Atherosclerotic arch and anemia: A dangerous combination

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In their article in this issue of the *Journal*, Ishii and coworkers¹ describe a young patient with anemia and acute cerebral infarction caused by the migration of a large mobile thrombus on the underside of the aortic arch at the previous insertion site of the ductus arteriosus. This is not a common finding. The patient required major surgery, consisting of a total aortic arch replacement. The central message was that patients with idiopathic cerebral infarction and acute anemia should be regarded as having cerebral infarction of aortic origin. The hemoglobin level was 7.5 g/dL. The remaining part of the ductus arteriosus definitely acted as an accelerator of calcification and atherosclerosis in the aortic arch. The combination created a dangerous situation for the brain.

This case reminds us of 2 important facts. First, atherosclerotic plaques and thrombus formation in the distal aortic arch are a major threat for thrombus migration and severe cerebral vascular complications.^{2,3} Second, thrombosis formation can occur in younger patients with morphologic or biologic risk factors, such as anemia. Mobile thrombotic masses in the distal arch can migrate somewhat backward and up into the brain as a result of a constant back-and-forth flow motion in the horizontal portion of the aorta. Those masses can be heterogeneous in nature, combining atherosclerotic plaques, mobile solid atheroma, and fresh thrombus. The more solid atheroma and less thrombus that can be shown, the less responsive these lesions are to anticoagulation. Considering that the current era of aortic surgery provides better outcomes, more aggressive treatment such as aortic arch surgery should be considered, particularly in young patients, to avoid catastrophic complications.⁴

Another important aspect of this case report is the impact of the hemoglobin level on stroke risk. The cause of stroke is undetermined in 25% of young adults.⁵ Observational studies have shown conflicting results, and actually both low and high hemoglobin levels can be associated with increase risks of stroke and mortality. A recent study⁶ including more than 8000 patients with stroke in the UK showed that anemia was present in 24.5% of the patient population with stroke.

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Central Message

Looking at arch atheroma in combination with other biologic factors, such as anemia, remains essential in diagnosis and prevention of stroke.

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Stroke remains a significant concern for cardiac surgeons and interventional cardiologists, who are dealing with an aging population with increased risk of aortic arch atherosclerosis undergoing cardiac catheterization, conventional cardiac surgery, or transcatheter aortic valve implantation. Better imaging tools are now available to detect and prevent embolic complications, including advanced imaging technology, spiral computed tomographic scanning, 3-dimensional intraoperative ultrasonography, and magnetic resonance imaging. Those tools should help provide better stratification of cardiovascular risk and better prevention of embolic stroke. Specific protocols based on such imaging findings are important for procedures involving manipulations of the aortic arch. One should not underestimate the negative consequences of untreated anemia and must pay attention to correct iron deficiency and consider blood transfusion as part of a preventive strategy for stroke.

In summary, the unique case report of Ishii and coworkers¹ attracts our attention to more common matters, such as perioperative stroke, aortic arch atheroma, and anemia. These common issues in cardiovascular surgery are worth thinking about.

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