



The significance of shunt directionality of iatrogenic atrial septal defect in different clinical scenarios: concerns on management

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The advent of catheter-based therapy for structural left heart diseases has created a group of acquired, iatrogenic atrial septal defects (iASDs) [1–3], because of the preferable approach to the left heart via interatrial septum crossing. In contrast to the congenital ASD, iASDs are created acutely, potentially limiting physiological compensation.

Concerning patients with atrial fibrillation and contraindication to anticoagulation, Puga et al. [1] presented the prevalence and the clinical outcome of iASD 1 month after LAA occlusion guided by transesophageal echocardiography or in some cases by intracardiac echocardiography. Interestingly the iASD remained in 37% of that specific population (mean age 72 years) with the use of intracardiac echocardiography to be associated independently with higher prevalence of iASD. In addition the presence of iASD had no significant association with right chamber remodeling and was not associated with clinical outcomes.

As the structural intervention procedures have increased lately, many questions have been emerged. Should iASDs be closed by routine or not and is this decision affected by shunt directionality? Prior studies have shown that the presence of an iASD may be associated with increased mortality if sustained chronically without repair [4]. However, conflicting findings exist, with other studies [2, 3] showing that the majority of iASDs spontaneously close within 12 months and that rates of systemic embolism and stroke did not differ from rates in patients without iASDs.

It is worth noting that iASDs are not always the unwelcome result of a cardiovascular intervention. Lately high interest has been presented at the transcatheter intra-atrial shunt device in patients with heart failure [5, 6]. It's known

that the high LAP is associated with patient morbidity and mortality. When LAP has been reduced by appropriate medical treatment (< 18 mmHg), a reduction in cardiovascular events occurred. It's known that there is a variation in LAP during daytime. The REDUCE LAP-HF I (Reduce Elevated Left Atrial Pressure in Patients With Heart Failure) trial by Feldman et al. [5] has investigated the use of a transcatheter intra-atrial shunt device in patients with heart failure. A significant reduction in exercise pulmonary capillary wedge pressure was found at 1-month post-procedure in the study group, with no significant difference in the rate of major adverse events (cardiovascular, cerebrovascular, or renal). These findings imply that in a particular group of patients iASD closure may be harmful.

Concerning iASDs following other structural procedures of left heart structures such as MitraClip implantation [7, 8], there are some concerns on iASDs closure particularly for patients with non-ideal MitraClip outcomes. On the other hand theoretically, an iASD could provoke paradoxical embolism and counterbalance some of the beneficial effects of a MitraClip procedure by right ventricular overload. In cases with elevated right atrial pressures the shunt R–L should result to a reduction of right ventricular pressures without significant changes in the left ventricular pressures. No data have been published about the clinical significance of long-term subclinical deoxygenation following iASD formation.

Overall, the heterogeneity in data regarding to iASD closure, highlights the multitude of complex physiological and mechanical variables an operator must consider when deciding whether to close an iASD. In our opinion several factors should be considered in order to decide iASD closure. Ideally the hemodynamic evaluation and the estimation of both left and right atrial pressures should be considered in the decision making during the procedure. The concomitance with concurrence of at least moderate mitral regurgitation, or tricuspid regurgitation should be taken into consideration because of the changes in intra-atrial pressure. The presence

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of a non-compliant left atrium in the context of chronic heart failure also results in increased left atrial pressure. More studies are needed to assess the role of right atrial function in flow directionality and clinical outcomes.

Due to these contradictory considerations, larger clinical studies are necessary to address the remaining questions and suggest guidelines for the management of iASDs. Decision for iASD closure is not provisional and decision should be personalized according the patient's profile, the iASD size and the intra-atrial pressure gradient.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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