The role of ultrasound examination in disease of the thoracic aorta

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Introduction

Stroke and transient ischaemic attacks are often the consequence of a disease of the aortic arch, especially in elderly patients. The thoracic aorta is a common site of embolising atheromas (1-5); in addition, the dissecting complication of aortic aneurysms can extend to the origin of the cerebral feeding arteries (6,7). A recent extensive metanalysis of a large number of studies clearly showed that when the transverse aortic diameter exceeds 3.4 cm, it is positively and strongly related to the incidence of cervical artery dissections (8). Given the possible link between aortic disease and sudden neurological symptoms, during the past three decades ultrasound techniques have been extensively used to achieve an anatomical characterisation of the aortic arch, to define the presence of atherosclerotic debris, and to diagnose aneurysmal disease and/or its dissecting complications.

Aortic aneurysms

Ultrasound examination of the ascending aorta is feasible both by transthoracic and transoesophageal echocardiography, but the yield of the two techniques is quite different. The first reports on applications of transthoracic echocardiography (TTE) for the diagnosis of aortic disease date back to the early 1970s (9). Subsequently, the diagnostic accuracy of transesophageal echocardiography (TEE) proved superior to that of TTE in detecting aortic aneurysmal disease and its complications; sensitivity and specificity ranged from 94 to 100% (10-12). Indeed, TTE was extensively shown to be less reliable than TEE examination due to the poor acoustic thoracic windows both from parasternal and jugular approaches. Aortic dissection is an acute medical emergency with a high mortality; early recognition and appropriate treatment is crucial to improving survival. Ultrasound examination of the aorta is recommended by American College of Emergency Physicians guidelines as a first level test (13) and given the superiority of the technique, TEE has become the preferred US modality for urgent evaluation of a patient with a suspected acute complication of an aneurysm of the thoracic aorta. Although desirable, TEE is not always readily available as the initial test, particularly in unstable patients with suspected aortic dissection in an acute setting soon after hospitalisation in the emergency room. On the other hand, data collected in limited case series (14,15) indicate that even TTE performed by emergency room physicians can allow reliable diagnosis of aortic dissections and can be a valuable resource especially in the presence of a haemodynamically unstable patient and/or in the presence of an acute cerebral ischaemia, when the findings of the cardiac examination can prompt rapid and often life-saving therapeutic decisions.

Aortic debris

Atheroma of the aortic arch is an important and poorly recognised factor in the aetiology of stroke (16). The risk of stroke is correlated with the presence and thickness of the atherosclerotic lesion and with the coexistence of an atherosclerotic plaque (17). The progressive enlargement of the elderly population is associated with an increasing prevalence of systemic and aortic atherosclerotic disease.
In addition, during the last two decades the astonishing increase in the number of coronary angiographies for diagnostic and therapeutic purposes and the increase in coronary by-pass grafting surgical procedures has increased the risk of mechanical dislodgement of embolic material from aortic plaques by surgical ma-