

Diagnosis of false lumen perfusion at the initiation of cardiopulmonary bypass using right axillary arterial perfusion during total arch replacement

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To the Editor:

False lumen perfusion (FP), a critical complication associated with cardiopulmonary bypass (CPB), causes organ malperfusion. Although the malperfusion mechanism associated with axillary arterial perfusion (AX-P) is not clear, elucidating the risk factors and the possible etiologies of malperfusion would aid anesthesiologists in making a rapid and accurate diagnosis. We describe a rare case of FP at the initiation of CPB using right AX-P. An 82-year-old woman diagnosed with acute type A aortic dissection underwent emergency total arch replacement. Although the aortic dissection extended from the distal ascending aorta to the abdominal aorta distal to the renal arteries, all the main branched arteries, including the three aortic arch branches, were perfused from the true lumen. Under general anesthesia, the hemodynamic status was stable (blood pressure, 80–90/40–50 mmHg; heart rate, 80–90 beats/min). The right and left baseline regional cerebral saturation of oxygen (rSO₂) values were similar (range 70–75 %). Transesophageal echocardiography (TEE) detected to and fro movement of the intimal flap, which was synchronized with the cardiac cycle, at the entry site of the dissection on the lesser curvature on the distal aortic arch (Fig. 1a). Right AX-P

with a side graft was established and full-flow CPB (cardiac index, 2.2 L/min/m²) was initiated; subsequently, the inflow line pressure increased inappropriately, and the arterial blood pressure measured at the right radial artery increased to 100 mmHg. Furthermore, the pulse wave at the left index finger suddenly disappeared. TEE revealed that the intimal flap started fluttering, the entry of the aortic dissection remained open due to a deformed intimal flap (Fig. 1b), and the enlarged false lumen compressed the true lumen, indicating FP. We communicated this information to the surgeons and decided to establish femoral artery cannulation. For cerebral protection, the target body temperature was set to 24 °C. After starting retrograde aortic perfusion, adequate extracorporeal perfusion was obtained. During the 37 min of FP, rSO₂ did not decrease. The operation was successfully completed, without any complications associated with malperfusion of CPB.

Although AX-P is associated with a lower incidence of malperfusion as compared to other sites of peripheral arterial perfusion [1, 2], the possibility of complications remains. Therefore, anesthesiologists need to check for possible malperfusion at the initiation of CPB in all patients. TEE is reportedly effective for detecting malperfusion [3]. Previously suggested mechanisms of malperfusion include the narrowing of the innominate artery [4] and FP caused by a dissection entry site involving the innominate artery [5]. The present case indicates another mechanism of malperfusion associated with right AX-P, that is, the blood flow of right AX-P via the innominate artery was directed toward the dissection's entry site on the lesser curvature of the aortic arch, with a deformed intimal flap, resulting in FP. Thus, although this is a rare complication, anesthesiologists should recognize the risk of FP associated with right AX-P and

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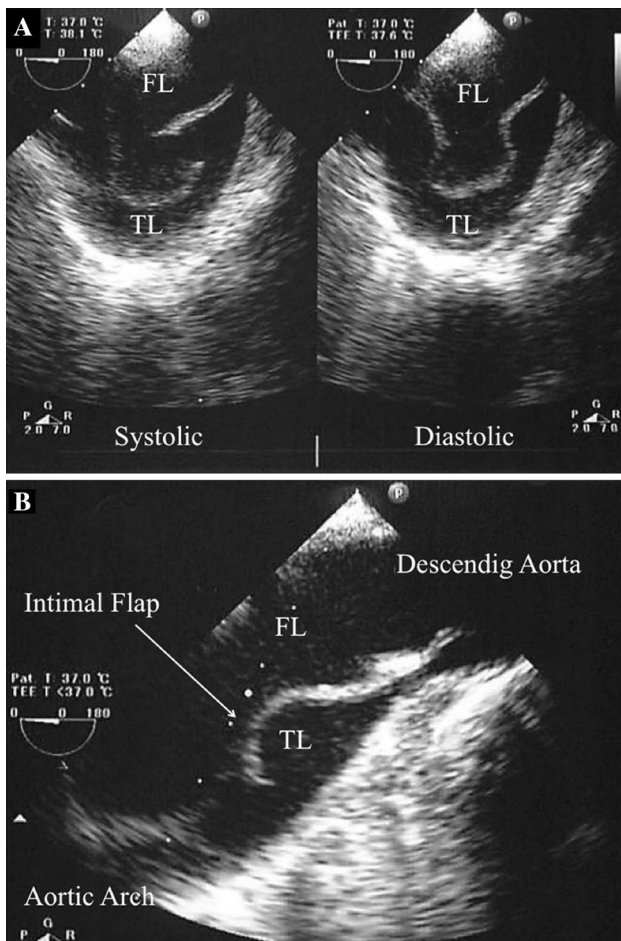


Fig. 1 Intraoperative transesophageal echocardiographic evaluation of aortic dissection. **a** Transesophageal echocardiography findings before cardiopulmonary bypass showed the entry of the aortic dissection on the lesser curvature of the distal aortic arch. The to and fro movement of the intimal flap was synchronized with the cardiac cycle. We could distinguish the true lumen from the false lumen because the lumen indicated TL in the figure lead to the left ventricle. **b** The intimal flap started fluttering after right axillary arterial perfusion, suggesting a relationship between the intimal flap's movements and the blood flow of the cardiopulmonary bypass via the innominate artery. Further, the entry of the aortic dissection remained open due to a deformed intimal flap, and the enlarged false lumen compressed the true lumen. *TL* true lumen, *FL* false lumen

careful observation is recommended in cases where the entry site of dissection is detected on the lesser curvature of the aortic arch.

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