



A case of Hamman's Sign: Value of auscultation

Parimal A. Patel, Alexander Chiu, Roxanne Nagurka* and Sangeeta Lamba

*Correspondence: nagurkrm@njms.rutgers.edu



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Department of Emergency Medicine, New Jersey Medical School, Rutgers, The State University of New Jersey, New Jersey, USA.

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 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 were examined, both medical students and residents accurately recognized the sounds only about 20% of 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,

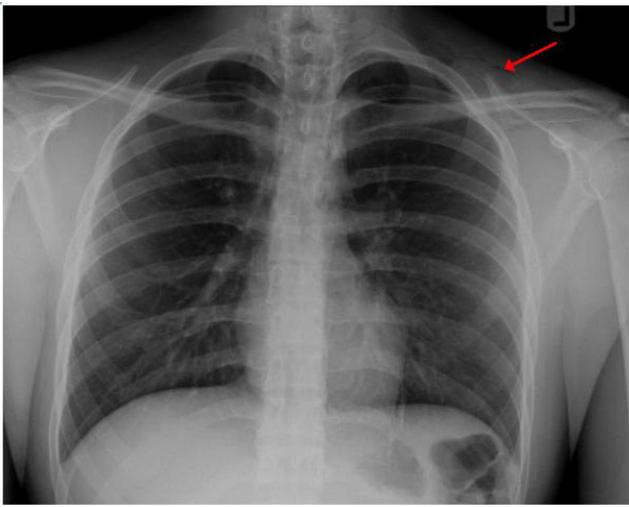


Figure 1. Posterioranterior (PA) chest x-ray showing pneumomediastinum and subcutaneous emphysema.

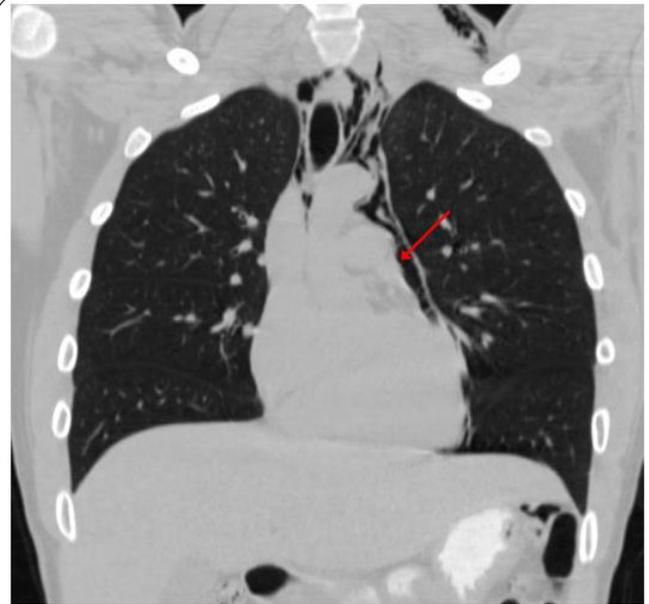


Figure 3. Computerized tomography (CT) scan showing pneumomediastinum and air pockets surrounding heart (coronal view).

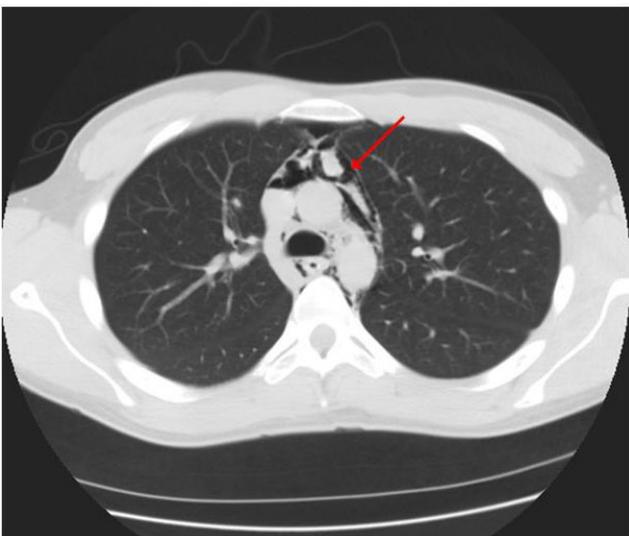


Figure 2. Computerized tomography (CT) chest scan showing pneumomediastinum (sagittal view).

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

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.

trauma (for example, Boerhave’s syndrome), early diagnosis and prompt management is necessary. Subcutaneous crepitus is another physical finding that may often be associated with presence of air that dissects into subcutaneous tissues associated with pneumomediastinum and pneumothorax and has a characteristic ‘crunchy and crackling’ feel to touch.

Over the past several decades, the art of using physical examination skills to make accurate diagnoses may be declining; especially among newer trainees [3,4,6,20-22]. Systematic, frequent reinforcement of physical examination techniques 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.

Conclusion

A thorough patient history and physical examination remains invaluable in obtaining an early disease diagnosis that is useful to then direct further care. Hamman’s sign, when heard on auscultation of heart sounds, is pathognomonic for diagnosis of pneumomediastinum.

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	✓	--	✓	✓
Critical revision of the article	✓	--	✓	✓
Final approval of article	✓	✓	✓	✓

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