Traumatic injury of the pulmonary artery: Transection, rupture, pseudoaneurysm, or dissection? Sometimes semantics do matter

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No other vessel commands the respect of a thoracic surgeon as much as the pulmonary artery (PA) does. Transection or rupture of even a small branch can cause fatal exsanguination in seconds, and yet it can also be easily controlled with gentle compression. Both of these characteristics are due to the low pressure in the PA circulation and to the thin, compliant nature of the wall of the PA.

A pseudoaneurysm may form when reepithelialization of the perforation does not occur, and delayed rupture can occur even months later.^{1,2} A pseudoaneurysm may stabilize and resolve or expand and rupture, depending on etiology, size, and intravascular pressure. In 1963, Symbas and Scott³ described how larger pseudoaneurysms tended to bleed, whereas smaller ones often went undetected.

The most common cause of PA ruptures and pseudoaneurysms is PA catheters.^{1,2,4,5} With the decreased use of PA catheters and the ubiquitous use of computed tomographic scans for trauma patients, however, the incidence of traumatic pseudoaneurysms has increased.^{3,6-17}

Traumatic PA dissections (PADs) have also been described.¹⁸⁻²⁰ The mechanism is likely similar to that seen in the aorta as a result of shearing forces and differential deceleration of the mediastinum and the spine. Traumatic PADs will usually resolve or remain stable unless associated with pulmonary hypertension, in which case the risk of bleeding may be quite high.¹⁸⁻²⁰

Management of traumatic PA injuries includes surgical repair, endovascular approaches, and observation. There are no strict guidelines, and the preferred approach depends on the lesion, the patient, and the institution. Currently, the standard treatment for pseudoaneurysms is endovascular placement of coils or plugs in or adjacent to the pseudoaneurysm or into the artery feeding it.²¹ Surgical repair may be considered when the endovascular measures fail or are not feasible and is the only option for acute rupture

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Central Message

When noninterventional therapy is attempted for traumatic proximal injuries of the pulmonary artery, it is important to determine accurately the exact type, location, and size of the injury.

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or tamponade. For intraparenchymal pseudoaneurysms, surgical ligation and lung resection may be possible. For a proximal PA injury, however, it is necessary to use cardiopulmonary bypass during the repair of the lesion. Conservative management with close clinical and imaging surveillance is recommended for asymptomatic lesions smaller than 2 cm and for PADs.^{5,12,22,23}

In this issue of the *Journal*, Demondion and colleagues²⁴ describe a case of a deceleration injury of the intrapericardial right PA that was successfully managed conservatively. Because of the associated intracranial injury, anticoagulation for cardiopulmonary bypass was contraindicated. The intrapericardial location made it hazardous to attempt transcatheter approaches because of the high risk of rupture and tamponade. PA stenting, which was initially considered, may not have been ideal for this angular vessel. In adults it is difficult to introduce a large stent device through both the tricuspid and pulmonary valves and into the right PA.

Demondion and colleagues²⁴ conclude that for acute pulmonary artery “transection” after blunt trauma, an initial conservative management strategy must be considered when anticoagulation is contraindicated. Of course, such a course would not be possible in cases of true transection. It may indeed be reasonable, however, for most cases of small and asymptomatic traumatic pseudoaneurysms or PADs. When

noninterventional therapy is attempted, one must ensure the absence of bleeding, because even minor intrapericardial hemorrhage can presage fatal tamponade. It is also important to accurately determine the exact location, size, and type of the injury, because in this disease, semantics do matter.

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