

# Pneumomediastinum and Subcutaneous Emphysema Following Vaginal Delivery

## Case Report and Review of the Literature

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A 23-year-old woman, gravida 1, para 0, at 42 weeks of pregnancy gave birth to a healthy female infant without complications except for a 4th-degree tear. Three hours after delivery, her voice was noted to have an unusual nasal quality, she complained of chest pain, and she

developed extensive swelling of the neck and upper throat.

*Key words.* Mediastinal emphysema; subcutaneous emphysema; delivery; labor complications.  
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Vaginal delivery complicated by pneumomediastinum and subcutaneous emphysema is rare,<sup>1,2</sup> with a reported incidence as low as 1 in 100,000 deliveries.<sup>3,4</sup> About 200 cases have been reported in the world literature.<sup>5</sup>

The case report below illustrates the simplicity of diagnosis and the favorable outcome that is the rule for this uncommon delivery complication.

### Case Report

A 23-year-old woman, gravida 1, para 0, with an uncomplicated 42-week pregnancy and no history of pulmonary disease, presented in early labor with a vertex presentation after spontaneous rupture of membranes. Her first stage lasted 6½ hours, and her second stage, during which she pushed vigorously, lasted 2 hours. She spontaneously gave birth to a 3435-g female infant, but had a 4th-degree obstetric laceration. After repair, mother and baby left the delivery suite with no apparent problems.

Three hours after delivery, while the patient was talking on the telephone, a relative noted that the patient's

voice had an unusual nasal quality. Subsequently, the patient complained of a sore throat and mild chest discomfort. Her vital signs were normal, but there was extensive swelling from the upper portion of her chest to the lower aspect of her jaw. All involved areas were palpably crepitant. Breath sounds were clear and equal.

A chest radiograph showed pneumomediastinum, pneumopericardium, and subcutaneous emphysema of the neck (Figure). There was no pneumothorax. Five hours later, a follow-up film showed less mediastinal and pericardial air.

During the first postpartum day, the subcutaneous swelling abated and crepitations were audible over the precordium in phase with cardiac systole (Hamman's sign). By the second postpartum day, physical and radiographic signs of air in the chest had resolved. She was discharged on the third day with mild subcutaneous emphysema.

Two years later, she spontaneously gave birth to a term infant from breech position without evidence of recurrent pneumomediastinum.

### Discussion

#### *Anatomy and Pathophysiology*

Pneumomediastinum is thought to occur when a marginally situated alveolus ruptures into the pulmonary inter-

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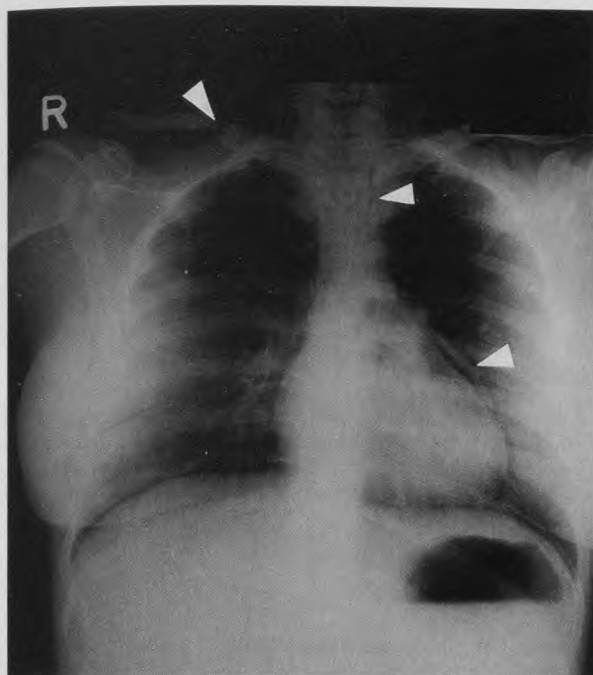


Figure. Anteroposterior chest radiograph demonstrating subcutaneous emphysema of the neck (*top left arrow*), pneumomediastinum (*middle arrow*), and pneumopericardium (*lower right arrow*).

stitial space, probably along perivascular fascial planes, with tracking of air toward the hilum and mediastinum.<sup>6-8</sup> High intra-alveolar pressure from coughing,<sup>4</sup> vomiting, or chest trauma can rupture an alveolus, but during labor, the cause is more likely the Valsalva maneuver associated with bearing down or pushing.

When air from the mediastinum escapes into the neck, subcutaneous emphysema develops. A more dangerous situation results when air under positive pressure stays trapped in the mediastinal space, where it may compress the heart and great vessels. Hypotension and reduced cardiac output can occur much like a cardiac tamponade or tension pneumothorax. This has been referred to as "malignant pneumomediastinum."<sup>6,8</sup>

Common features of a labor complicated by pneumomediastinum have been thought to include nulliparity, a prolonged 2nd stage that requires strenuous pushing,<sup>9</sup> and cephalopelvic disproportion or dystocia.<sup>2,7</sup> An analysis of data from 187 cases confirmed that most women were primiparas but had a normal mean length of labor and fetal size.<sup>10</sup>

### Symptoms

Chest pain is the most common symptom of pneumomediastinum, but its quality and location varies widely depending on the air dissection pattern and the location

and amount of air. Other symptoms can include dyspnea, cough, anxiety, hemoptysis, and palpitations. The patient may be aware of abnormal sounds in her chest and call attention to them.<sup>11</sup>

A sensation of tearing or rupture in the neck may herald the escape of air from the mediastinum. However, as in our case, the patient may notice only dysphagia or a change in tone of voice as a result of accumulating emphysema in the neck. Overall dyspnea is usually mild, and cyanosis and orthopnea are rare.<sup>12</sup>

### Signs

A classic physical finding with pneumomediastinum is the auscultation of "crackles, bubbles, or churning sounds with each contraction of the heart."<sup>11</sup> This finding, known as Hamman's sign, was present in all cases of confirmed pneumomediastinum reported by Hamman,<sup>11</sup> although his cases were not related to delivery. Although virtually pathognomonic for pneumomediastinum, Hamman's sign has not always been observed in obstetric cases.<sup>4,13</sup> Other signs include tachycardia, decreased cardiac dullness, and hyperresonance over the sternum.

Subcutaneous emphysema of the neck, face, or trunk with palpable crepitation suggests the presence of pneumomediastinum,<sup>5</sup> decompression of the mediastinal space, and often a more favorable prognosis. Massive emphysema that extends from the neck to the scalp, thighs, and wrists, however, can lead to temporary gross disfigurement.<sup>10</sup>

### Tests

The chest radiograph is useful to confirm the presence of a pneumomediastinum and subcutaneous air in the neck. Hamman described a distinctive "sharply defined translucent band . . . outlining the course of the pericardium"<sup>11</sup> (Figure).

### Differential Diagnosis

When the obstetric patient has chest pain, the differential diagnosis includes embolism of amniotic fluid or thrombus, myocardial infarction, pneumothorax, toxic effects of injected drugs, aortic dissection, cardiac tamponade, angina pectoris, and mediastinitis.<sup>5,8,14</sup> Since there are no reports of the coexistence of pneumomediastinum with any of the embolic disorders and rarely with pneumothorax,<sup>5</sup> a chest radiograph confirming only air in the mediastinum usually obviates the need for further evaluation.

## Management

As in our case, pneumomediastinum and subcutaneous emphysema are often recognized postpartum.<sup>7,9,13-16</sup> Therapy in this event should include reassurance and treatment of the symptoms. Chest pain, dyspnea, and anxiety can be treated with oxygen, analgesics, and sedatives.<sup>4,7</sup>

When pneumomediastinum exists before delivery, there is the potential for bearing-down efforts to worsen mediastinal pressure or subcutaneous emphysema, or both, since the presumed cause is spontaneous alveolar rupture. Although some patients in whom pneumomediastinum was diagnosed in labor have given birth spontaneously,<sup>3,7,17</sup> others have been managed with forceps delivery.<sup>2,5,7</sup> Some authors have recommended the use of forceps routinely in any delivery following a diagnosis of pneumomediastinum, whether in the current or a subsequent pregnancy.<sup>4,18</sup> However, this recommendation has been challenged because of the lack of evidence that recurrence of pneumomediastinum is likely.<sup>10</sup>

In the rare case involving severe cardiovascular symptoms, a mediastinotomy, performed by incising above the manubrium sternum, may be indicated to relieve a tension pneumomediastinum, or symptomatic subcutaneous emphysema. We found only one report of a case in which this procedure was performed in pregnancy. A preterm patient who was not in labor had refractory cough, dyspnea, pneumomediastinum, and massive subcutaneous emphysema that improved rapidly after mediastinotomy. Complete resolution of signs and symptoms followed. Subsequently, prophylactic forceps were used to assist delivery at term.<sup>4</sup>

## Prognosis

The prognosis for pneumomediastinum in the puerperium appears to be quite good, with the only two reports of maternal fatalities occurring in the 19th century. A number of stillbirths also have occurred,<sup>7</sup> but the most recent, reported in 1949, involved a patient whose pneumomediastinum was associated with status asthmaticus rather than labor.<sup>19</sup> Subcutaneous emphysema, the most persistent clinical manifestation, usually resolves within 2 weeks.<sup>7</sup>

## Conclusions

Pneumomediastinum occurring in pregnancy is a rare problem that raises a differential diagnosis that may include many serious conditions. Fortunately, auscultation of crepitations in phase with the cardiac cycle (Hamman's

sign) and subcutaneous swelling and crepitus are specific diagnostic signs. A simple chest radiograph confirms the diagnosis and precludes other invasive workup. Expectant management is appropriate in most cases.

If the diagnosis is made during labor, prevention of hypoxia and fetal monitoring are indicated. Forceps delivery can be considered to prevent worsening mediastinal pressure, or to avoid the development of massive subcutaneous emphysema.

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