

Hamman's Crunch: An Adventitious Sound

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Hamman's crunch of pneumomediastinum is an unusual, adventitious sound heard on auscultation of the chest. Its rarity and dramatic nature frequently result in an expensive evaluation and hospitalization. Once recognized, it can be managed on an outpatient basis with

serial chest radiographs to resolution of the pneumomediastinum or pneumothorax.

Key words. Pneumothorax; pneumomediastinum, diagnostic; physical examination; cost control.
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Air in the mediastinum, known as pneumomediastinum or mediastinal emphysema, sometimes produces an unusual, adventitious sound that is unique and unforgettable. Pneumomediastinum has been recognized in the presence of trauma since 1819.¹ Dr Louis Hamman first described this sound associated with spontaneous pneumomediastinum in 1939.² It is described in various textbooks on physical diagnosis,^{3,4} yet it occurs so infrequently that it is considered an unusual finding for any physician on examination of a patient.

Case Presentation

A 21-year-old white man presented to a clinic for evaluation of a "sloshing" sound in his chest that had been present for 4 days.

History

Five days before this visit, the patient noted the gradual onset of a sharp pain under his left breast that radiated to his left shoulder blade. This pain was exacerbated by deep breathing. He did not experience shortness of breath and did not use analgesics. Four days before evaluation, he pitched in a softball game without exacerbation of the symptoms. Later, he trotted approximately a dozen steps

to his car to obtain material for class, immediately after which he noticed a "sloshing" sound. That evening, the sound was loud enough to be heard by his girlfriend standing next to him. During the next 2 days, the patient noticed the sound was loudest in the left lateral decubitus position and diminished when he was upright. At the insistence of his girlfriend, he came to the health center for evaluation of the sound. The patient did not smoke or use drugs, nor had he been coughing before the onset of pain.

On examination, the patient reported that he was in no distress but expressed concern that the evaluation was taking time away from his studies. His blood pressure was 110/80 mm Hg, pulse 72 beats per minute, temperature 97.3°F, and respirations 16 breaths per minute. When seated, he had a I/VI early systolic murmur, heard best at the left sternal border. There also was an adventitious sound, I/VI, at the apex that was related to systole and increased in volume to II/VI with expiration. In the left lateral decubitus position, this sound increased to V/VI, increased with expiration, and was related to systole. The character of the sound was peculiar, consisting of crackling, bubbling, and rubbing. On deep inspiration, a faint pleural rub was heard in the left midback T7-8 area.

An electrocardiogram indicated a sinus rate of 72 with an incomplete right bundle branch block. A chest radiograph showed a left pneumothorax with the apex of the lung at the level of T-4 posteriorly (Figure).

Because the nature of the sound was uncertain and there was concern regarding the involvement of some form of pericardial disease, a cardiology consultation was

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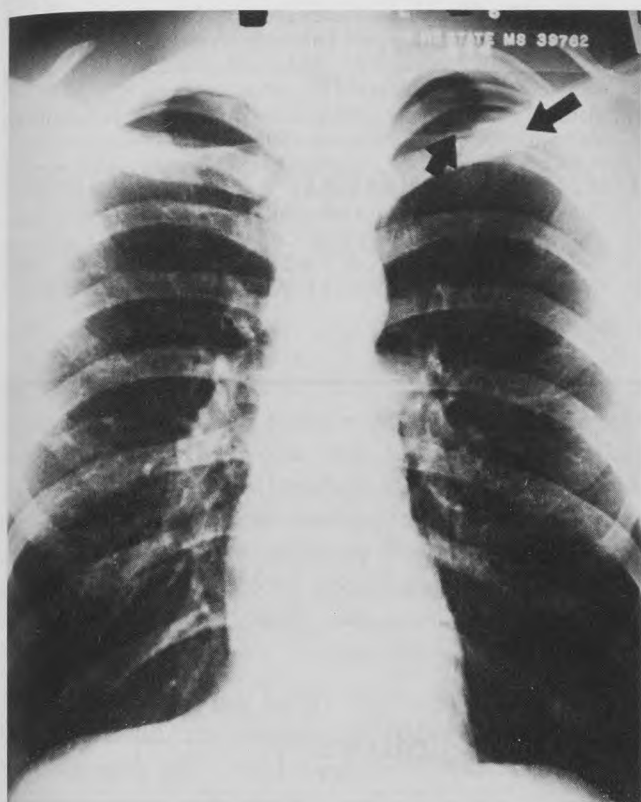


Figure. Posterior-anterior chest radiograph. The pleural line in the left upper lung field at T-4 posterior (indicated by arrows) shows the pneumothorax.

obtained. An ultrasound evaluation was normal. The consultant diagnosed the problem as Hamman's crunch of pneumomediastinum.

Discussion

In 1939, Dr Louis Hamman² described an unusual, adventitious sound in seven cases, three of which involved physicians. The cases featured an extraordinary sound that could be heard at the apex and was composed of crunching, bubbling, popping, crackling, or clicking. The sound was synchronous with systole, was pronounced in the left lateral decubitus position, and faded when the patient assumed an erect or supine position. All his cases were associated with the sudden onset of left chest pain, and two patients showed clinical evidence of pneumothorax.

Our patient presented with a classic Hamman's crunch. The only difference between him and the patients described by Dr Hamman was the obvious increase in the sound on expiration. Dr Hamman describes the mechanism of pneumothorax as being secondary to mediastinal emphysema and interstitial emphysema, citing but not

referencing Macklin's study of forcibly hyperinflating the lungs of cats.²

Baumann and Sahn⁵ performed thoracic computed tomography on a patient with Hamman's crunch and failed to demonstrate pneumomediastinum. They did, however, demonstrate a 15% pneumothorax with air trapped in the major fissure inferiorly and in proximity to the heart. From these findings, they proposed that Hamman's crunch is caused by the "cardiac filling-emptying, cyclic anterior-posterior cardiac motion or a combination of both channel[ing] pleural air into the lung fissure and then force[ing] it out creating the noise." They cited the work of Scadding and Wood,⁶ who described a similar mechanism between the visceral and parietal pleura as the source of systolic clicks in a left pneumothorax.

Most pleural rubs will increase with inspiration, whereas pericardial rubs are not related to the respiratory cycle.³ The mechanism of the expiratory increase appears to be related to the change in pleural pressure with the respiratory cycle. If the crunch is caused by intrapleural air or mediastinal air, expiration will cause an increase in pressure in the mediastinal and the intrapleural spaces,⁷ which will force air to move within the spaces. If the air is next to the pericardium, it will also move with cardiac filling. Summation of the two forces will cause a sound that varies with heartbeat and increases with expiration.

Pannacek and colleagues¹ reviewed the medical records of 17 patients seen at three major hospitals in Cleveland, Ohio. Nine of these patients presented with Hamman's crunch, 11 had subcutaneous emphysema, 2 had pneumothorax, 13 admitted to illicit inhalational drug use, and 12 described a concomitant history of a "Valsalva type maneuver." The Valsalva maneuver can cause alveolar injury with subsequent interstitial emphysema, which dissects through tissue planes along the vascular tree to the hilum and subsequently penetrates the mediastinum. These alveolar ruptures are self-sealing and are essentially sterile. If a history of Valsalva can be ascertained, there is no need for esophageal studies. Most cases can be managed with outpatient rest, reassurance, and follow-up as needed.¹

In this case, the patient made an uneventful recovery, with follow-up chest radiograph showing resolution of the pneumothorax 2 weeks later. The Hamman's crunch cleared rapidly over the 48 hours after his initial evaluation. The incomplete right bundle branch block, a common finding in athletes,⁸ was determined by the consulting cardiologist to be an incidental finding.

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