access for hilar dissection.

Overall, the worldwide experience with this procedure is limited, so the appropriate use of thoracoscopy is currently being defined. One of the concerns regarding the use of thoracoscopy for lung cancer surgery is the adequacy of the cancer surgery performed in this fashion. In this series, all of the lung specimens were removed in tact and routine sampling or dissection of mediastinal lymph nodes was performed. Nine to 21 (average, 14) lymph nodes were submitted for pathologic examination per case. Thus, standard lung cancer surgery was performed.

CONCLUSIONS

This study was undertaken to perform lobectomy or pneumonectomy with mediastinal node sampling the standard, rather than a compromise operation, for patients 80 years of age or older. All operations were performed with video-assisted thoracic surgery. All patients underwent a standard anatomic resection with mediastinal node sampling or dissection. There were no deaths or major complications in this preliminary experience, so video-assisted thoracic surgery allows lung cancer surgery to be performed in selected elderly patients with minimal morbidity.

REFERENCES


Pneumomediastinum and Bilateral Pneumothoraces in a Patient With Hyperemesis Gravidarum*

Marlene Schwartz, M.D.; and Leonard Rosoff, M.D.

Hyperemesis gravidarum (HG) is a severe form of the more common nausea of early pregnancy. We report an unusual case of pneumomediastinum and bilateral pneumothoraces presenting in the tenth week of pregnancy complicating HG. (Chest 1994; 106:1904-06)

HG=hyperemesis gravidarum

Key words: hyperemesis gravidarum; pneumomediastinum; pneumothorax; pregnancy

Hyperemesis gravidarum (HG) is the extreme manifestation of the more frequent nausea of early pregnancy. The vomiting of HG can be severe enough to cause fluid and electrolyte abnormalities and occasionally nutritional deficiencies. Risk factors include nulliparity, younger age, increased estrogen levels, and an emotional response to stress. The incidence of HG is 3.5 per 1,000 deliveries and it usually resolves by the third month. Barotrauma has been well documented in association with severe and protracted vomiting and labor. We report an unusual case of pneumomediastinum and bilateral pneumothoraces early in pregnancy as a complication of HG.

CASE REPORT

A 26-year-old woman, G1P0, was admitted to the hospital in the tenth week of gestation with retching and some vomiting daily for 2 months. One week prior to hospital admission, she noted hematemesis followed by severe nonpleuritic chest pain without dyspnea. Swelling of the head, neck, and anterior chest prompted her admission to the hospital. On admission, her temperature was 36.8°C orally; respiratory rate was 16/min; blood pressure was 96/60 mm Hg; pulse was 108/min both without postural change. The only physical finding was extensive subcutaneous emphysema. Initial room air blood gas revealed a pH of 7.53, PaCO2 of 33, PaO2 of 97, and an SaO2 of 99 percent. The chest x-ray film (Fig 1) revealed pneumomediastinum, bilateral small apical pneumothoraces, and extensive subcutaneous emphysema. An esophageal barium dye study did not reveal extravasation into the periesophageal space. Esophagoscopy, which might miss small leaks and extend a perforation, was deferred as was computed tomographic (CT) scan of the mediastinum because of the undesirable fetal radiation exposure. The patient received nothing by mouth. Total parenteral nutrition and systemic antibiotic therapy were initiated. Initial white blood cell count was 9.5 × 10^9/L with a normal differential but repeated 3 and 7 h after admission. They were 24.5 × 10^9/L and 23.8 × 10^9/L, re-

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but rarely rupture/Boerhaave’s esophageal leading to distention and rupture. The conjunction with hematemesis and itinal pressure exceeding 40 mm Hg is considered the most characteristic finding in this syndrome, has been reported in 1:10,000 to 1:100,000 live births.7,8 Aberrant gas may enter the mediastinum through the diaphragm, with eventual leakage extending to the pleura and retroperitoneal spaces.7,8,10

Within 24 h, the patient felt much improved, and all white blood cell counts were less than 7.8 × 10^9/L with normal differentials. By day 7, clinical and radiographic evidence of the pneumothoraces resolved. A repeated barium esophagogram was normal. The patient was discharged from the hospital and subsequently had a normal spontaneous vaginal delivery.

**DISCUSSION**

Aberrant gas in the mediastinum can originate from the esophagus, lung, airways, neck, and abdominal cavity decompressing through a continuum of fascial planes. Subcutaneous emphysema of mediastinal origin, Hamman’s syndrome, has an incidence of 1 in 2,000 labors to 1:100,000 in pregnancy,7 usually during the second stage of labor.

The two most likely causes of this patient’s pneumomediastinum were either esophageal or spontaneous alveolar rupture. Vomiting may increase the esophageal intraluminal pressure exceeding the tensile strength of its wall leading to distention and rupture. The possibility of an esophageal rupture/Boerhaave’s syndrome had to be entertained. It has been well reported in chronic alcoholics but rarely in HG. The presence of “Mackler’s triad”8 of vomiting, chest pain, and subcutaneous emphysema in conjunction with hematemesis and a brisk leukocytosis suggested the possibility in this case. However, the absence of other evidence of infection, rapid resolution of the leukocytosis after only 5 h of antibiotics, and negative barium esophagogram made the diagnosis extremely unlikely.

The clinical course here strongly favors spontaneous alveolar rupture as the etiology. Abdominal muscles contracting against a closed glottis may result in the spontaneous rupture of marginal alveoli secondary to the shearing forces between alveoli and adjacent bronchovascular sheaths. The mean mediastinal pressure, always somewhat lower than that in the peripheral lung parenchyma, allows air to preferentially dissect proximally along the bronchovascular sheath to the hilum and mediastinum and may decompress into cervical soft tissue or the retroperitoneum. If mediastinal pressure rises too abruptly, the mediastinal parietal pleura may rupture resulting in pneumothorax.

The chest pain of this pneumomediastinum is likely secondary to stretching of mediastinal tissues by air. Dysphagia, dysphonia or “hot potato” voice, and abdominal discomfort are due to extension of air into the retropharyngeal, perilaryngeal, and retroperitoneal or peritoneal spaces, respectively. Examination may reveal subcutaneous emphysema, absent cardiac dullness, and Hamman’s sign, a crunching sound occurring in synchrony with cardiac contraction believed to be pathognomonic of pneumomediastinum. Fever, leukocytosis, eosinophilia, and low-voltage, nonspecific axis shifts and ST-T wave changes on the electrocardiogram may also occur.

The radiologic findings of pneumomediastinum are

**FIGURE 1.** A posteroanterior view revealing pneumomediastinum, bilateral small apical pneumothoraces, and extensive subcutaneous emphysema. Note laterally displaced left mediastinal pleura and visualization of central portion of diaphragm.

**FIGURE 2.** A lateral view showing highlights of the aortic knob.
pivotal. In the posteroanterior projection (Fig 1), the mediastinal pleura is displaced laterally and is best seen on the left parallel to the heart border. A lateral projection (Fig 2) may double the detection rate by demonstrating retrosternal air or highlighting the thoracic aorta and knob with vertical translucent streaks. Air may outline the tissue planes of the neck, pectoralis muscle, and axilla. Interposition of gas between the heart and diaphragm may allow visualization of the central portion of the diaphragm (Fig 1) or “continuous diaphragm sign.” Extrapleural displacement of parietal pleura by air, the “extrapleural air sign,” has also been described but only over the diaphragm.29 We speculated that the “bilateral pneumomediastinum” seen here (Fig 1) might have actually represented extrapleural air. Lateral decubitus films may have been helpful in this assessment.11 Elevation of the thymus by underlying air, the “thymic sail sign,” is diagnostic of pneumomediastinum.

Radiologic findings suggesting esophageal perforation include restriction of air posteriorly along the aorta and left hemidiaphragm, a left pleural effusion, or lower lobe infiltrate. Radiolucent streaks of air along the aorta and diaphragm, the “V sign of Naclerio,”2 and extravasation of contrast through the perforation are more specific.

Pneumomediastinum and subcutaneous emphysema are usually self-limited. Potential complications include bilateral or tension pneumothorax, rare tension pneumomediastinum, pneumopericardium, or air embolism. In the rare case of tension pneumomediastinum, evacuation of the air becomes necessary by surgical incision over the manubrium and introduction of a drain. Sedation and shortening of the second stage of labor have also been advocated to prevent recurrence.12

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Fallibility of Persistent Blood Return for Confirmation of Intravascular Catheter Placement in Patients With Hemorrhagic Thoracic Effusions*

Martin H. Kollef, M.D.

Two patients are described with hemorrhagic thoracic effusions who required central venous catheterization. Presumed subclavian and internal jugular vein cannulation, ipsilateral to the hemorrhagic thoracic effusions, was confirmed by the operators in each case by the persistent aspiration of blood. Subsequent clinical and radiologic evaluation revealed that the vascular catheters were introduced into the pleural space. In both individuals, the persistent aspiration of extravascular hemorrhagic fluid mimicked intravascular catheter positioning. Physicians treating patients with hemorrhagic thoracic effusions need to be aware of this potential complication that may result in the delayed resuscitation of hemodynamically unstable patients.

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Key words: central venous catheter; hemorrhagic effusion; Seldinger technique

The Seldinger technique was originally described in 1953 as a method to percutaneously insert a catheter into central vessels for the performance of diagnostic arteriography.1 Persistent blood return through the cannulating needle and the inserted catheter have been described as methods of confirming intravascular positioning.2-5 We describe two patients with hemorrhagic thoracic effusions in whom the persistent aspiration of blood led to the false assumption of intravascular catheter placement.

CASE REPORTS

CASE 1

A 43-year-old woman with ascites and presumed cirrhosis underwent a fluoroscopically guided percutaneous liver biopsy. Her baseline vital signs were a blood pressure of 122/84 mm Hg with a pulse of 77. Laboratory studies at the time of hospital admission showed a hemoglobin of 84 g/L, hematocrit of 0.25, platelet count of 40 × 10^9/L, and a prothrombin time of 17.5 s (control values, 10.7 to 13.0 s). Within minutes of the procedure, the patient developed

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