Chronic traumatic aortic injuries: a potentially lethal situation

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Introduction
Aortic injuries are reported as the second cause of death in patients with non-penetrating trauma with a mortality rate of 80-90% (1). Such injuries are highly lethal during the initial hours following injury and during the next 72 hours (2). Indeed, few victims survive the acute phase and about 1-2% remain undiagnosed, with the injury manifesting itself as a chronic aneurysm (2). There is a paucity of data on the management of this chronic condition and the focus of the majority of the available guidelines is on the acute setting. Both surgical and endovascular approaches with acceptable results have been applied for these patients, but there is still no randomized trial to compare the two approaches in this chronic setting (3).

In the present study, we describe 7 patients with chronic traumatic aortic injuries successfully managed with either surgical or endovascular approaches. In the present literature review, we underscore the importance of the early detection of these patients and its impact on their clinical course.

Patients
Seven patients with a diagnosis of chronic traumatic aortic injuries were admitted to our center between September 2012 and August 2016. The clinical characteristics of the patients, consisting of 5 males and two female patients, are depicted in Table 1. The majority of the patients had car accidents as the main etiology of their injuries, and the interval between the accident and the admission varied from 1 to 26 years. Two patients had coronary artery disease (CAD) risk factors: one patient was diabetic with controlled blood glucose and the other used antihypertensive medication and had a stable blood pressure. Apart from a positive Hb 5g without active hemorrhage on imaging in one patient with aortic inflammatory illness in our group of patients. All the subjects were symptomatic at the time of admission, and pain was the most frequent symptoms. In 6 patients, a suspicious mass was detected, and in 2, aortic thrombus in plain X-ray radiography; these individuals, consequently, underwent multi-slice computed tomographic (CT) angiography. In one patient who actually presented with dysphagia, the X-ray was not conclusive, and the aortic lesion was detected on spiral CT scan. The aortic defect in all of our patients was detected in the ascending aorta just distal to the left subclavian artery. Two of our patients had CAD risk factors and underwent noninvasive studies, which showed no inducible ischemia. Six patients were managed via the endovascular approach and one had a conventional surgical repair.

Endovascular Management
Under general anesthesia, right femoral artery arteriography was performed as the main access site for the introduction of the device. A 7Fr sheath was placed into the femoral artery in order to create an access for contrast injection via a pigtail catheter. Next, a 0.035 guide wire was advanced into the true lumen of the aorta, and these injuries tend to become symptomatic acutely and only a small number of the patients remain asymptomatic and develop chronic pathology (1,2). In the present case series, we describe seven patients with chronic traumatic aortic injuries. All the patients were asymptomatic at the time of admission, and none of them had received any diagnostic evaluation at the time of the traumatic accident.

About 1-2% of patients with traumatic aortic injuries go undiagnosed during the acute phase (1). In a study by Bennett and colleagues, among the patients with traumatic aortic injuries, half of the patients became symptomatic and the risk of rupture was about 10% (4). In a similar study performed by Finkelmeier et al., the rate of rupture was reported at 33% (5). These two studies showed that the chronic traumatic lesion is not a benign pathology and that it is not only satisfactory.

There is no precise recommendation as regards which patients with initial trauma need further aortic evaluation in the future (3). It has been shown that the risk of aortic trauma is increased by the time to presentation and that there is a direct correlation between the severity of head injuries and the rate of aortic traumatic injuries (5). Consequently, the diagnosis of chronic lesions requires a high index of clinical suspicion and attention to history of previous serious trauma (3).

Surgical graft replacement has been the traditional treatment for aortic injuries. Nevertheless, given its potential risk of mortality and considerable disabling complications (cerebrovascular and paraplegia), the interventional procedure has been introduced (4). This new method has the following potential advantages (3,10): (a) The technique is less invasive in that it obviates the need for thoracotomy and aortic clamp, which is associated with high morbidity and mortality. (b) Hemostatic administration is significantly lower, which results in a lower bleeding risk and concomitant pathologies. (c) Most of the time, single lung ventilation suffices for endovascular repair. (d) Traumatic lesions are localized, which makes them an ideal target for intervention.

The existing literature contains only a few studies on the management of traumatic aortic injuries specific to the circumstances of traumatic aortic disease included 3 patients with chronic injuries who responded perfectly to endovascular treatment and were complication-free in the follow-up period (6). Elsewhere, Takagawa et al. analyzed 26 patients with chronic traumatic aortic disease and employed both surgical and endovascular procedures. In both groups, one patient died in the postoperative period. In addition, one patient had an endoleak repair, and in the endovascular group, both were fabricated and commercially available stent grafts. One patient died postoperatively, and 2 cases of endoleak occurred. They reported freedom-from-treatment failure rates at one and 6 years of 95% and 58% respectively. This is of course, in addition to the risk of rupture in chronic traumatic aortic injuries is a safe procedure associated with satisfactory results but that it definitely needs further optimization (8). Thus, the surgical approach is no longer the gold standard for the treatment of traumatic aortic injuries and is deemed inferior to the endovascular method in most cases.

Although the endovascular approach has gained wide acceptance, there are some distinctive features in traumatic aortic injuries in which the stent graft employment may prove challenging (3,5). Compared to patients presenting with degenerative aortic disease, traumatic injuries tend to happen in a younger population and consequently the aortic diameter is significantly smaller, resulting in oversized stents with possible malposition. Also, the aorta has a tighter radius of curvature in these patients, which increases the risk of the collapse of the stent graft. Moreover, the proximity of the left subclavian artery could potentially compromise the procedure. The introduction of new devices may have resolved some of these limitations (5).

In summary, chronic traumatic aortic injuries may remain asymptomatic during its course, but the victims often become symptomatic and the risk of rupture is considerable. There is no precise guideline for the follow-up of patients who sustained a severe trauma; nonetheless, evidence shows that some individuals may benefit from serial imaging or at least close observation. The early detection of these lesions will result in smaller deficits and potentially easier management.

References