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Severe gastrointestinal bleeding with paradoxical bradycardia mimicking a heart attack

Short title: Hemorrhage with paradoxical bradycardia mimicking a heart attack

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Paradoxical bradycardia in hemorrhagic shock is defined as a heart rate (HR) ≤ 60 bpm and blood pressure ≤ 70 mm Hg. It occurs in up to 7% of patients with severe hemorrhagic shock, may be confusing and delay diagnosis and treatment [1].

A 55-year-old man with a history of hypertension was admitted to the Department of Interventional Cardiology with suspected myocardial infarction (MI) due to compressive pain in the chest and upper abdomen, along with one episode of vomiting (digestive contents). On admission, the patient was in shock with a blood pressure 60/40 mm Hg, HR 50/min and normal oxygen saturation (Figure 1A). Auscultation revealed symmetric alveolar respiratory sounds, no cardiac murmurs and audible peristalsis. The abdomen was soft with no pathological signs. Electrocardiography showed sinus rhythm 60/min and no significant ST-T deviation, nor block. Echocardiography showed normal left ventricular contractility with no valve abnormalities or

signs of right ventricular overload. The Focused Assessment with Sonography in Trauma showed no abnormalities. The laboratory workup showed metabolic acidosis (pH 7.27), a hemoglobin concentration of 12.0 g/dl, and hyperglycemia (18.5 mmol/l). Myocardial necrosis markers and N-terminal pro-B-type natriuretic peptide were within normal limits. Intravenous fluids were administered in rapid infusions, as well as noradrenaline, followed by insulin and potassium. Transient improvement was observed, followed by recurrent hypotension. Dobutamine and adrenaline were added. A toxicological screening, including β -blockers poisoning, was negative. A subsequent test showed Hgb 7.9 g/dl (Figure 1A). During blood cross-matching, a computed tomography scan of the chest, abdomen and pelvis was performed and revealed an extensive (14 \times 8 cm) hemorrhage in the omentum. Following a transfusion of four units of packed red blood cells and two units of plasma, the patient was transferred to a surgical unit for laparotomy. Following laparotomy 3500 ml of blood was found in the abdominal cavity with ruptured vessels of the greater curvature of the stomach (Figure 1B).

Hemorrhagic shock typically presents with hypotonia, tachycardia and poor peripheral perfusion [2]. Hypotonia, as part of cardiogenic shock, frequently complicates MI [3]. In this case acute chest/upper abdominal pain with bradycardia and signs of shock in a middle-aged man without trauma suggested MI. Normal electrocardiography and echocardiogram spoke against MI and required follow-up diagnostics. This case emphasizes that massive bleeding may, in rare cases, manifest with bradycardia and that low HR should not exclude hemorrhage from differential diagnosis.

Paradoxical bradycardia may occur in a variety of abdominal bleedings. Similar cases were reported in spleen laceration or intraperitoneal bleeding secondary to an ectopic pregnancy and fallopian tube rupture [4, 5].

The mechanism of relative bradycardia in abdominal hemorrhage remains unclear, yet the suggested causes include vagal parasympathetic reflex activation, rapid blood loss, periarrest hemorrhage and β -blockers or digitalis [4]. A 10%–15% blood loss triggers aortic arch baroreceptor reflexes and inhibits parasympathetic activity, resulting in increased HR. However, at 20%–25% blood loss, vagal nerve fibers induce bradycardia [2]. Most probably the sudden, severe hemorrhage in this case caused a bypass of the tachycardia phase and the patient presented with bradycardia.

To conclude, paradoxical bradycardia in hemorrhage is an unusual but immediately life-threatening finding. Ambiguous shock symptoms with bradycardia need to be treated with extreme caution and require rapid, multidirectional diagnostics.

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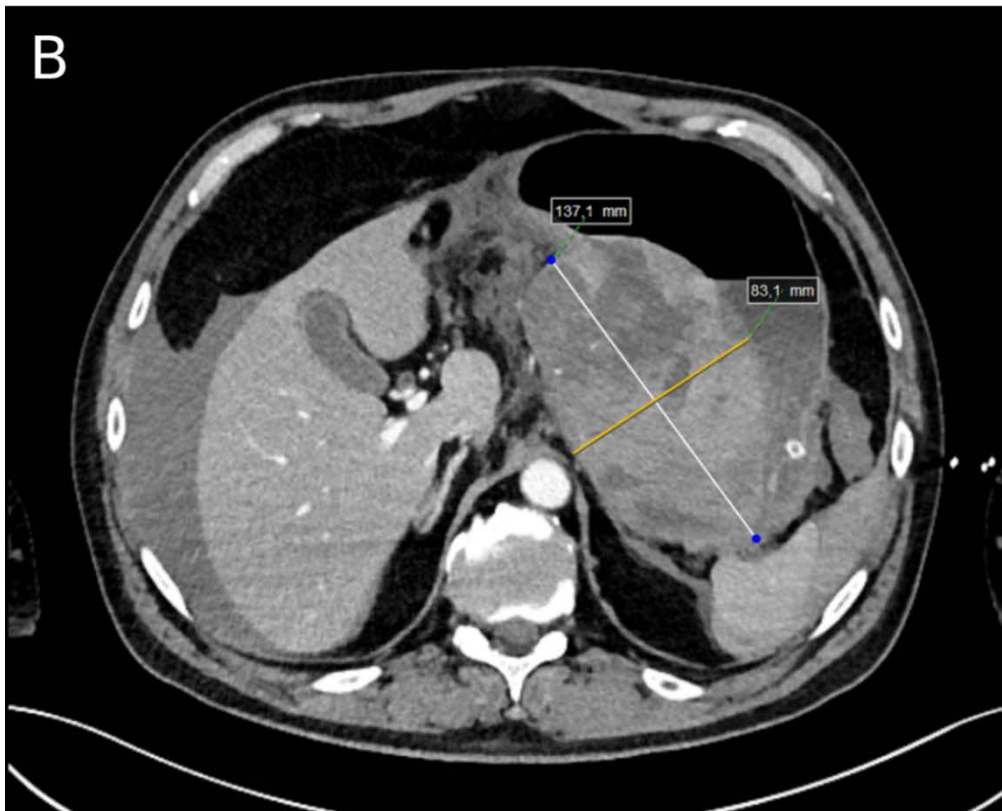
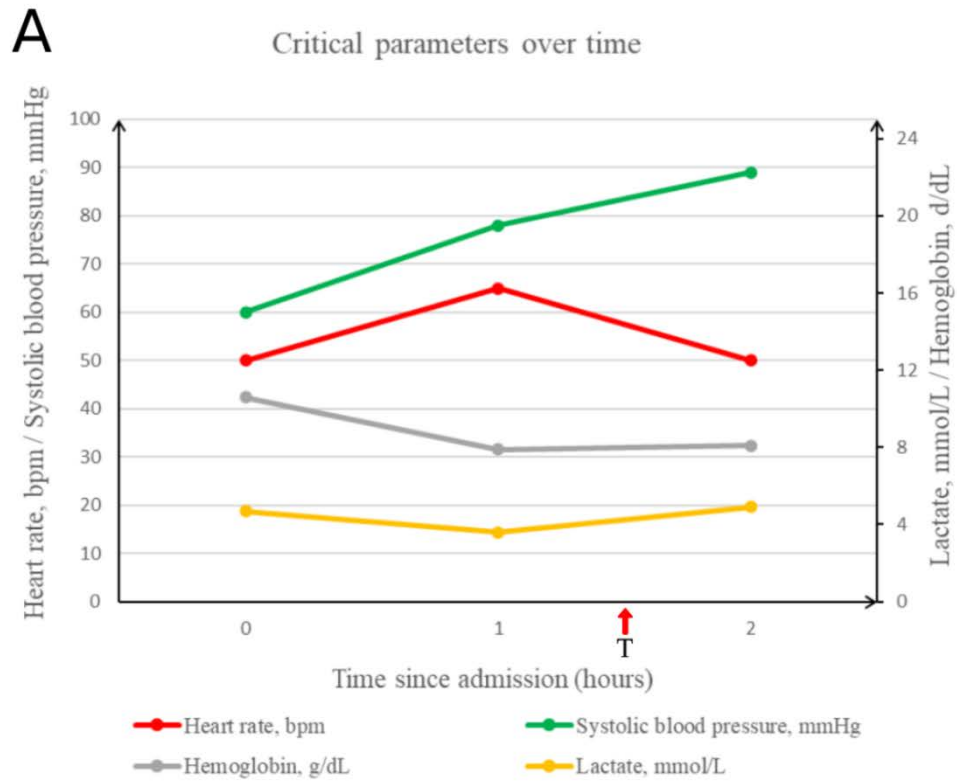


Figure 1. A. Changes in critical parameters overtime. T — beginning of transfusion of 4 units of packed red blood cells and 2 units of plasma). **B.** Computed tomography — hemorrhage in the omentum