

The clicking chest: what exactly did Hamman hear? A case report of a left-sided pneumothorax

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Background

Hamman's sign is a rare phenomenon. Louis Hamman described this pathognomonic clicking chest noise in association with pneumomediastinum in 1937. This typical noise can also be present in left-sided pneumothorax. Clinical cases already mention this pericardial knock in 1918 in gunshot wounds of the left chest and in 1928 in cases of spontaneous left-sided pneumothorax. However, the sound itself has only rarely been recorded.

Case summary

We describe a case of a young man with no significant medical history who was referred to the hospital with chest pain and audible clicks, documented with his smartphone. Imaging studies including chest radiograph and computed tomography scan revealed a left-sided pneumothorax. The patient underwent semi-urgent insertion of a thorax drain. His clinical outcome was excellent.

Discussion

In recent years only a few case reports describe Hamman's sign, as it is rare and happens only transiently. This case report includes the audible clicks recorded by the patient with his smartphone. We stress the importance of thoracic clicking sounds as key symptom in the differential diagnosis of left-sided pneumothorax, pneumomediastinum, and valvular pathology such as mitral valve prolapse.

Keywords

Hamman's sign • Audible clicks • Left-sided pneumothorax • Case report

Learning points

- Audible clicks can be a key sign of left-sided pneumothorax. Differential diagnosis should be made with pneumomediastinum and valvular pathology such as mitral valve prolapse.
- The registration of these clicks (included in the online version of the article) will be useful in the future training of physicians to recognize this pathology.

Introduction

Hamman's sign is a lesser-known clinical sign since it is very rare and only transiently present. Hamman¹ described this phenomenon in

association with pneumomediastinum in 1937. Clinical cases already mention this pericardial knock in 1918 in gunshot wounds of the left chest^{2,3} and in 1928 in cases of spontaneous left-sided pneumothorax.⁴ Despite its value in the differential diagnosis of left-sided

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pneumothorax, pneumomediastinum, and valvular pathology such as mitral valve prolapse, the sound itself has only rarely been recorded.^{5,6} This case report can make this sound accessible to physicians taking care of patients presenting with audible clicks in association with dyspnoea and/or thoracic pain.

Timeline

Case	A 19-year-old man presented to the hospital with chest pain and a strange precordial clicking sound
Day 1	Start symptoms: gastroenteritis (nausea and diarrhoea) and acute sharp thoracic pain
Days 2–21	Recovering from the gastroenteritis, persistent thoracic pain despite use of non-steroidal anti-inflammatory drugs (NSAIDs), intermittently developing a precordial clicking and popping sound
Day 21	Admission to the hospital: tentative diagnosis of pericarditis
Day 22	Final diagnosis of pneumothorax and 'Hamman's sign' as the explanation for the audible clicks
Day 23	Insertion of a thorax drain
Day 27	Removal of the thorax drain
Day 34	No signs of pneumothorax on chest X-ray; patient free of symptoms

Case presentation

A 19-year-old man with no past medical history was referred to the hospital with chest pain and a strange precordial clicking. He was a non-smoker and had never taken any illicit drugs. Three weeks previously he experienced an acute precordial sharp pain. At that moment, he was suffering from a gastroenteritis. While the gastrointestinal symptoms disappeared completely, the chest pain persisted in mild amplitude. The pain increased on inspiration. This was initially suspected to be a pericarditis secondary to the viral gastroenteritis. Despite non-steroidal anti-inflammatory drug therapy, the symptoms persisted and therefore he presented at our emergency department. Another reason for his referral was a transient 'click' that could be heard on the left sternal edge during auscultation. The patient noticed that the clicking, popping sound had been sporadically present for 3 weeks and could be very loud at times. On such an occasion, he managed to record the sound digitally with his smartphone since it could be heard even without the use of a stethoscope ([Supplementary material online, Audio S1](#)). The patient had no other symptoms, in particular no shortness of breath.

Physical examination revealed a fit young man with a body mass index of 18.3 kg/m². His vital parameters were reassuring: normal blood pressure, fever was absent, oxygen saturation was 99%. There was a normal lung and heart auscultation except for the sporadic clicking sound on the left sternal edge, confirmed in the emergency department (ED). Arterial blood gas, full blood count, and biochemistry results were normal, including haemoglobin (Hb), leucocytes, C-

reactive protein, D-dimer level, and troponins, excluding pulmonary embolism and acute myocardial infarction. At the ED the chest radiograph was reported normal. Electrocardiography showed a sinus rhythm of 78 b.p.m., QRS 88 ms, QRS-axis 88°, without repolarization disturbances, prominent R and S waves, most likely related to the slim constitution of the man, in absence of any sign for connective tissue disease ([Figure 1](#)).

A viral pericarditis or cardiac valve pathology was initially suspected and the patient was hospitalized. Treatment with acetylsalicylic acid at a dose of 1 g three times a day was started, but did not relieve the pain completely. After careful re-inspection of the chest radiograph the following day, a small apical left-sided pneumothorax was found ([Figure 2](#)). Echocardiographic analysis was completely normal without evidence of pericardial disease or pericardial effusion, valvular pathology, or left ventricular hypertrophy. A chest computed tomography (CT) scan confirmed a left-sided pneumothorax of at least 1 cm at the apex, 1.2 cm at the lateral side, and 4 cm at the lung base. Adjacent to the mediastinum, the pneumothorax was 1 cm. There was no pneumomediastinum ([Figure 3](#)).

A small apical chest drain was inserted. It was removed 4 days later and the patient could be discharged in good condition with no more clicks. Follow-up was uneventful. A chest CT scan 1 year later was reported normal.

Discussion

Primary spontaneous pneumothorax has an incidence of 18–28/100 000 cases in men and 1.2–6/100 000 in women.⁷ Typical symptoms, although sometimes minor or even absent, include dyspnoea and chest pain. Some patients present with cardiorespiratory distress, tachypnoea, tachycardia, and hypotension, suggesting a looming tension pneumothorax. On physical examination classical findings are reduced lung expansion, hyper-resonance, and diminished breath sounds at the side of the pneumothorax, but these findings can be subtle.⁷

In <1% of pneumothoraxes, an audible click can be heard.⁸ This precordial, pulse-synchronous sound is called Hamman's sign. Although rare, it is a key feature for diagnosis, as it is pathognomonic for pneumomediastinum or for left-sided pneumothorax.⁹

Hamman's sign should not be confused with Hamman's syndrome, which is a combination of spontaneous pneumomediastinum and subcutaneous emphysema in conditions of elevated intrathoracic pressure or Valsalva manoeuvre's (e.g. prolonged labour, asthma, heavy vomiting).¹⁰ Seldom, both conditions, Hamman's sign and syndrome, are co-existing.

The origin of the sound has been investigated for nearly a century. During the first World War, it was known that soldiers with left-sided chest wounds could produce intermittent audible noises.^{2,3} In 1928, Lister⁴ presented for the first time a case that described a pericardial knock as a sign of a spontaneous pneumothorax. In 1937, Hamman¹ investigated several patients with precordial clicks and found the sign to be pathognomonic for the presence of air within the mediastinum. Although the sign was connected to his name, in 1939 Scadding and Wood¹¹ described a series of patients with spontaneous pneumothorax who also presented with a precordial systolic click. Hamman did admit that some of his patients had a pneumothorax, but he thought this was secondary to air leaking from the

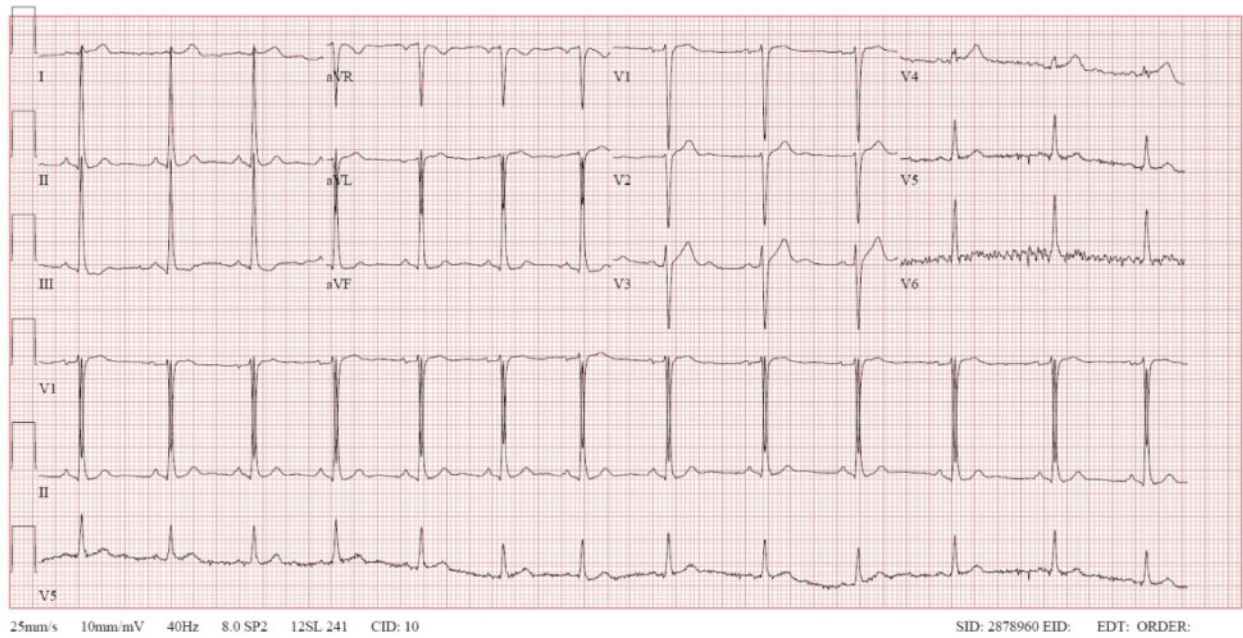


Figure 1 Electrocardiogram.



Figure 2 Chest radiograph showing the apical left-sided pneumothorax. Left: overview. Right: zoom image.

mediastinum into the pleural space. In the sixties audible clicks were investigated with a phonocardiogram by Roelandt *et al.*¹² In 1969, they concluded that in spontaneous pneumothorax these extra

cardiac sounds could be heard as clicks during systole as well as during diastole although they were more prominent during systole. In some patients the sound could even mimic a cardiac murmur.

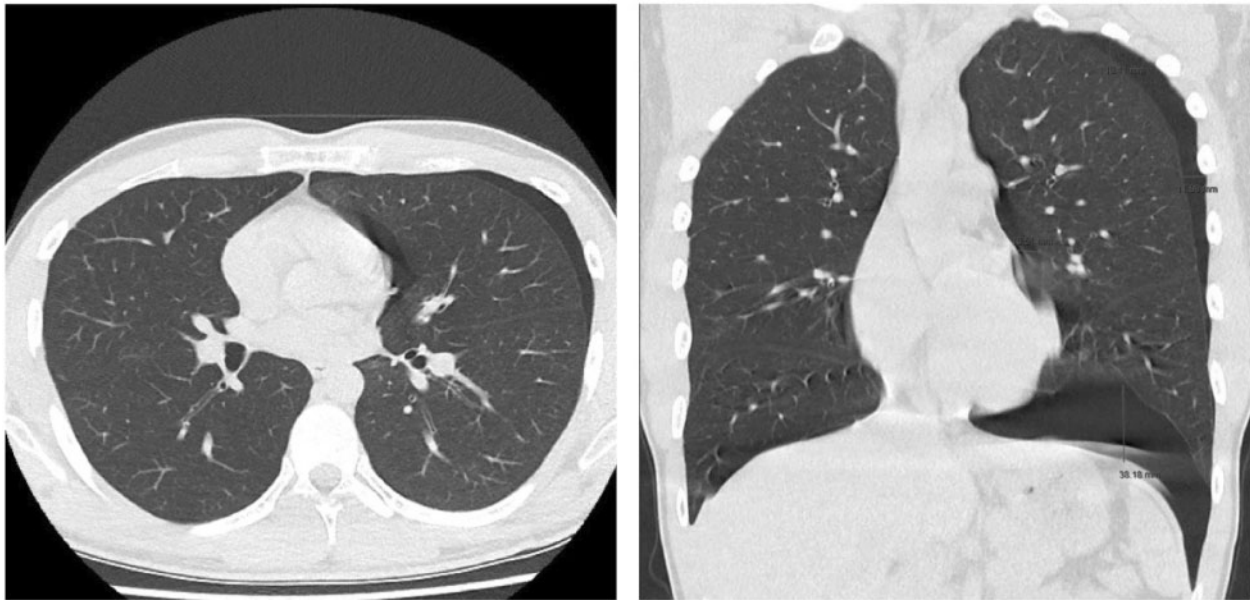


Figure 3 Chest computed tomography scan showing the left-sided pneumothorax. Left: transversal view. Right: frontal view.

The pathophysiology of Hamman's sign remains unclear. It has been suggested that small pockets of air within the mediastinum (in case of pneumomediastinum) or close to the border of the left ventricle, in case of left-sided pneumothoraxes, are compressed, pushed, and moved during systolic contractions. The chest wall functions as an amplifier and provokes the rhythmic sound. This could explain why the Hamman's sign disappears when the pneumothorax resolves but also diminishes when the pneumothorax expands.¹³

In recent years only a few case reports have described Hamman's sign, as it is rare and happens only transiently.^{9,14–16} In 2018, a case report of a patient with pneumomediastinum included a recording of Hamman's sign heard by auscultation with a stethoscope.⁵ In 2019, another case of Hamman's sign, secondary to a left-sided pneumothorax, was recorded at the emergency department. The audible clicks did not seem to be in relation to the heartbeats.⁶ To the best of our knowledge, this is the first time in which a patient himself has digitally recorded loud, audible clicks. These clicks resemble the heartbeat and can be contributed to his pneumothorax, adjacent to the left ventricle. Of course, in patients presenting with clicking mediastinal sounds valvular pathology such as mitral valve prolapse should be included in the differential diagnosis. However, understanding of this phenomenon is important because it is a key sign for early diagnosis and will prevent unnecessary diagnostic tests.^{9,13}

Conclusion

We report the case of a 19-year-old man who suffered a spontaneous left-sided pneumothorax. This condition resulted in the patient hearing audible clicks for weeks, a clinical sign known as Hamman's sign. Because it is rare, and not constantly present, it is remarkable that the patient was capable to record his clicking sounds with his

smartphone. Physicians do not always associate mediastinal clicking sounds with left-sided pneumothorax. Therefore, this case stresses the importance of recognizing this condition in the differential diagnosis.

Lead author biography



Dr Nadeem Jimidar born in Belgium, graduated as a physician in 2018 with great distinction at the University of Antwerp. During med school, he was an active member of the 'European Medical Students' Association Antwerp'. Because of a keen interest in cardiology, he subsequently started his residency in cardiology in Sint Dimpnaziekenhuis Geel, Belgium.

Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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