Case report - Aortic and aneurysmal
Direct epiaortic ultrasound scanning for the rapid confirmation of intraoperative aortic dissection

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Abstract

We present a case of an intraoperative acute aortic type A dissection (AADA) extending from the distal ascending aorta to the distal aortic arch, initially not visible on the transesophageal echocardiography (TEE). The rapid confirmation of the diagnosis by means of direct epiaortic ultrasound scanning facilitated decision-making and the subsequent successful surgical treatment.

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1. Introduction

Intraoperative acute aortic dissection is a life threatening complication in cardiac surgery. Rapid recognition and adequate surgical treatment are of paramount importance for patient survival. Important elements for diagnosis are interpretation of visually perceivable signs, such as rapid diameter increase and/or color change of the ascending aorta or aortic arch, high level of suspicion, as well as instrumental findings. Usually transesophageal echocardiography (TEE) can confirm the diagnosis of an intraoperative acute aortic type A dissection (AADA), provided that the typical echocardiographical signs are present in the aortic segments accessible to TEE. An AADA limited to the distal ascending aorta and/or proximal aortic arch (De-Bakey’s Type II) can be missed by TEE [1]. Accurate direct epiaortic ultrasound scanning [2] can overcome this limitation by providing confirming images and facilitating the necessary decision-making for the surgical treatment to follow.

2. Case report

We present the case of a 72-year-old male patient operated upon for an ascending aortic aneurysm, severe aortic valve regurgitation, moderate mitral valve regurgitation and chronic atrial fibrillation. After completion of the combined procedure (epicardial cryoablation, mitral valve repair and replacement of ascending aorta and aortic valve, the latter with a bioprosthesis) and upon releasing the soft padded aortic clamp, all above mentioned visual signs were recognized on the short remaining segment of the distal aorta and proximal aortic arch: the bluish color of the adventitia extended up to the aortic arch including the aortic cannulation site distal to the origin of the brachiocephalic trunk. It was not possible to confirm the diagnosis by means of TEE (Sonos 7500, Philips Medical Systems, Eindhoven, The Netherlands) since distal arch and descending aorta did not show any signs compatible with an AADA. The clinical suspicion was confirmed by the images obtained by means of direct epiaortic ultrasound scanning (Linear vascular probe 15 MHz, Philips connected to a Sonos 7500 echocardiography machine, Philips Medical Systems, Eindhoven, The Netherlands) (Fig. 1). Interestingly, and despite the probe was held in the suspected direction of flow, color Doppler did not detect flow in the false lumen (obviously due to the absence of a re-entry). However, the false lumen was under significant tension: a small incision carried out on purpose to rule out a less dangerous adventitial hematoma resulted in an active jet-type bleeding which was digitally controlled.

The patient was cooled down (targeted nasopharyngeal temperature 21 °C). During cooling the dissection progressed distally and became visible on the TEE (Fig. 2). In total circulatory arrest the remaining distal ascending aorta was opened and the diagnosis was confirmed: the adventitial layer was completely detached from the media. The entry was at the aortic cannulation site. Antegrade cerebral perfusion was initiated through silicone tipped balloon cannulas in the left and right common carotid arteries (the left common carotid artery was reached via the brachiocephalic trunk). The distal ascending aorta (including the entry at the cannulation site) was resected, the layers of the aortic arch were reconstructed using resorcin-gelatin-based glue with formaldehyde-glutaraldehyde polymerizing agent (Colle Chirurgicale, Cardial, Saint-Etienne, France). An oblique open anastomosis in the concavity of the aortic arch was created using a vascular prosthesis (Intervalvular,
La Ciotal Cedex, France) and a felt-reinforced continuous polyporpylene suture (Prolene 3-0, Ethicon GmbH, Norderstedt, Germany). The patient was rewarmed and weaned off bypass without inotropes and in sinus rhythm. His further recovery was uneventful, he was discharged from the hospital on the 8th postoperative day. A CT-scan at discharge confirmed the absence of dissection in his remaining aorta.

3. Discussion

Intraoperative aortic dissection is a rare but life threatening complication [3, 4]. Rapid diagnosis and adequate surgical treatment are of paramount importance for patient survival. TEE is considered the gold standard for the diagnosis of intraoperative aortic dissection. However, visualization of the distal ascending aorta and aortic arch can be difficult due to the interposition of tracheal air between the ultrasonic probe and those structures [1]. Therefore, TEE could miss a limited DeBakey’s Type II dissection, especially in the particular setting of an already performed ascending aortic replacement. In these cases, epiaortic direct ultrasound scanning can be a valuable additional tool for diagnosis confirmation [2, 5]. If the dissection progresses toward the descending aorta (as in the reported case) it becomes visible again for the TEE. The absence of detectable flow is not a reason to discard the diagnosis as a significant flow cannot exist without a re-entry. Independently from any ultrasound based diagnostic aides, fast recognition of this complication depends mainly on rapid interpretation of visible changes of the aorta and high level of surgical alertness.

References


