Objective: Intraoperative cerebral micro embolism is a cause of cerebral dysfunction after cardiac surgery, and particulate micro emboli are the most damaging. Using a new-generation transcranial Doppler ultrasound, we compared the number and nature of micro emboli in patients undergoing off-pump coronary artery bypass grafting during performance of proximal anastomoses with three techniques: an aortic side-biting clamp and two clampless devices (the Enclose II device [Novare Surgical Systems, Inc, Cupertino, Calif] and the Heartstring II device [Guidant Corporation, Santa Clara, Calif]) developed to obviate the need for an aortic side-biting clamp, thereby reducing the number of cerebral micro emboli.

Study Design: Bilateral continuous monitoring of the middle cerebral arteries was performed with a multirange, multifrequency transcranial Doppler device that both automatically rejects artifacts online and discriminates between solid and gaseous micro emboli. Recordings were continuously undertaken during performance of 66 proximal aortic anastomoses in 42 patients. Thirty-five anastomoses were performed with an aortic sidebiting clamp, 20 with the Enclose device, and 11 the Heartstring device.

Results: Most micro emboli occurred during application/insertion and removal of each device from the ascending aorta. The median number (interquartile range) of total micro emboli was 11 (6-32) during side clamping, 11 (6-15) with the Enclose device, 40 (31-48) with the Heartstring device (P < .01). The proportion of solid micro emboli was significantly higher in the side-clamp group (23%) compared with 6% and 1% in the Enclose and Heartstring groups, respectively (P < .01).

Conclusion: Avoidance of aortic side clamping results in a significant reduction in the proportion of solid micro emboli detected with transcranial Doppler. As solid microemboli are probably the most damaging, use of the Enclose and Heartstring devices may represent an important strategy for minimizing cerebral injury during proximal aortic anastomoses.