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Pericardial knock

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DESCRIPTION

A 69-year-old woman with a history of systemic lupus erythematosus complicated by recurrent episodes of acute pericarditis was admitted to the hospital with chronic, progressive dyspnoea. Physical examination was notable for a jugular venous pressure (JVP) of 18 cm H₂O, with paradoxical rise on inspiration (Kussmaul's sign). The y descent of the jugular venous waveform was observed to be sharp and deep (Friedreich's sign). Coinciding with the nadir of the y descent, an extra, early diastolic heart sound was heard over the apex. It occurred just after the second heart sound (S2) and was high-pitched, heard best with the diaphragm of the stethoscope. A digital stethoscope was used to record the heart sounds. Simultaneously, an antique phonocardiograph was used to produce visualisation of the sounds in the form of a phonocardiogram. Combining these results, a video was created for analytic and teaching purposes (video 1). The qualities of the extra sound, including pitch, timing

and location, were consistent with that of a pericardial knock. In a patient with a history of recurrent episodes of acute pericarditis, the constellation of elevated JVP, Kussmaul's sign, Friedreich's sign, and a pericardial knock led to the diagnosis of constrictive pericarditis. A pericardial knock can be difficult to distinguish from an S3 gallop; it is a high-pitched, diastolic sound heard 0.09 to 0.12 s after the aortic component of S2 (A2).¹⁻³ It tends to be louder, higher-pitched, and slightly closer to A2 than the low-pitched S3 gallop, which occurs 0.1 to 0.2 s after A2.^{2,3} The sound is presumed to occur when stiff and thickened pericardium cause sudden arrest of ventricular filling during diastole.^{2,3}

Contributors AMM captured the audio and phonocardiographic tracing of the heart sounds. TEB created the synchronised video. TEB,>NNL, GSO, PDS, and AMM were involved in writing the manuscript.

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REFERENCES

- 1 Wood P. Chronic constrictive pericarditis. *Am J Cardiol* 1961;7:48-61.
- 2 Marriott HJL. *Bedside cardiac diagnosis*. Philadelphia, PA: Lippincott Company, 1993.
- 3 Tavel ME. *Clinical phonocardiography and external pulse recording*. 2nd edn. Chicago, Illinois: Year Book Medical Publishers, Inc, 1967.

Learning points

- ▶ The pericardial knock is a high-pitched, early diastolic sound that occurs when unyielding pericardium results in sudden arrest of ventricular filling. It can be an important clue to the diagnosis of constrictive pericarditis.^{2,3}
- ▶ The pericardial knock occurs earlier in diastole (0.09-0.12 s after the aortic component of the second heart sound (A2)) compared with the S3 gallop (0.1-0.2 s after A2).¹⁻³
- ▶ Phonocardiography combined with modern digital recording devices can be used to facilitate the understanding and recognition of extra heart sounds.



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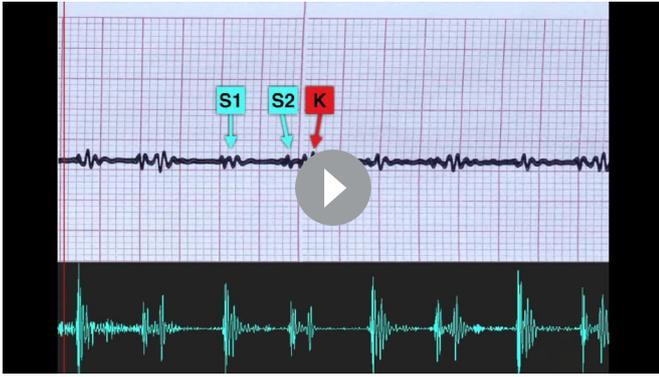
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video 1 The combination of an audio recording and a phonocardiographic tracing of a pericardial knock in a patient with constrictive pericarditis, demonstrating its pitch and timing relative to the second heart sound (S2).