

## Editorial

## Minimal Access Surgery for Atrial Septal Defects in Children

## Cirugía mínimamente invasiva para la comunicación interauricular en niños

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Alternative incisions for access to cardiac structures during open heart and thoracic procedures have received much attention in the surgical community over the years. The stated goal has been to improve the cosmetic results, reduce pain and recovery time, and reduce length of hospitalization. Of all these factors, improved cosmetic results has proven to be the most objective outcome of these surgical approaches. While there have been some studies to evaluate the differences in pain and hospital or intensive care unit length of stay, no objective differences between the various approaches have been noted in children, even in comparison to full sternotomy.<sup>1</sup> A wide variety of minimal access approaches have been described including: lower sternotomy,<sup>2</sup> "trans-xyphoid" approach,<sup>3</sup> anterior or lateral thoracotomy,<sup>4</sup> and trans-axillary incisions.<sup>5</sup> An array of techniques for management of cardiopulmonary bypass, cardiac arrest, and de-airing procedures have also been described. The main tenets of the procedure, however, are common to most of these, which are: extracorporeal circulation is used in virtually all cases, either cardioplegic or fibrillatory arrest is used to prevent the heart from ejecting air into the systemic circulation, and maneuvers to remove air from the left side of the heart are required prior to resuming ejection.

As technology has advanced, more and more of these types of defects are being closed using a catheter-based device, with improving results. The current indications for surgical closure of secundum defects are the inability to close the defect with a device because of the absence of a rim, too large a defect, or parental or patient choice. While debate continues with regard to the long-term consequences of device closure, and some alarming reports of late complications of device erosion into adjacent structures have begun to appear,<sup>6</sup> it is a fact that a substantial proportion of patients will have atrial septal defects closed in the catheterization laboratory rather than the operating room.

For the surgeon, the choices for incision are many and in experienced hands, the risks and results should be the same as for a full sternotomy approach. Awareness of the potential pitfalls with each of the alternative approaches is mandatory since each one has different limitations for exposure to the heart and intracardiac structures, and potential for injury to adjacent structures. Examples of these include phrenic nerve injury, presumably from

the pericardial traction sutures, in the thoracotomy and axillary approaches; impaired breast development in females with the anterior thoracotomy approach;<sup>7</sup> and limited ability to de-air the left heart with most of the small incision approaches.

De-airing is an important topic in itself, since the atrium is opened in all the surgical procedures and, by necessity, air is introduced into the heart. Limiting the amount of air introduced into the left side of the heart seems an obvious goal; however, this must be balanced with the need to visualize the entire defect and adjacent structures, particularly for ostium primum defects. Thus, an effective routine must be developed for not only removing the air visible to the surgeon through the atrial incision but also the air that can be trapped in the pulmonary veins and left atrial appendage. In the current era, intra-operative trans-esophageal echocardiography is an important aid for the surgeon and anesthesiologist to detect air and confirm the efficacy of the de-airing maneuvers. While most reports focus on the technical aspects of bypass and cardiac arrest, rarely is the use of intra-operative echocardiography described. Given the advantage that this imaging modality provides the surgeon, its routine use in these cases has become common practice at our institution.

In the article published in *Revista Española de Cardiología*, Gil-Jaurena et al.<sup>8</sup> describe their experience with two minimal access approaches to closure of atrial septal defects in children: the anterior thoracotomy approach and the axillary approach. In their hands these two incisions provided equally effective access to all the important structures and allowed the surgeons to achieve excellent results with both techniques. Cannulation was somewhat more complex with the axillary approach, but the complication rates did not differ from those of the sub-mammary incision. It is also interesting to note that a survey of parental satisfaction revealed no differences between the two incisions. Similar results were obtained by Bleiziffer et al. in their study,<sup>7</sup> despite the objective differences between the two groups.

## CONFLICTS OF INTEREST

None declared.

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