Conflict of interest: none declared.

References


eReply re: Atrial septal defect closure with a composite check-valved patch in pulmonary hypertensive patients

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We read with great interest the manuscript by Rosic et al. [1]. The authors offered an applicable method of atrial septal defect (ASD) closure with a check-valved uni-directional composite patch in patients with pulmonary hypertension. We believe that there are certain issues to be discussed.

At our institution, we perform ASD closure with fresh pericardium in patients with normal or slightly increased pulmonary artery pressure and glutaraldehyde treated pericardium in patients with increased pulmonary artery pressure but not exceeding systemic blood pressure, with the ease of availability and very low cost of the material. The idea of the pericardium eventually adhering to the Dacron patch and producing a secure closure of the septal defect is quite attractive. However, could the authors comment on why they preferred the bovine pericardium in particular rather than autologous tissue?

Unidirectional check-valved patch closure is a technique especially suitable for patients with VSD and reactive pulmonary hypertension in our unit. The check-valved patch is created by the use of two Dacron patches, one being bigger than the other, the big one being oval and the small one being U-shaped, after sewing the two patches to each other so as to create a pocket, a hole is created with an aortic punch [2]. Although the direction of the flow through the opening seems more important in case of VSD closure with an unidirectional flap valve patch, i.e. to prevent outflow tract obstruction, valvular damage etc [2], do the authors aim any particular direction for the opening of the patch by leading the flow inside the left atrium during ASD closure? Another issue concerns the post-operative medications in the era of pulmonary arterial pressure lowering agents, especially nitric oxide and sildenafil. Although the authors successfully managed the early post-operative course of the patient with sodium nitroprusside and then gradually converted to calcium channel blocker therapy [1], in our practice, we routinely give nitric oxide to facilitate postoperative recovery in pulmonary hypertensive patients [2], which is followed by oral sildenafil therapy [2,3]. Could early postoperative nitric oxide and long-term sildenafil therapies influence the recovery of the patient?

The last issue is regarding the severe tricuspid valve regurgitation of the authors’ case [1]. It is known that moderate to severe tricuspid regurgitation in the post-operative period after congenital heart defect repair is associated with increased morbidity, thus tricuspid repair is strongly advocated [4]. Unfortunately, there is no data regarding any intervention to the tricuspid valve during the surgery of the authors’ case or the status of the tricuspid valve in the first year follow-up echocardiography. Did the authors perform annuloplasty? What was the reaction of severe tricuspid regurgitation to ASD closure and influence of it to the right ventricular dimensions and symptoms of the patient during the follow-up? We congratulate the authors once again for their successful management strategy in such a high-risk patient and for stressing once again the importance of unidirectional valved patches in treating patients with increased but reactive pulmonary vascular resistance. We believe it would be more informative if the authors could kindly comment on the afore-mentioned issues.

Autologous pericardium is harvested during cardiac surgery procedures and has been used in the surgical reconstruction of various congenital and acquired cardiovascular diseases. Using autologous pericardium as a patch material may provide multiple advantages, some of which are ready availability, excellent handling characteristics, conformability, non-porosity, lack of bleeding through needle holes, resistance to infection, and reduced inflammatory response. Bovine pericardium has come into common clinical use during the past 20 years. Commerically available patches are processed to be acellular, preventing transplantation of bovine proteins or DNA into the host [3]. Glutaraldehyde is a typical processing agent, croslinking -NH2 groups of lysine, hydroxylsine, or the N-terminus of amino acids, to form amine linkages with the elimination of water, increasing tissue strength to inhibit biodegradation, as well as reduces antigenicity to sterilize the tissue.

Although it may seem that both autologous and bovine pericardium are similar in their main properties, a recent experimental study comparing the progression of calcification in vivo between autologous and heterologous pericardium in a rabbit model, showed that the autologous pericardium has a stronger ability to resist calcification [4]. It seems intuitive to use autologous pericardium whenever possible. Indeed, autologous pericardium would be our primary choice for creation of unidirectional flap valve. However, in our patient, autologous pericardium was extremely thin and loose and for this reason we decided to use bovine pericardium with its reliable consistency and minimal thickness of 0.5 mm providing dependable suture retention and lack of pressure deformation.

2. Is there any particular direction for the opening of the patch by leading the flow inside the left atrium during ASD closure?

The key question here is how does the right-to-left atrial flow affect the flow dynamics in the left atrium (LA) and consequently transmural flow pattern. The LA has a complex structure; the left pulmonary veins are positioned lower in the atrial cavity near the mitral orifice and the right pulmonary veins are positioned higher with respect to the LA cavity. Additionally, there is a highly distensible and trabeculated muscular sac positioned near the mitral orifice - left atrial appendage.

From the point of not compromising native left atrial flow dynamics, it may seem logical to direct the opening of the unidirectional patch valve in such a manner that it faces the superior-anterior wall of the left atrium. We hypothesize that this direction would induce minimal disturbance in left atrial flow pattern, not significantly affecting antegrade or retrograde flow through the chamber. However, for precise...