A healthy 28-year-old man with no history of cardiac disease and no cardiac risk factors presented to the hospital 2 hours after being bitten on his right hand by his pet snake. He was in anaphylactic shock and was rapidly resuscitated with fluids, inotropic support, intramuscular antitoxin serum, and intravenous infusion of Viper-FAB, an antidote. His vital signs normalized and he was admitted to intensive care for further observation.

One hour after admission, the patient’s systolic blood pressure dropped to 40 mm Hg. Intravenous noradrenaline was started. Thirty minutes later, the patient lost consciousness in association with a rhythm change to torsade de pointes. He was defibrillated with 100 J (biphasic defibrillator) to sinus rhythm. Intravenous magnesium was started, and a repeat 12-lead ECG showed a prolonged corrected QT interval at 490 ms with no ST elevation (Figure 1). An urgent echocardiogram demonstrated normal-sized left ventricle with mild hypokinesis of the anterior wall and a global left ventricular fraction of 60%. Tissue Doppler images acquired by Vivid-7 (GE Medical) with high frame rate of 180 frames/s can differentiate between normal myocardial movements and normal strain rate in healthy subjects12 (Figure 2) and absent contraction in the anterior and apical septal wall. It can also differen-

Figure 1. ECG in hyperacute stage showing prolonged corrected QT >490 ms.

Figure 2. Normal tissue velocity imaging. Left, Apical 4-chamber transthoracic view. Curved line is drawn from basal lateral wall to apex and continued to basal septum. 2D image shows 8 points of focus corresponding to y-axis on accompanying M-mode images. Time domain represented at x-axis for both M-mode images. Upper right, M-mode of normal TVI. Color coding represents direction of longitudinal movements: red indicates moving upward toward transducer, coinciding with systolic ejection phase; blue, moving down away from transducer coinciding with early and late diastole; brightness, aliasing with high velocities. Lower right, M-mode of normal strain rate imaging. Color coding represents direction of internal movements of the myocardium. If 2 pixels in any defined segment in myocardial wall are moving toward each other, segment will be red (i.e., compression or contraction); if they are moving away from each other, segment will be coded blue (i.e., expansion or relaxation); green indicates noncompressed, nonexpanded myocardium; brightness, aliasing with higher strain rate.
tiate late systolic contraction in the infarction segments during isovolumic relaxation phase, indicating myocardial viability as demonstrated in this patient1,2 (Figure 3, top right). Tissue velocity imaging (TVI) M-mode demonstrated a brief systolic dyskinesis in the anterior wall, which was not detected by conventional echocardiography because of its low temporal resolution.

A coronary angiogram showed normal coronaries with a large thrombus in the proximal left anterior descending artery. With an x-sizer and eptifibatide, the artery was cleared and no stent was necessary. Tissue strain imaging (Figure 3, bottom right) and TVI (Figure 4) repeated 2 days after percutaneous coronary intervention (PCI) showed significantly improved myocardial contractility. Laboratory tests for coagulopathy were negative, and peak TnI and creatine kinase-MB were 2.3 nmol/L and 19 μmol/L, respectively. The patient was discharged on aspirin, clopidogrel, ramipril, and metoprolol. Stress test at the 3-month follow-up was negative for ischemia.

Rare physical causes of myocardial infarction such as snakebite can cause disseminated intravascular coagulation with thrombotic occlusion3–5 in previously normal6–10

Figure 3. Strain rate imaging (SRI). Upper left, 2D view with area of injured myocardium at apical lateral and septal segments (marked by curved black line from points 3 to 6). Upper right, SRI before PCI showing large green area with noncompressed, nonexpanded myocardium at apical lateral and septal segments marked by straight black arrow. Small area of red (black circled area) represents small island of myocardium contraction during isovolumic contraction phase. Bottom right, SRI 2 days after PCI. Note larger area of contraction during systolic ejection phase in apical septum. Area of contraction during isovolumic phase before PCI also decreased significantly.

Gaballa et al  MI After Snakebite
mid-sized coronary arteries. Some snake venom may also contain endothelins or sarafotoxins that have coronary vasoconstrictor effects. ECG is the earliest available diagnostic tool for myocardial infarction, but it may not show characteristic patterns in the hyperacute phase. As the present case demonstrates, a high index of suspicion is necessary, and TVI was used to detect the hyperacute stages of myocardial injury manifesting with impaired contractility and reduced tissue strain (Figure 3). TVI was also used in the assessment of reperfusion postrevascularization to detect recovery of myocardial function (Figures 3 and 4). This case, therefore, demonstrates how TVI may offer clinicians a rapidly accessible noninvasive method of detecting subtle wall motion abnormalities that occur in ischemic coronary syndromes.

References
Myocardial Infarction as a Rare Consequence of a Snakebite: Diagnosis With Novel Echocardiographic Tissue Doppler Techniques
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_Circulation._ 2005;112:e140-e142
doi: 10.1161/CIRCULATIONAHA.104.492942

_Circulation_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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