Myocardial Injury After Blunt Trauma
Cardiac Magnetic Resonance Imaging and Intravascular Ultrasound to the Rescue

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A 43-year-old healthy Amish man presented to the emergency department with a history of blunt trauma to the chest following a horse kick. The blunt trauma happened 6 hours before presentation. He also reported loss of consciousness for a brief period of 5 minutes. After regaining consciousness, he experienced constant dull ache in his chest that radiated to his left shoulder. He presented to the emergency department for further evaluation. He was a tobacco user and there was no family history of coronary disease. On examination, he did not have any bruising over his chest. His chest was tender to palpation. Laboratory tests were significant for troponin T of 0.8 ng/mL (normal <0.01 ng/mL). Twelve-lead ECG revealed age indeterminate inferior infarct (Figure 1). Chest radiograph did not reveal any evidence of rib fractures. A preliminary diagnosis of cardiac contusion was made. Cardiac MRI was performed to evaluate for cardiac contusion. Cardiac MRI revealed no evidence of contusion. However, there was inferior, inferoseptal wall akinesis (Figure 2, Movie I in the online-only Data Supplement) and evidence of transmural myocardial infarction in the inferior territory (Figure 3). The patient was taken for emergent coronary angiography. Coronary angiography revealed a diffuse lesion involving the right coronary artery with TIMI 2 flow (Figure 4). Intravascular ultrasound was performed to further evaluate the lesion. Intravascular ultrasound demonstrated intramural hematoma of the right coronary artery (Figure 5, Movie II in the online-only Data Supplement). The other coronary arteries had luminal irregularities. Successful percutaneous coronary intervention was performed to the right coronary artery with a drug-eluting stent (Figure 6). The patient had an uneventful hospital course and is doing well on follow-up.

Blunt trauma to the chest has cardiac implications. Cardiac contusion, coronary dissection, coronary artery intramural hematoma, epicardial hematoma, and commotio cordis are some disease entities that occur secondary to blunt trauma. Coronary intramural hematoma is a rare complication after blunt trauma, other causes being iatrogenic during percutaneous coronary intervention, spontaneous and retrograde propagation of aortic dissection. Hemorrhage in the vessel wall occurs because of the rupture of vasa vasorum and leads to hematoma formation in the medial-adventitial layers. This entity is distinguished from coronary dissection by the absence of intimal flap. Intravascular ultrasound is the mainstay modality to diagnose intramural hematomas and to differentiate from dissection. The most common coronary artery to be involved in blunt trauma is the left anterior descending artery, followed by right coronary artery and left circumflex artery. Very few reports of coronary intramural hematomas secondary to blunt trauma have been published.

Our case is unique in that cardiac MRI performed to assess for contusion revealed evidence of transmural infarction in the right coronary artery territory. This prompted emergent coronary angiography. Intravascular ultrasound performed during angiography further characterized the mechanism of myocardial infarction. Elevated cardiac biomarkers can be seen both with contusion, and with vessel injury, as well. Multimodality assessment in patients experiencing blunt trauma can characterize the type of myocardial injury and expedite appropriate therapy.

Disclosures

None.

References

Figure 1. Twelve-lead ECG, showing age indeterminate inferior infarct.

Figure 2. Cardiac MRI, short-axis view obtained with balanced steady-state free precession technique, end-systolic frame showing absent wall thickening in the inferoseptum and inferior wall (white arrow) in comparison with other segments.
Figure 3. Cardiac MRI, delayed enhancement showing evidence of transmural infarction in the inferior wall and inferoseptum (white arrow) with evidence of no reflow phenomenon in the same area (arrow head).

Figure 4. Coronary angiography demonstrating the diffuse lesion (white arrow) in the right coronary artery.

Figure 5. Intravascular ultrasound demonstrating intramural hematoma (white arrow).

Figure 6. Post-percutaneous coronary intervention with a drug-eluting stent to the right coronary artery.
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Movie Legend

**Movie 1.** Balanced SSFP cardiac MRI short axis cine showing inferior and inferoseptal wall akinesis.

**Movie 2.** IVUS of the right coronary artery showing intramural hematoma. Best viewed with Windows Media Player.