Comparison of agitated saline mixed with blood to agitated saline alone in detecting right-to-left shunt during contrast-transcranial Doppler sonography examination.

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Abstract

PURPOSE: To evaluate a technique for contrast agent preparation as mixing the patients' blood with agitated saline and to compare it with agitated saline alone in diagnosis of cardiac right-to-left shunt in regard to their sensitivity, time window, and distribution of artificially induced microembolic signals.

METHODS: Fifty-two patients with stroke who had Transesophageal echocardiography proven right-to-left shunt underwent contrast-transcranial Doppler sonography with injection of agitated (i) 9 ml saline with 1 ml air with Valsalva maneuver, (ii) 9 ml saline with 1 ml air without Valsalva maneuver, (iii) 8 ml saline, 1 ml of the patient's fresh blood and 1 ml air with Valsalva maneuver, and (iv) 8 ml saline, 1 ml of the patient's fresh blood and 1 ml air without Valsalva maneuver.

RESULTS: The sensitivity of the bilateral middle cerebral artery monitoring in diagnosis of right-to-left shunt was 94.2%, 71.2%, 96.2% and 76.9% for agitated saline with Valsalva maneuver, agitated saline without Valsalva maneuver, agitated saline and blood with Valsalva maneuver, and agitated saline and blood without Valsalva maneuver methods, respectively. Severe right-to-left shunt was detected in 100% of patients when agitated saline and blood with Valsalva maneuver was used. Application of Valsalva maneuver resulted in detection of more right-to-left shunt (P = 0.002).

CONCLUSION: Agitated saline mixed with blood with Valsalva maneuver is a sensitive method to detect right-to-left shunt, especially in the case of severe shunt. Mixing agitated saline with blood may increase the sensitivity of the test.