A case of Hamman’s Sign: Value of Auscultation

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Abstract
We report a case of acute chest pain diagnosed as pneumomediastinum by auscultation of the Hamman’s sign in the emergency department. We provide the recording and description of Hamman’s sign in our patient. We further discuss the value of and challenges to physical examination skills of clinicians practicing in a technology-driven environment.

Keywords: Physical exam, Hamman's sign, spontaneous pneumomediastinum, mediastinal emphysema, dyspnea, chest pain, subcutaneous emphysema

Introduction
Over the last few decades the rapid advances in technology have evolved the healthcare environment such that diagnostic tests can be ordered with the click of a button and results are obtained and disseminated in a very time-efficient manner. An unintended ‘side-effect’ of this technology-driven healthcare environment may be that clinicians become reliant on ‘tests’ to assist in diagnosis and consequently may have a decline in their hands-on clinical examination skills [1]. Undergraduate and graduate medical education training is dedicated to ensuring that trainees are able to master the basic skill of conducting a thorough history and physical examination on the patient [2]. As with any other learned skill, there is expected to be a natural decline in retention and ability to perform this skill or procedure if it is not reinforced by frequent bedside practice. We demonstrate the value of clinical bedside skills by the case discussion of a young eighteen-year-old male in which a complete history with a thorough auscultation led to a definitive diagnosis of a potentially life-threatening condition. We supply the audio recording of our auscultation findings to inform clinicians of this rare sign.

Case presentation
An 18-year-old African-American male presented to the emergency department with acute onset of substernal sharp chest pain that awakened him from sleep. The pain was described as 8/10, with no radiation and no worsening on exertion or palpation. Deep inspiration and swallowing exacerbated the chest pain. The patient denied any associated shortness of breath, cough, fever, gastrointestinal symptoms, or recent trauma. He stated that he was an energetic person who exercised and lifted weights to tone his body regularly, and smoked one pack of cigarettes per day. The physical examination revealed reproducible pain, but was also significant for “Hamman’s sign” on auscultation over the precordial area (Media 1). This sound was best heard with the patient leaning forward. There was subcutaneous crepitus felt on examination to the left neck and left shoulder area. Laboratory analysis revealed no abnormalities in cell counts, cardiac enzymes and urine toxicology screen. A chest radiograph (Figure 1) confirmed the presumptive diagnosis of subcutaneous emphysema in the neck soft tissues. The extent of air was identified with pockets of air visible in the mediastinum and surrounding the cardiac area as shown marked on computed tomography scan (Figures 2 and 3). The patient was managed conservatively for the spontaneous pneumomediastinum.

Discussion
Physical examination skills are a key component of medical education and daily practice. Senior medical students are usually competent at performing physical exam maneuvers; however, they may be unable to apply the appropriate examination skills to their work-up of clinical cases [2]. This skill is expected to improve with practice. Literature reveals that when accuracy of cardiac auscultation skills for major cardiac sounds of medical students and residents was examined, both medical students and residents accurately recognized the sounds only about 20% of the time [3,4]. Anecdotally, it is not surprising to find that clinicians in daily practice may often order tests without a complete history and physical examination.

Ideally, laboratory tests and radiography should be tools used to confirm a diagnosis that is suspected on the basis of a complete history and physical examination [5]. Over the past several decades however, there is an increasing reliance on technology and less use of the fundamentals of medicine practice such as physical exam skills [6]. The tools and tests,
though helpful and often necessary, come with an added cost and occasional harm to patients [7]. The lack of confidence in physical exam skills may prevent patients from getting prompt diagnosis-directed care since often a clinician may wait for a definitive test result before treatment, lead to extra costs due to an unnecessary additional test, and may expose patients to an increased risk such as radiation from a radiograph or discomfort from a blood draw. In our patient case, a thorough history on arrival with classic pleuritic chest pain combined with the physical examination finding of Hamman’s sign would have identified spontaneous pneumomediastinum early and perhaps some of the tests such as the cardiac enzymes could have been avoided.

Spontaneous pneumomediastinum is a rare entity that often involves a benign course and is misdiagnosed due to similar clinical presentations of other pathology. In 1819, Laënnec described pneumomediastinum as the presence of free air in the mediastinal cavity [8]. Pneumomediastinum is also referred to as mediastinal emphysema. Usually, pneumomediastinum is secondary to trauma or a complication of endoscopic procedures. However, this phenomenon is also known to occur in patients for an unknown reason which is then known as spontaneous pneumomediastinum. Spontaneous pneumomediastinum occurs more commonly in men with the highest incidence in the third decade of life [9-14]. The most common symptom is chest pain with dyspnea, cough, and neck pain as less common associated symptoms [9-14].

First described by Louis Hamman in 1939, Hamman’s sign (also known as Hamman’s crunch), is considered to be pathognomonic for pneumomediastinum, however, it is only present in about 20% of such cases [8,15-17]. The crunching, crackling sound is best heard over the precordium and is synchronous with the heartbeat as illustrated in our clinical case. The heart contracting within a structure with surrounding tissue displacement of air bubbles yields this classic raspy sound. Tobacco use, asthma history, and illicit drug use have been noted to predispose patients to develop a spontaneous pneumomediastinum, however, the physiology behind the process is likely the same [10]. Macklin proposed that an alveolar rupture leads to air dissection along bronchovascular sheaths, which spreads into the mediastinum causes the pneumomediastinum [18,19]. Due to serious complications when associated with esophageal...
Authors' contributions

A thorough patient history and physical examination remains at the patient’s bedside during medical school and residency training may need to be implemented, such that this valuable medical skill is not ‘lost’ over time.

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

| Authors’ contributions          | PAP | AC | RN | SL |
|--------------------------------|-----|----|----|----|
| Research concept and design    | --  | ✓  | -- | ✓  |
| Collection and/or assembly of data | --  | ✓  | ✓  | -- |
| Data analysis and interpretation | --  | ✓  | -- | ✓  |
| Writing the article            | ✓   | -- | ✓  | ✓  |
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References

1. Cook C. The lost art of the clinical examination: an overemphasis on clinical special tests. J Man Manip Ther. 2010; 18:3-4. | Article | PubMed Abstract | PubMed Full Text
2. Wilkerson L and Lee M. Assessing physical examination skills of senior medical students: knowing how versus knowing when. Acad Med. 2003; 78:530-2. | Article | PubMed
3. Mangione S. The teaching of chest auscultation in U.S. internal medicine and family practice medicine residencies. Acad Med. 1999; 74:590-2. | Article | PubMed
4. Mangione S. Cardiac auscultatory skills of physicians-in-training: a comparison of three English-speaking countries. Am J Med. 2001; 110:210-6. | Article | PubMed
5. Summerton N. The medical history as a diagnostic technology. Br J Gen Pract. 2008; 58: 273-6. | PDF
6. Mangione S and Duffy FD. The teaching of chest auscultation during primary care training: has anything changed in the 1990s? Chest. 2003; 124:1430-6. | Article | PubMed
7. Lysdahl KB and Hofmann BM. What causes increasing and unnecessary use of radiological investigations? A survey of radiologists’ perceptions. BMC Health Serv Res. 2009; 9:155. | Article
8. Laennec RT. De L’auscultation Médicale ou Traité du Diagnostic des Maladies des Poumon et du Coeur. Brosson & Chaudé. 1819. | PDF
9. Abolnik i, Lossos IS and Breuer R. Spontaneous pneumomediastinum. A report of 25 cases. Chest. 1991; 100:93-5. | Article | PubMed
10. Caceres M, Ali SZ, Braud R, Weiman D and Garrett HE, Jr. Spontaneous pneumomediastinum: a comparative study and review of the literature. Ann Thorac Surg. 2008; 86:962-6. | Article | PubMed
11. Iyer VN, Joshi AV and Ryu JH. Spontaneous pneumomediastinum: analysis of 62 consecutive adult patients. Mayo Clin Proc. 2009; 84:417-21. | Article | PubMed Abstract | PubMed Full Text
12. Jougon JB, Ballester M, Delcambre F, Mac Bride T, Dromer CE and Velly JF. Assessment of spontaneous pneumomediastinum: experience with 12 patients. Ann Thorac Surg. 2003; 75:1711-4. | Article | PubMed
13. Kaneki T, Kubo K, Kawashima A, Koizumi T, Sekiguchi M and Sone S. Spontaneous pneumomediastinum in 33 patients: yield of chest computed tomography for the diagnosis of the mild type. Respiration. 2000; 67:408-12. | Article | PubMed
14. Macia I, Mayo J, Ramos R, Morera R, Escobar I, Saumench J, Perna V and Rivas F. Spontaneous pneumomediastinum: 41 cases. Eur J Cardiothorac Surg. 2007; 31:1119-4. | Article | PubMed
15. Fraser RS, Fraser RG and Pare PD. Synopsis of Diseases of the Chest. Philadelphia: WB Saunders, 1994.
16. Hamman L. Spontaneous mediastinal emphysema. Bull Johns Hopkins Hospital. 1939:1-21.
17. Roguin A. Rene Theophile Hyacinthe Laennec (1781-1826): the man behind the stethoscope. Clin Med Res. 2006; 4:230-5. | Article | PubMed Abstract | PubMed Full Text
18. Macklin CC. Transport of air along sheaths of pulmonic blood vessels from alveoli to mediastinum. Arch Intern Med. 1939:913-926. | Article
19. Macklin MT and Macklin CC. Malignant interstitial emphysema of the lungs and mediastinum as an important occult complication in many respiratory diseases and other conditions: an interpretation of the clinical literature in the light of laboratory experiment. Medicine. 1944:281-358. | Article
20. Mangione S and Nieman LZ. Pulmonary auscultatory skills during training in internal medicine and family practice. Am J Respir Crit Care Med. 1999; 159:1119-24. | Article | PubMed
21. Mangione S and Peitzman SJ. Revisiting physical diagnosis during the medical residency: it is time for a logbook—and more. Acad Med. 1999; 74:467-9. | Article | PubMed
22. Mangione S and Torre DM. Teaching of pulmonary auscultation in pediatrics: a nationwide survey of all U.S. accredited residencies. Pediatr Pulmonol. 2003; 35:472-6. | Article | PubMed

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