

Peer Review File

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Reviewer A:

Comment 1: The present article shows the results and follow-up of a series of percutaneously closed residual postoperative VSDs. The VSDs are divided into two groups, one related to the surgical patch and the second related to additional muscular VSD after surgery. This is a potentially interesting article because it is a relatively large series of unusual procedures treated with various devices. It has "acceptable results" and also includes children with low weight (33-66% of the left ventricular outflow tract (LVOT) diameter - or other reasons.

Reply 1: Thank you, we are grateful for your kind words.

Comment 2: It is necessary to provide information (in the tables and/or text) regarding the- VSDs' size, location, and how many were close to tricuspid and aortic valves.

-it is also necessary to define how much (in mm) the authors considered "close to the valves. "Echocardiographic parameters, at least

- Left ventricular end-diastolic and end-systolic volume
- Ventricular ejection fraction
- Pulmonary systolic pressure

Reply: Thank you for bringing this to our attention; the study was retrospective, and

regrettably, not all procedures had hemodynamic data taken (this limitation was mentioned in the limitation section). The hemodynamic data of a subset of patients who received hemodynamic assessments prior to VSD closure were gathered and analyzed statistically and reported in the revised manuscript. Data regarding the echocardiographic parameters were also collected before and after closure and provided in the relevant sections of the revised manuscript.

Change in the text: All the recommended information is supplied in the relevant sections, summarized in tables 2 and 3, and in the supplemental materials /supplemental table. Methodology page 7, lines 147-157. Results section, para 2, Para 5.

Comment: 3.- It would be necessary to explain in a little more detail the steps taken in both antegrade and retrograde procedures (guides, catheter crossing, high support guides, loops...). This is important so that other groups can reproduce the study's results in other patients.

- also preprocedural antibiotic prophylaxis, if administered, needs to be written

Reply: Thank you for pointing this out; As cardiac catheterization is performed using a fully aseptic approach, and prophylactic antibiotics are not routinely given as a matter of institutional policy. The revised manuscript included detailed descriptions of the antegrade, retrograde, and AV loop approaches.

Change in the text: The text and accompanying tables have been updated to reflect the necessary recommendations. The methodology section, page 6, lines 121-123, Pages 7-13.

Comment 4: - Information is also missing on how many procedures were antegrade

and retrograde and how many arteriovenous loops were done.

Reply: Thank you for the recommendation. The approaches for VSD closure are mentioned in the revised manuscript. All essential revisions were made to the tables, the manuscript, and the supplementary materials (table 2, results section page 15, supplementary material).

Comment 5: - It is necessary to provide specific clinical follow-up data

- Did the ICC improve?

- Did the functional status improve, by how much?

- Did the cardiac parameters (ventricular diameters, LVEF, PSAP...) improve with the intervention

- etc

Reply: Thank you for this suggestion; we agree that clinical outcome data would strengthen the study. The relevant clinical and echocardiographic parameters were gathered, statistical analysis was performed, and the findings of these analyses were presented in table 3 and in the results section.

Changes in the text: Results section page 17, and discussion section page 22

Comment 5: - Among the deaths that occurred during follow-up, it is necessary to specify in the third patient the location of the endocarditis (did it occur in the mitral valve? did it occur in the closure device? in a pacemaker lead? and how long it was after the percutaneous closure (Was it related to the procedure?))

Reply: Thank you for pointing this out; The third patient had trisomy 21 with a complete atrioventricular septal defect. The patient underwent surgical repair, then

VSD device closure, and was discharged home. One year later and during follow-up, the patient had severe mitral regurgitation and underwent mechanical mitral valve replacement. After the mechanical valve, the patient had infective endocarditis on the mechanical valve, stroke, sepsis, and multiorgan failure.

Change in the text: more data about this patient is mentioned in the text (Results section, Pages 16-17).

Comment: 6.- The discussion section should improve significantly. Key findings, authors' study strengths, comparison with similar research, and explanations of findings should be written.

Reply: Thank you for your suggestions to improve the readability of the article; the discussion section has been revised with the expectation that it will be enhanced by the implementation of the offered recommendations and required language revisions.

Change in text: Discussion section (all changes are highlighted in red).

Comment:7.- I recommend including in the abstract the potential clinical and echocardiographic parameters improvement during the follow-up

Reply: Thank you for this suggestion. The most noticeable change during follow-up was the significant improvement in clinical status, as reported in the abstract.

Change in text: Abstract, the result section.

Comment:8.- Current Table 3 and Table 4 are interesting to explore, but I recommend attaching them as supplementary data online. I would recommend including the data in these tables in a generic table format and organizing the tables in

TABLE 1: Demographic and clinical characteristics

TABLE 2: Procedural data and devices

TABLE 3: Clinical and echocardiographic follow-up Data

Although this is an interesting article, the writing needs to be improved, many relevant data are missing, the abstract and methods need to be better structured, and the poor discussion needs to be improved.

Reply: Thank you for these suggestions for improving the manuscript's readability.

Change in text: All the suggested adjustments were made in each section of the manuscript and relevant tables.

Reviewer B:

Comment: In the present manuscript, Abdelmohsen et al. report a retrospective single-center experience of 33 patients undergoing percutaneous closure of residual VSD. The paper is interesting and well-written. Please find some minor comments below:

Reply: Thank you for this encouragement.

Comment: -Abstract: Express data as median (interquartile range) instead of minimum/maximum

Reply: The abstract has been revised to incorporate clinical data after cardiac catheterization and findings in the median and interquartile range.

Change in text: Abstract results section.

Comment: -Evaluation: Significant VSD is generally defined as $Qp/Qs \geq 1.5$. Please specify the percentage of patients that underwent invasive right cath before the

procedure. How many patients had a preprocedural cardiac CT for sizing and device selection?

Reply: Thank you for pointing this out. However, given that the study was retrospective, not all procedures had hemodynamic data collected (this limitation was mentioned in the limitation section). The hemodynamic data of 28 right cardiac catheterizations performed prior to VSD closure were collected and statistically evaluated. The results are described in table 2 and in the supplementary material. Thus, all necessary revisions were made to the text and tables. Regarding CT for VSD evaluation and device selection, TTE, TEE, and LV angiography were used to determine the VSD's size and identify the most suitable devices in this cohort. We did not use CT/MRI for the evaluation of VSD size or for device selection.

Changes in text: Techniques for VSD closure and device selection are mentioned in the methodology section of the updated manuscript (Pages 6-13), Results section (pages 14-15), Table 2.

Comment -Please specify in table 3 or in the text, which were the main mechanisms of unresolved VSD (eg. fenestration, Gerbode, etc).

Reply: thank you for pointing this out. The mechanism of residual VSD was mentioned in the discussion section.

Change in text: discussion section (Page 17).

Comment: -How many patients require more than one device for VSD closure?

Reply: More than one device was used in 9 procedures.

Change in text: The Number, size, and type of every device used for every patient are

provided in the supplementary material (excel table). The required changes were made in the manuscript accordingly (page 15, lines 319-320).

Comment: -Hemolysis is a quite common complication after transcatheter closure of residual VSD, especially during the days close to the procedure. How many patients developed anemia and what was the postprocedural antithrombotic strategy?.

Reply: Thank you for pointing this out. None of our patients reported a significant change in urine color or Hb drop following the procedure. Regarding anti-thrombotic therapy, IV heparin was given during the procedure, then 3 doses of subcutaneous LMW heparin and Aspirin afterward.

Change in text: The methodology section describes the anticoagulation strategy in the revised manuscript (page 13).

Reviewer C:

Comment: This is a retrospective review of percutaneous residual VSD closure with various occluders. The results are interesting, and the paper is well-written and reads well. However, the discussion section sometimes lacks clarity.

Reply: Thank you for the nice words and encouragement; the discussion section is rewritten with some details and adjustments.

Change in text: Discussion section, all changes are highlighted in red.

Comment: Please explain, for example, this sentence:

« In this study, Patients with residual muscular VSD (group 2) were younger than patients with VSD at patch margin (group 1). This could be explained by the early

surgical repair for group 2, mostly having VSD. »

Reply: We are sorry for the unclarity of the sentence. We meant that group 2 patients had many patients with large VSD +/- aortic coarctation or aortic arch interruption, and usually, these patients need surgical repair early in life. In contrast, group 1 patients mostly had patients with tetralogy of Fallot, pulmonary atresia-VSD, or TGA-VSD-PS, and usually, these patients undergo corrective surgery at relatively older ages. So, patients in group 2 were relatively younger during the closure of residual postoperative VSD being operated on at younger ages.

Change in text: The sentence was rewritten in the manuscript accordingly (page 18).

Comment: The article is well detailed concerning the technical point of view, but I guess that it lacks more clinical datas. For example some patients have no datas about the amplitude of the shunt (table 2), how was the indication of closure decided in these patients? This should be discussed.

Reply: Thank you for pointing this out; the hemodynamic data are documented in table 2 (updated version) and the results section. Clinical data (before and after VSD closure) were documented in table 3. Regarding indications for VSD closure, VSD was considered significant and indicated for closure if VSD size > 33% of LVOT, LV dilatation, or heart failure symptoms or $QP/QS \geq 1.5$). Preparing children with complete heart block and a permanent epicardial pacemaker for a transvenous pacemaker at an older age is another reason for the closure of residual VSD. Two patients in this cohort with pre-catheterization complete heart block and permanent epicardial pacemakers had VSD device closure.

Changes in text: Methodology section (Pages 6). Table 2, 3 results section(Pages 15, 17)and discussion section(pages 21,22).

Comment: The authors should highlight the added value of this study in regard to the existing published data.

Reply: Thank you for pointing this out; the added value of this study is added in the discussion section of the revised manuscript (page 22).