CASE REPORT

When your patient clicks: a loud clicking sound as a key sign to the diagnosis

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SUMMARY

A 19-year-old male patient was referred by his general practitioner with a new 'cardiac murmur'. For 1 week, he had been able to provoke a clicking sound, which was in time with his heart beat and originated from his chest. The physical examination and laboratory tests were normal. The sound was initially interpreted as most likely due to a valve condition such as mitral valve prolapse, but a transthoracic echocardiogram was normal. A cardiac CT was obtained, which showed left-sided ventral pneumothorax.

The Hamman's sign is a loud precordial pulse synchronous sound, which is often postural. It is pathognomonic for left-sided pneumothorax or pneumomediastinum. Hamman's sign as a presenting symptom is rare, but if present is key to diagnosis. The awareness of rare clinical findings is important and will prevent unnecessary diagnostic tests.

BACKGROUND

Pulse synchronous noises audible with the stethoscope are a common clinical finding in the general practitioner (GP)'s practice as well as in emergency rooms and hospitals. However, sounds audible at a distance are unusual. The most common causes of sounds in time with the heart beat are valve dysfunctions or functional murmurs. Nevertheless, rare causes should always be kept in mind. The patient's history and physical examination are important tools in establishing a diagnosis. The value and the diagnostic power of clinical findings should not be underestimated, especially in times when high-tech diagnostic techniques are widely available. Extra costs can be avoided if this typical sound is known.

CASE PRESENTATION

A 19-year-old man was referred to our emergency department by his GP with a newly discovered 'cardiac murmur'. For 1 week, the patient had been able to provoke a position-dependent clicking sound originating from his chest, which was in time with his heart beat and clearly audible from a distance. On further questioning, he reported mild left-sided chest and back pain, first noticed 1 week ago while on a long distance march with full kit in military training school. He denied any respiratory distress, cough or trauma. He did not have any other medical conditions and no relevant family history.

On examination we saw a lean, tall patient (height: 193 cm, weight: 60 kg, body mass index

16.1 kg/m²) in good general condition, with normal vital signs and no respiratory symptoms. Aside from his ectomorphic build, there were no signs of connective tissue disorders. Physical examination, including auscultation and percussion of the lungs, was normal as were laboratory tests.

INVESTIGATIONS

The sound was primarily interpreted as most likely due to a valve condition such as mitral valve prolapse and the patient discharged with a transthoracic echocardiogram scheduled 2 days later. At this point, no X-ray was deemed necessary.

Two days later, the patient was still well with no respiratory complaints or chest pain. The sound, which can be heard in online video 1, was still audible and recorded by the cardiologist's mobile phone as shown in figure 1. The echocardiogram was entirely normal.

As the sound was timed to the cardiac cycle, a cardiac CT was obtained to assess pericardial structures. It showed normal pericardial structures and heart but revealed a left-sided ventral partial pneumothorax (figure 2). There were no signs of a pneumomediastinum.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of new cardiac sounds includes functional murmurs, valve dysfunctions, pericardial sounds and extracardiac sounds. Especially when sounds are audible at a distance from the chest, extracardiac causes should be considered.

TREATMENT

A tube thoracostomy was inserted and a subsequent chest X-ray showed almost complete expansion of the lung with slight soft tissue emphysema. After the lung expansion, the sound disappeared.

OUTCOME AND FOLLOW-UP

The patient suffered several recurrences of pneumothorax, each of which was accompanied by the same clicking sound. Although he underwent multiple thorascopic procedures including mechanical pleurodesis, apex resection and apical pleurectomy, the pneumothorax kept reoccurring. After a wedge resection of the left apex, the patient finally had no further incidences of pneumothorax.

DISCUSSION

'Hamman's sign', a loud precordial pulse synchronous sound, was first described by Laennec in the

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Figure 1 (A) Recording heart sounds with a mobile phone (iPhone5; Apple, Cupertino, California) using a commercial stethoscope (Littmann Master Cardiology), which was held close to the microphone for recording. (B) Waveform visualisation of the recorded audio track shows the variation of the pulse synchronous sound.

19th century.¹ It was thought to be pathognomonic for spontaneous mediastinal emphysema, but further investigations demonstrated that a shallow left pneumothorax is by far the

Figure 2 Cardiac CT showed left-sided partial pneumothorax.

most common cause of Hamman's sign.² The characteristics of the sounds vary. The sounds may be clicking, crackling or bubbling and may depend individually on the respiratory cycle and posture. It is thought that small air pockets between the parietal and visceral pleura cyclically change their size and shape and are pulsed in the left oblique fissure with the alteration of intrapleural pressure due to the contraction of the ventricles.³ In the left-sided position, the air collects at the uppermost point of the left oblique fissure directly adjacent to the heart.

Several publications describing Hamman's sign in pneumomediastinum,^{4–6} in postoperative⁷ or postpartal pneumothoraces,⁸ were released in the last years. However, Hamman's sign as a presenting symptom of spontaneous pneumothorax is rare. Only three cases of Hamman's sign associated with spontaneous pneumothorax were published in the last 20 years.^{9–11} Remarkably in all of them, the diagnosis was initially missed.

Primary spontaneous pneumothorax is common in young males of stature such as our patient and is typically associated with shortness of breath and a sudden stabbing chest pain. If respiratory complaints and suggestive findings on physical examination are absent, pneumothorax may be difficult to diagnose.

Our case illustrates the possible applications of new technologies such as smartphones. Mobile devices are omnipresent and provide an easy and convenient tool to capture clinical findings by medical staff or even by the patients themselves. This could be particularly important when findings are transient. The recorded findings could be helpful in making a diagnosis and could even be sent to specialists if required.

Patient's perspective

I first heard the sound when I was lying in my bed in military training school. I was a bit concerned because the sound seemed synchronous with my pulse and I was worried that I could have a heart condition. But as I did not have any physical disability, I did not tell anybody about the sound. One day later I felt a stabbing back pain and roughly at the same level a stabbing pain in my chest, mainly while running or skipping. As I have back pain from time to time, I noticed this pain as back pain. When I went to my GP and told him of the sound and the pain, he referred me to the hospital for further evaluation of the sound. Because he told me, that the pain is most likely musculoskeletal I did not further mention the pain in the hospital as I thought that there is no association with the sound. The diagnosis of a pneumothorax was a big surprise for me as I did not have any trouble breathing and I even passed a physical test in the military. In retrospect I can clearly say, that the back and chest pain was related to the pneumothorax. When I was asked if my case may be published, I agreed immediately. I think it is important to share this information. During my illness, I recorded the sound often with my iPhone. When I searched the internet after the sound and the symptoms without knowing the medical term, I could not find any results. That shows the rarity of the sound. I hope that other patients will benefit from my case.

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Learning points

- ▶ Extracardiac causes should always be kept in mind as a differential diagnosis of heart sounds, especially if the sound is audible at a distance from chest.
- ▶ Hamman's sign is a loud precordial pulse synchronous sound, which is often postural and pathognomonic for left-sided pneumothorax and pneumomediastinum.
- ▶ Hamman's sign as a presenting symptom of pneumothorax is rare, but, if present is key to diagnosis.
- ▶ Critical consideration and the awareness of rare clinical findings are important and will prevent unnecessary diagnostic tests.
- ▶ Mobile phones are becoming increasingly popular tools for documenting and interpreting clinical findings, which illustrates the versatile applications of new technologies.

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