Percutaneous Management of Penetrating Aortic Ulcer

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Penetrating aortic ulcer is a variant of classic aortic dissection having distinct histopathological characteristics. If not appropriately treated, it evolves to combined morbidity and mortality rates as high as those of classic dissection. This condition, therefore, warrants special attention with accurate diagnosis and treatment. Percutaneous management using endoprosthesis is the method of choice, since the patients are usually elderly and have comorbidities that would increase the complication rates of traditional surgery. A 78-year-old woman complaining of thoracic pain was admitted to the hospital; her pain had been radiating to the interscapular and left lumbar regions for four months. Upon diagnostic investigation, a penetrating aortic ulcer was found, and after being successfully treated percutaneously with stent implantation, the patient became asymptomatic and is under outpatient follow-up.

With the expanding technological development in the field of imaging techniques, the variants of aortic dissection can be characterized as: penetrating ulcer and intramural hematoma[1-3]. The first refers to a serious condition that, if not appropriately treated, may cause massive bleeding as well as a persistent, refractory, and extremely limiting pain.

Dissection of the aorta is defined as the delamination of its walls by blood infiltration in the space formed between the adventitia and intima. Aortic diseases are associated with high cardiovascular mortality and morbidity rates and, despite all technological advances achieved in diagnostic and therapeutic methods, they remain a challenge for clinical cardiologists, interventionists and cardiovascular surgeons. If left untreated, early mortality rate is estimated at 1% per hour within the first 48 hours and up to 75% by the end of the second week[1-6].

Penetrating aortic ulcer is defined as an ulcerating atherosclerotic lesion that invades the internal elastic lamina of the aortic wall. This condition predisposes to hematoma formation within the aortic media layer[7]. This lesion is similar to the peptic ulcer observed in the esophageal-gastroduodenal seriography.

Penetrating atherosclerotic ulcers occur most commonly in the thoracic aorta, particularly in its mid and distal thirds. Radiographic findings of focal ulcer with adjacent subintimal hematoma on computed tomography corroborate this diagnosis[8].

Currently, considering the profile of patients with penetrating aortic ulcer, regarding age group and associated comorbidities, endoprosthesis implantation via the femoral artery is the preferred treatment. The classical surgical procedure should be reserved only for the more severe cases in which the percutaneous approach is difficult to perform[3,6].

Case Report

A seventy-eight-year-old white female, born and residing in the city of São José do Rio Preto (SP) with a long-standing history of systemic arterial hypertension and taking medications regularly for 25 years. The patient was admitted with a complaint of continuous pain in the interscapular region of insidious onset which commenced about two years earlier and had gradually worsened over the past four months, radiating to the left lumbar region of the ipsilateral flank. Her pain was not related to physical exertion. She had sought medical assistance several times, and on all these occasion was medicated unsuccessfully with non-hormonal anti-inflammatory drugs.

On physical examination, the patient was in regular general condition, well hydrated, eupneic, afebrile, and with normal complexion. Although in great pain, she was cooperative. BP = 150/80 mmHg; HR = 90 bpm. Her heart rhythm was regular and no abnormal sounds were detected; her peripheral pulses were wide and symmetrical. Her lungs were clear, with no adventitious sounds; her abdomen was soft, painless, with normal bowel sounds and no palpable masses.

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Based on the clinical condition described, the following diagnostic hypotheses were considered: atypical acute coronary syndrome, compressive radiculopathy from intervertebral disc herniation, and urolithiasis (despite the continuous nature of the pain).

Blood cell count and blood chemistry were found to be normal, as well as the myocardial injury markers. Chest and abdomen radiographs were non-specific, with the presence of some osteophytes and parietal calcifications of the aorta. Serial electrocardiograms showed sinus rhythm with diffuse, non-specific changes of ventricular repolarization without dynamic changes in the ST segment. The echocardiogram showed diastolic dysfunction, such as abnormal relaxation. The abdominal ultrasonography was normal. A thoracoabdominal CT scan revealed the absence of compressive radiculopathy and the presence of aneurysmal dilatation at the distal third of the descending thoracic aorta, the image being suggestive of penetrating aortic ulcer or saccular aneurysm with intraluminal thrombus at T-8 level (fig. 1).

Therefore, aortography was performed and confirmed the presence of penetrating aortic ulcer in the left posterior lateral wall of the descending thoracic aorta with intraluminal thrombus, determining saccular aneurysm of the aorta as the differential diagnosis (fig 2).

In view of the persistent symptomatic clinical condition, and also considering the patient comorbidities, it was decided for a percutaneous approach using a self-expandable aortic stent-graft, which was successfully performed (figs. 3, 4, and 5).

On clinical follow-up, a complete resolution of symptoms with reduced risk of hemorrhagic complications was noted.

Discussion

Aortic dissection is one of the most feared cardiovascular emergencies, as it results in degeneration of the media layer and thus the delamination of its walls, creating a false lumen between the intima and adventitia. Its incidence has been estimated at about 15 cases per million inhabitants per year. Mortality rate from untreated dissection of the ascending aorta is 1% per hour in the first 48 hours, 74% within 2 weeks, and 90% within three months[2,6].

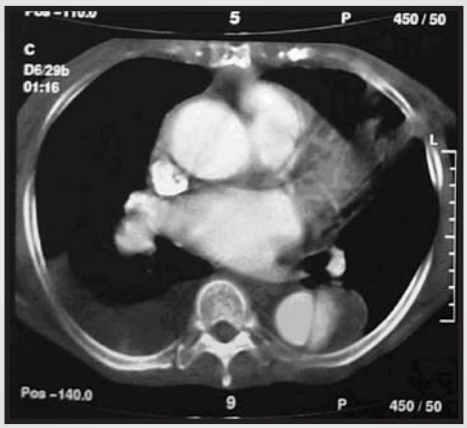

Fig. 1 *- Chest tomography showing penetrating aortic ulcer, a variant of classic aortic dissection*

At the end of the 20th century, with the remarkable technological advances in the field of imaging techniques, the variants of aorta dissection were rediscovered. First described by Shennan in 1934, penetrating aortic ulcers were characterized later by Stanson in 1986[3,4].

These lesions result from the ulceration of atheromatous plaques that disrupt the aortic wall layers, penetrating deeply into the adventitia. According to Stanson et al, the majority of aortic ulcers are single lesions[4].

Fig. 2 *- Aortography showing penetrating ulcer of the descending thoracic aorta*

Most patients with this variant of aortic dissection are between the sixth and eighth decades of life, different from the age group of patients with classic type-A aortic dissection and similar to those with type-B dissection. These patients have systemic hypertension, pulmonary emphysema, dislipidemias, chronic renal failure, and diabetes mellitus. Aortic ulcers usually occur in a larger descending aorta, irrespective of gender. Thoracic pain radiating to the caudal regions is a common clinical finding, following the involvement of the descending thoracic aorta[3,6].

Imaging techniques are essential for the diagnosis of penetrating aortic ulcer. A common issue refers to the examination that should be performed first, and this actually depends on the clinical condition and on the availability at the institution in which the patient is being treated. Angiography, despite being an invasive method, is considered the golden standard for diagnosis of vascular diseases. Some institutions offer less invasive techniques, just as effective as angiography, such as magnetic

Fig. 3 - Aortography showing penetrating ulcer of the descending thoracic aorta, treated with self-expandable aortic endoprosthesis

Fig. 4 - Control TC of the chest after stent implantation in the aorta

resonance imaging and ultra-fast helical computed tomography (multi-slice), which are extremely useful in the diagnosis of these conditions[3,6,9].

Aortic ulcers are now recognized as a potential source of massive hemorrhage or even chronic, refractory pain. Therefore, treatment should be instituted whenever possible, using either traditional surgery or percutaneous endovascular stenting via the femoral artery. The latter has been shown to be a safer procedure, as it results in

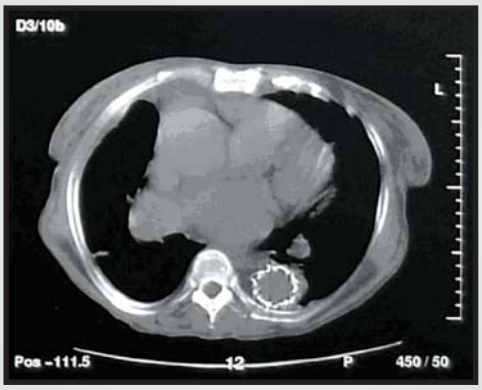

Fig. 5 - Control TC of the chest after stent implantation in the aorta

lower complication rates for these patients who are at a higher surgical risk due to their more advanced age and associated comorbidities[3,5].

In this specific case the patient is an elderly and hypertensive woman with chronic thoracic pain refractory to non-hormonal anti-inflammatory drugs and who, incidentally, was diagnosed with a penetrating aortic ulcer in its descending thoracic segment. The presence of unstable myocardial ischemic syndrome, disc herniation and urolithiasis was properly investigated and ruled out.

The differential diagnosis between penetrating atherosclerotic aortic ulcer and saccular aneurysm, which are often mistaken, is confirmed by the pathological study. These conditions can be associated. The management and complications of this condition, however, follow the same line of thought, thus requiring expeditious and appropriate diagnosis and treatment.

Due to the age group and comorbidities, a percutaneous approach using self-expandable aortic stenting was performed, with angiographic and clinical success. Having no complaints and free of impending risk of the hemorrhagic complications associated with the penetrating aortic ulcer, the patient is now under outpatient follow-up.

While uncommon, penetrating aortic ulcer should be always suspected in elderly patients with heart disease and systemic hypertension presenting with subacute and chronic thoracic pain difficult to be clinically controlled and no evidence of myocardial ischemia. Under these circumstances, percutaneous treatment by means of endovascular stenting via the femoral artery is preferred because of the excellent angiographic and clinical results achieved, as in the case just discussed.

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