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This Week's Citation Classic

Mendelson C L. The aspiration of stomach contents into the lungs during obstetric anesthesia. *Amer. J. Obstet. Gynecol.* 52:191-205, 1946.
[Dept. Obstetrics and Gynecology, Cornell Univ. Medical Coll., and New York Hosp., NY]

This study described a new type of adult respiratory distress syndrome due to aspiration of gastric hydrochloric acid. The pertinent etiologic, pathologic, clinical, diagnostic, therapeutic, and prophylactic features were presented. [The *SCI*® indicates that this paper has been cited in over 270 publications since 1961—the 5th most-cited paper published in that journal.]

Curtis L. Mendelson
5427 Alta Way
Lake Worth, FL 33463

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"While serving as obstetric consultant to the New York City Health Department I observed high maternal mortality locally, throughout the country, and abroad due to aspiration complicating general anesthesia. Personal experiences demonstrated the common occurrence of gastric retention during labor with copious fluid being vomited at the time of delivery.

"I attended a case having massive liquid aspiration with clinical findings resembling those of an acute asthmatic attack. The cardiopulmonary status deteriorated rapidly and pulmonary edema ensued. X rays revealed fluffy densities throughout the lungs, and normal mediastinal position. This differed significantly from the classic syndrome of solids aspiration, namely, either suffocation due to complete obstruction; or atelectasis, segmental consolidation, and mediastinal shift due to incomplete obstruction.

"The clue to etiology of the liquid aspiration syndrome was apparent when I inadvertently inhaled gastric fluid following an evening of relative intemperance. Accordingly, I presented an investigative protocol to the Cornell University Medical College—and rabbits, funds, and facilities were soon forthcoming. In the animal experiments, hydrochloric acid produced bronchiolar spasm, peribronchiolar exudation, and congestion which frequently culminated in pulmonary edema.

"I stressed that gastric retention during labor subjects ALL PARTURIENTS to the PREVENTABLE HAZARD of aspiration. Getting this message across was—and still is—a serious problem. Prophylactic recommendations included: withholding all oral feeding during labor; wider use of conduction anesthesia; gastric alkalinization; and emptying the stomach prior to general anesthesia. Treatment of aspiration was directed toward alleviating bronchiolar spasm, maintaining oxygenation and cardiopulmonary function, and preventing secondary bacterial infection: pneumonia and lung abscess.

"Other investigators[1-6] have confirmed the findings and have made important additional observations and recommendations. Prophylactic measures emphasize avoiding oversedation and hypotension, administering antacids during labor, and practicing refined techniques of general anesthesia: rapid smooth induction; universal intubation with an inflatable endotracheal cuff; cricoid pressure to seal off the esophagus during the interval between loss of consciousness and successful intubation; and extubation after the patient is completely responsive. Raising gastric pH above 2.5 reduces intensity of aspiration pneumonitis although particulate antacid in the aspirate is also irritating.

"The goal of therapy is maintenance of adequate oxygenation through careful and continued monitoring of blood gases, preferably in an intensive care environment. There are conflicting reports concerning therapeutic effects of tracheostomy, steroids, and lyophilized urea.

"I am honored by creation of the term 'Mendelson's syndrome' but hasten to note the dubious distinction of being identified with a vomiting tableau. I believe my study is cited frequently because aspiration is so common and so lethal. The prevalence is undoubtedly related to the rising incidence of cesarean section and the mortality associated with aspiration is 70 percent and higher. Surgeons, anesthesiologists, dentists, and veterinarians have also come to more fully relate the syndrome to their respective specialties. If all these facts and figures serve to spread the word, perhaps there is hope for greater safety in childbearing and in surgery."

1. **Nicholl R M, Holland E L & Brown S S.** Mendelson's syndrome: its treatment by tracheostomy and hydrocortisone. *Brit. Med. J.* 2:745-6, 1967.
2. **Chapman R L, Jr.** Treatment of aspiration pneumonitis. *Int. Anesthesiol. Clin.* 15:85-96, 1977.
3. **Dines D E, Baker W G & Scantland W A.** Aspiration pneumonitis—Mendelson's syndrome. *J. Amer. Med. Assn.* 176:229-31, 1961.
4. **Johnson H.** Pulmonary aspiration of gastric acid: Mendelson's syndrome. Successful treatment with lyophilized urea and 10% invert sugar. *J. Amer. Med. Assn.* 179:900-2, 1962.
5. **Roberts R B.** Aspiration and its prevention in obstetrical patients. *Int. Anesthesiol. Clin.* 15:49-70, 1977.
6. **Wynne J W, Reynolds J C, Hood C I, Auerbach D & Ondrasick J.** Steroid therapy for pneumonitis induced in rabbits by aspiration of foodstuff. *Anesthesiology* 51:11-19, 1979.