



GLENMARK CARDIAC CENTRE NEWSLETTER

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CONTRAST ECHOCARDIOGRAPHY FOR EVALUATION OF CARDIOEMBOLIC

One third of all cryptogenic strokes are cardioembolic in nature. Although Transthoracic (TTE) is widely available, noninvasive, cheaper, and easier to perform than Transesophageal echocardiography (TEE), it is less sensitive for the detection of cardiac source of embolus. Conditions which may be missed by TTE include left atrial thrombus, small tumors, patent foramen ovale and atheromas in the ascending aorta. TEE has a much higher diagnostic yield for detection of these anomalies. The TEE in the evaluation of suspected cardioembolic stroke has to be carried out in a systematic and diligent manner. It includes careful examination of all chambers, LV apex, LA appendage, each valve in turn, contrast TEE with Valsalva manoeuvre for detection of patent foramen ovale (PFO) and finally interrogation of the ascending, descending thoracic and arch of aorta.

Contrast TTE & TEE using agitated saline is performed for detection of right-to-left shunts. Microbubbles of air formed by agitating saline persist long enough to opacify the right heart chambers but are subsequently trapped in the pulmonary microcirculation. As a consequence, these bubbles will not gain access to the left heart chambers unless a right-to-left intracardiac or extracardiac shunt is present. The appearance of bubbles in the left heart early (within three to five beats) after right chamber opacification suggests an intracardiac shunt. Later appearance of bubbles in the left heart suggests pulmonary arteriovenous shunting.

Agitated Saline Echocardiography Study Technique:

- ◆ A large bore angiocath is inserted into the right antecubital vein (preferred site - shortest distance to the heart for maximal opacification).
- ◆ Two 10 cc syringes are taken, draw up 8.5 ml of normal saline, 1 ml of blood from the IV site and 0.5 ml of air
- ◆ Agitate solution forcefully between two syringes that are attached to a 3 way stopcock, until solution appears cloudy
- ◆ First injection completed at rest
- ◆ Second injection completed with a provocative manoeuvre. Provocative manoeuvres such as Valsalva manoeuvre & cough are used to increase RA pressure above LA pressure so that right to left shunting becomes more evident.

Results:

Results are coded as positive for PFO detection if there are micro bubbles seen in the left heart chambers within 5 beats of the entrance of the saline into the RA. Late appearance of contrast, > 5 beats, is most likely due to intrapulmonary shunting.

We present an interesting case of a 28 yrs young female who suffered a stroke, and whose MRI findings were suggestive of an embolic etiology. There were no risk factors and her MRA did not reveal extra / intra cranial vascular disease. Her contrast TTE with Valsalva manoeuvre suggested evidence of a PFO with significant right to left shunt during the test (Fig 1A to 1D).



Figure 1-A: four chamber view prior to agitated saline injection

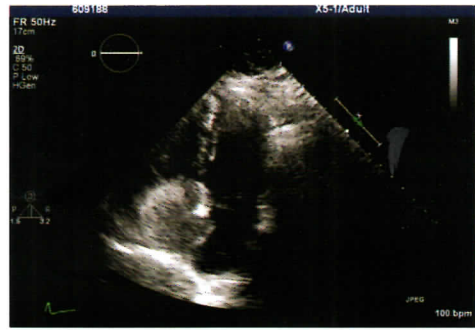


Figure 1-B: agitated saline occupying RA .



Figure 1-C: agitated saline occupying RA & RV

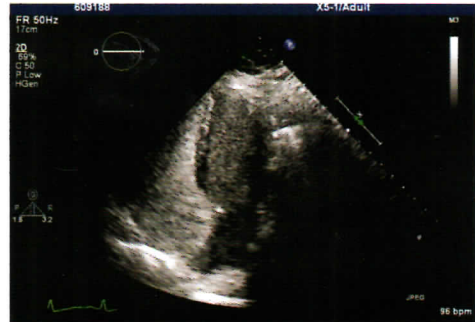


Figure 1-D: agitated saline occupying LA & LV

The size and other anatomical details of the PFO, however were not adequately delineated. Hence we performed a TEE with contrast injection which demonstrated an aneurysm of the IAS and right to left shunt across the PFO (Fig. 2A to 2C). The patient subsequently underwent transcatheter closure of the PFO and has not had a recurrence of his CVA since.

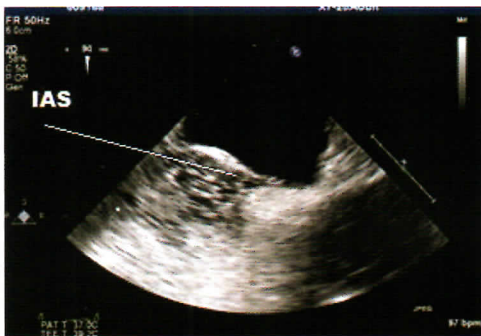


Figure 2-A: TEE 90 degree view agitated saline occupying RA

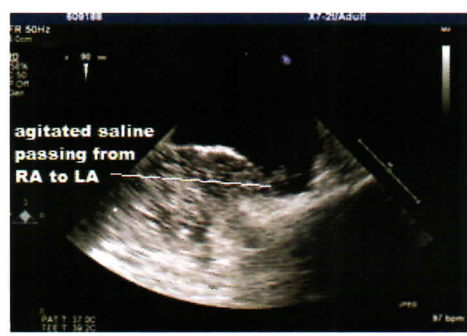


Figure 2-B: agitated saline passing from RA to LA through PFO



Figure 2-C: micro bubbles occupying LA

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INVESTIGATIONS PROVIDED AT OUR CENTRE

- ✦ 2D Colour Doppler Echocardiography
- ✦ Head-up Tilt Test
- ✦ Tissue Doppler
- ✦ Pediatric Echocardiography
- ✦ Computerised Stress Test
- ✦ 3D Colour Doppler Echocardiography
- ✦ Fetal Echocardiography
- ✦ Ambulatory B.P. Monitoring
- ✦ Diet Consultant : Dr. Sheetal R. Mhamunkar
- ✦ Transesophageal Echocardiography
- ✦ Ambulatory Holter Monitoring
- ✦ Comprehensive Cardiac Medical Check-up
- ✦ Dobutamine Stress Echocardiography
- ✦ Event Recorder

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