia. *Br J Anaesth* 44:97-99, 1972

### Pin-indexing Failures

CHARLES E. HOGG, M.D.

Safety devices applied to equipment convey an impression of infallibility. The pin-index safety system applied to anesthesia machines is an example of such a device. Failures in the pin-indexing safety system prompted our review of its development and the technical reasons for failure. These factors are the basis of this communication.

The pin-index safety system was developed to eliminate the hazard of accidental interchange of gas tanks. The problem received considerable attention prior to World War II. The idea for the present system was presented to the Ohio Chemical Company by Dr. Philip

Woodbridge in 1939.<sup>1</sup> The need for such a system was recognized by the manufacturer and by various societies, including the Compressed Gas Manufacturers Association, American Society of Anesthesiologists, and the American Hospital Association. Agreement by these associations, as well as the military, resulted in the adoption in 1949 of the present standard known officially as "The Pin-Index Safety System for Flush-Type Cylinder Valves."<sup>2</sup> It has been presented to Technical Committee No. 58 of the International Organization for Standardization as a proposed international standard.

The system consists of six possible pin positions on the yoke and six possible hole locations on the valve. Each gas is identified by two pin positions, allowing ten possible com-

Received from the U.C.L.A. School of Medicine, Harbor General Hospital Campus, 1000 W. Carson Street, Torrance, California 90509.