A Calcified Vascular Mediastinal Mass

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Abstract: **We report the incidental finding of a late post-traumatic pseudoaneurysm of the thoracic aorta in a patient being treated for subarachnoid hemorrhage from a motorcycle accident. The diagnosis of calcified vascular mediastinal masses may be suspected from routine chest roentgenograms and confirmed by aortography. Computed tomography and magnetic resonance imaging are helpful when the diagnosis remains obscure. The recognition of chronic pseudoaneurysms is clinically important. (J Am Bd Fam Pract 1989; 2:272-4.)**

The differential diagnosis of a calcified mass in the region of the aortic arch includes post-traumatic pseudoaneurysm, ductus arteriosus aneurysm, aneurysm in a congenitally patent ductus arteriosus or false aneurysm formation after ligation of a patent ductus, pseudocoarctation of the aorta with dilation proximal to the ligamentum arteriosum, lymphadenopathy in the aortopulmonary window, treated lymphoma, or infections, such as lues.

Post-traumatic pseudoaneurysm of the thoracic aorta is being recognized with increasing frequency.[1] In 1964, McClenathan and Brettschneider noted that 28 percent of all thoracic aneurysms seen by their surgical service from 1953 to 1964, excluding coarctation, were of the post-traumatic variety.[2] Rises in the number of motor vehicle accidents and heightened index of suspicion by emergency personnel can explain the trend toward more numerous diagnoses.

While automobile accidents most frequently dispose toward formation of pseudoaneurysms, motorcycle injuries and falls are included among the second most common causes.[3] Abrupt deceleration in the anterocranial direction causes powerful longitudinal stretching of the aortic arch. As different parts decelerate at varying rates, lateral shearing forces exert their greatest effects at points of relative fixation: the aortic root, the ligamentum arteriosum, and the diaphragm.[4] Additionally, anterior chest wall impact may cause intra-aortic blood pressure to rise and fall rapidly by compressing and then releasing the heart between the sternum and the spine.[5]

Case Report

A 28-year-old man sustained a head injury in a motorcycle accident. Computed tomography (CT) of the head showed a subarachnoid hemorrhage. There were no cardiopulmonary signs or symptoms, and the physical examination of the chest was normal. His medical history was significant for a motorcycle accident 8 years ago, resulting in several rib, pelvic, and long-bone fractures.

Posteroanterior (Figure 1) and lateral roentgenograms of the chest were obtained. A localized aortic aneurysm is suggested on the chest roentgenogram. Calcification implies chronicity. Biplane thoracic arch aortogram shows a 7.5 cm by 6.5 cm aneurysm of the aorta at the ligamentum arteriosum (Figure 2). Post-traumatic calcified pseudoaneurysm involving the aortic isthmus was diagnosed by radiography and confirmed at the time of elective surgery.

Discussion

Natural History of Aortic Trauma

Complete transection of the aorta usually precipitates immediate death, and of such patients with isolated aortic rupture, only 19.8 percent survive initially.[6] Varying degrees of lesser disruption do permit increased survival, however. By definition, one must live with an aneurysm for 3 months following disruption before the designation of "chronic" may be applied. Even small tears may progress to become asympto-

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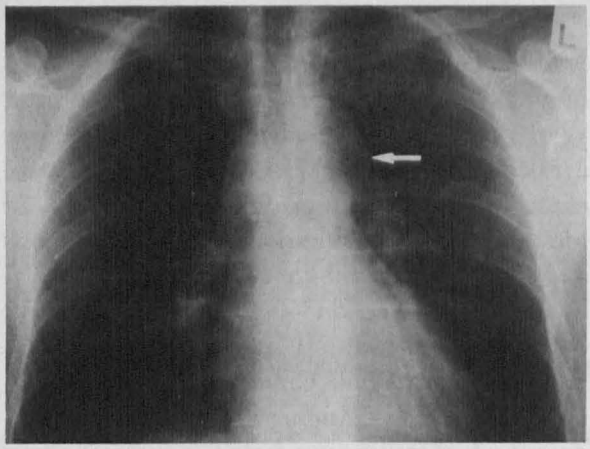

Figure 1. Posteroanterior chest radiograph on the day of admission shows a mediastinal mass.

matic chronic aneurysms.[7] Several sources have reported the number of chronic false aneurysm formations to vary from 2–4 percent.[7] Intervals from 23 days following trauma to 48 years between initial injury and rupture have been reported.[6]

The clinical importance of these lesions is highlighted by data describing how one-third of patients without surgery died secondary to aneurysm rupture, most of them without premonitory symptoms.[8] Of 401 patients with chronic traumatic pseudoaneurysms, 42 percent in 5 years and 85 percent within 20 years developed signs and symptoms of aneurysm expansion. The group with surgery had significantly higher survival than the group without surgery.[8] Surgical intervention may be crucial for the patient once the proper diagnosis is established.

Diagnostic Methods and Findings

The risk of sudden fatal hemorrhage from rupture of a pseudoaneurysm demands a rapid and true diagnosis and treatment plan. Usually, the first step is evaluation of a chest radiograph that suggests a mediastinal mass. It must be determined whether such a mass is more likely to be vascular or parenchymal. This decision can be made on the basis of the history of trauma or any associated radiographic findings. If an acute vascular nature is suspected, angiography is usually performed because it provides excellent delineation of the aneurysm and the arch. This clearly aids the surgeon in planning intervention. Nevertheless, angiography may be indeterminate or falsely negative because it may miss parietal thrombi and small calcifications involving the vessel wall.[1]

Arriving at the diagnosis of post-traumatic thoracic aortic pseudoaneurysm depends upon several features. A history of previous chest trauma, even though remote, and the lack of evidence of other causes of aneurysm strongly suggest post-traumatic pseudoaneurysm.[1] Finding a saccular aneurysm at the isthmus of a normal left-sided aortic arch in the proper clinical setting is virtually diagnostic.[3] Radiographically, pseudoaneurysms are in the posterior part of the aortic arch, just distal to the origin of the left subclavian trunk. Parietal calcification is often present and indicates chronicity. Such aneurysms tend to grow toward the left and project not only in the direction of the aortic window, but also into the posterior wall of the aorta. Formation of a mediastinal hematoma because of rupture may be evidenced by mediastinal widening, obliteration of

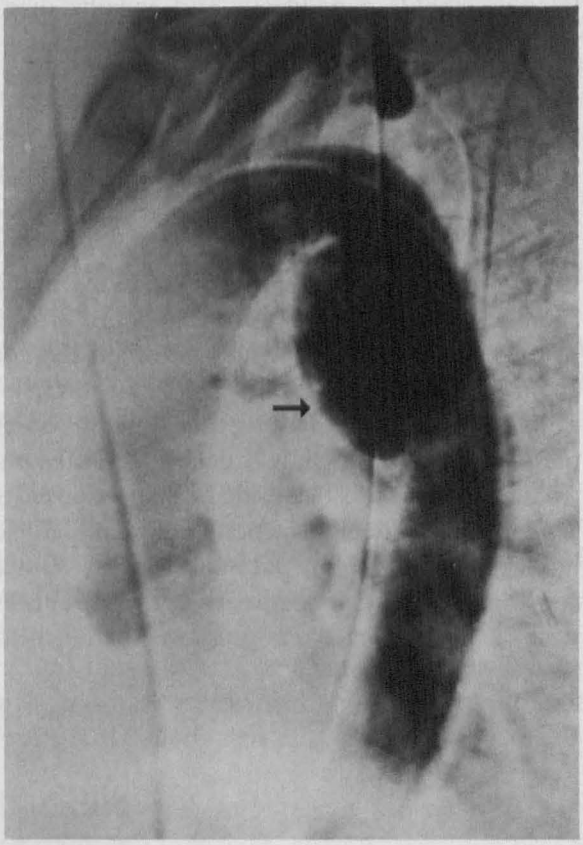

Figure 2. Aneurysm at the aortic isthmus is identified on the lateral projection during aortography.

the aortic knob, widening of the paraspinal lines, depression of the left main bronchus, rightward deviation of the trachea, obliteration of the aortopulmonary window, appearance of a left apical cap, and deviation of a nasogastric tube to the right.[9] Irregularity of the aortic wall adjacent to a laceration and sharply demarcated linear defects representing infolding of the intima may earmark a post-traumatic pseudoaneurysm on angiography.[9]

CT and magnetic resonance imaging (MRI) are often chosen as the second step in diagnosis after chest radiography when there is little or no suspicion of recent trauma. These are noninvasive techniques that can readily differentiate solid versus vascular etiologies for a mediastinal mass. Axial imaging and high contrast resolution by CT allow definition of the relations between the mass, the aorta, and the pulmonary artery. The use of intravenous contrast material provides opacification of the lumen, thereby excluding solid masses. CT is sensitive for detection of parietal calcification and can clearly show aneurysmal thrombus. MRI may likewise enable expeditious and specific diagnosis; it has the advantage of multiplanar imaging without the need for contrast enhancement.

Ductus Arteriosus Aneurysm

While we have focused this report on aortic injuries, we have observed similar radiographic findings in patients having aneurysms of a patent ductus arteriosus. These aneurysms are much rarer in adults, but they can occur even after a patent ductus has been ligated, and their risk for complications is just as formidable as aortic lesions. Radiographic features that suggest patent ductus aneurysms include: calcification at the periphery of the lesion or mottled calcification at its aortic side and demonstration of a small pedicle linking the lesion to the pulmonary artery. Other congenital cardiac anomalies may be present, as well as symptoms from pressure on adjacent structures.

Conclusion

Aortic trauma can cause chronic aneurysm formation that might not be recognized until months or years after the injury. Such lesions often present as a calcified mediastinal mass seen on a standard chest radiograph. Because of their increased risk for life-threatening complications, accurate diagnosis and surgical treatment are necessary.

The early selection of an imaging modality (angiography versus CT and MRI) should take into account available clinical history and radiographic findings. Angiography is usually required when trauma is a factor or surgical repair is anticipated. The role of CT and MRI becomes more important when angiography is indeterminate or when the condition suggests chronicity.

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