Response to the letter to the editor

We thank Dr. Saura for the interest in our work. Dr. Saura raised an important issue regarding the preferred venous route of contrast administration during bubble studies for assessment of a patent foramen ovale (PFO). In the vast majority of published literature and more relevant in clinical practice an antecubital venous access is used for administration of agitated saline or other non-transpulmonary contrast agents. The superior sensitivity for detection of right-to-left shunts was clearly shown using femoral versus antecubital (brachial) veins in two comparative studies.\(^1,2\) The rationale behind the higher sensitivity of the femoral approach remains unclear. One probable mechanism for the better results from the femoral vein approach may be due to intra-right atrial flow pattern where the inferior caval flow is directed towards the inter-atrial septum compared to superior caval flow which is directed away from the inter-atrial septum.\(^3\) Another postulated theory is the more extensive right atrial opacification following femoral injection (due to larger vessel and cannula diameter) compared to the antecubital or brachial vein.\(^4\) However, weighing evidence for which mechanism has more contribution of improved sensitivity for PFO detection using femoral approach, both theories lack enough support from published literature. Moreover, the case report by Lindeboom et al. in which the authors showed from transthoracic apical four-chamber view a persistent area of negative contrast in the right atrium facing a probable PFO after several antecubital contrast injection. This area of negative contrast disappeared immediately after femoral venous contrast administration. Moreover, the authors have clearly demonstrated from two transoesophageal 2D images, after contrast administration, the flow from the inferior caval vein which is directed to the PFO as well as the superior caval flow which is directed away from the inter-atrial septum. Despite Saura et al. suggest that this is an evidence for the importance of the extent of right atrial opacification, rather than caval flow pattern, the reverse may be true.\(^5\) The negative contrast effect in this case may be explained only by two mechanisms, which are related to blood flow patterns. The negative area of right atrial shadowing may be caused by a left-to-right flow from a mixed flow shunt or it suggests that the blood crossing the PFO is originated mainly from the inferior caval vein. The negative contrast area, which lies close to PFO, is seen in patients with atrial septal defect where color Doppler clearly demonstrated left-to-right shunt flow. However, immediate opacification of the negative contrast area following femoral vein contrast administration supports the caval flow mechanism, which is also suggested by the authors of the case report.\(^5\) In our experience, a negative contrast area, which is seen despite optimal contrast protocol using Valsalva technique, disappears immediately after small amount of contrast administration via femoral vein. In such cases both Doppler color flow to detect a possible left-to-right shunt as well as femoral contrast injection may be justified. We may agree with Saura et al. that future development of non-invasive estimation of intra-atrial pressure gradients may be able to clarify the actual weight of flow streaming in inter-atrial PFO-related shunt in the adult.\(^6\) Finally, justification of femoral vein approach should be carefully weighed against potential complications.

References


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