Author’s response to reviews

Title: Surgical Strategies Protecting against Right Ventricular Dilatation following Tetralogy of Fallot Repair

Authors:

Amr Arafat (Amr.arafat@med.tanta.edu.eg)
Elatafy Elatafy (Atafym@hotmail.com)
Sahar Elshedoudy (sahar_elshedoudy@yahoo.com)
Mahmoud Zalat (drmzalat@gmail.com)
Neamat Abdallah (nmamariam@gmail.com)
AHMED ELMAHROUK (a_marouky@hotmail.com; ahmed.elmahrouki1@med.tanta.edu.eg; ael-mahrouk@kfshrc.edu.sa)

Version: 1 Date: 23 Dec 2017

Author’s response to reviews:

Reviewer #1:

This retrospective review of patients who underwent a valve sparing TOF repair is consistent with the many publications in this area in the literature. It supports the general idea, but does not explore the limitations of the technique, specifically, how small a valve is too small and how much residual RVOTO is acceptable?

Thank you very much for those valuable comments. We selected our patients according to their preoperative pulmonary annulus z score which ranged from -2 to -3. In our experience and others preservation of the valve in patients with z-score less than -3 is associated with recurrent RVOTO. We highlighted this in the discussion in the following paragraph.

“Pulmonary valve z-score 4 or more was found to be a predictor of recurrent RVOT obstruction in other series (13) and our current strategy is to preserve the pulmonary valve in patients without severe annular hypoplasia.”

Regarding the residual RVOTO, we routinely measure both RV and PA pressures directly after weaning from cardiopulmonary bypass and accept gradient of 30-35 mmHg post repair and our
results show the mean pre-discharge RVOT pressure gradient to be $28.8 \pm 7.2$ mmHg and we added this point to the operative description.

“RV and PA pressures were directly measured after weaning from cardiopulmonary bypass and pressure gradient of 30-35 mmHg was accepted.”

I have a couple of questions for the authors. First, the average age of these patients is over a year and they are nearly 10 kg, and these patients have a PV z-score ranging from -2 to -3, however, only 17% had a prior BT shunt. My question is, how did you manage to get these patients out to a year of age with RVOT gradients in the 80 range without having any of the experience acute hypercyanotic spells requiring emergent procedures? The youngest patient in the group was 8 months old. This seems like a dramatically different patient population than I have seen through my career.

Answer:

We do thank the reviewer for his questions. The older age of our population is mainly due to the referral system in our area, patients are presented to us late due to the limited access to the healthcare system in remote areas.

Second, did the authors need to perform any pulmonary valve repairs? Or was a simple commissurotomy and infundibular resection enough?

Answer:

Commissurotomy and infundibular resection were enough in most patients. 11 patients had limited trans-annular patch and 2 patients had commissural suspension. We added this in the operative description.

“Pulmonary valvotomy was done in most patients and in case of borderline annulus not passing 2 sizes less than the expected Hegar dilator for the body surface area, the incision was extended few mms though the annulus keeping the valve in situ. Pulmonary valvotomy was performed at the site of the fused leaflets. Commissural suspension was performed in 2 patients.”

Reviewer #2:

The authors have presented their surgical results in a series of patients with moderate pulmonary valvar hypoplasia in Tetralogy of Fallot.
Overall, the paper is well-written, but I am not sure that there are very many unique findings from the paper. There are several questions that I have.

First, the authors describe that the patient population has an incidence of TR that is much higher than what has previously been described. It would be helpful if the authors could try to explain why so many of their patients had at least moderate tricuspid regurgitation.

We thank the reviewer for his valid questions:

Regarding the high incidence of Tricuspid incompetence in our series, we think this could be attributed to the older age in our patient population compared to other series, children subjected to longer duration of RVOTO resulting in pressure overload and annular dilatation. Furthermore, we also included repair of the regurgitation resulted from septal leaflet distortion during closure of the VSD which was performed through trans-atrial approach in all patients.

We added the explanation of this in the discussion as follows:

“This high percentage of patients requiring concomitant tricuspid repair in our series could be attributed to the relatively older age of our patient population compared to the other published series. In older children, the right ventricle is subjected to long period of overload, with a resultant decrease in the compliance of the RV and annular dilatation. We also included repair of the regurgitation resulted from septal leaflet distortion during closure of the VSD.”

Next, the authors report that they extended the incision through the annulus for a percentage of the patients but they still call this a valve-sparing procedure. If the annulus is divided at all, I don't think this is truly a valve-sparing. The authors need to develop this more in their discussion. Is the description actually that of leaflet sparing TOF repair? Perhaps this would be a better description.

Answer:

We agree with reviewer, “leaflets sparing” is a more accurate description to our technique and we changed it all parts of the manuscript to be “pulmonary leaflets sparing rather than pulmonary valve sparing.” We do thank the reviewer for his valuable suggestion.

Next, the authors don't mention if this series includes all consecutive patients with a z score between -2 to -3. Were there patients during this time period that met the criteria but had a true transannular patch?
Answer:

Yes, we excluded patients with severely distorted pulmonary valve leaflets, those patients had mono-cusp pulmonary valve reconstruction.

We added the following statement in the Methods

“Moreover, patients with moderate annular hypoplasia (z-score from -2 to -3) with dysplastic pulmonary valve had mono-cusp pulmonary valve reconstruction and were excluded from the study.”

Next, the authors comment that that was a reduction in pulmonary regurgitation from postop to last echo. Since there were a significant number of patients that had an annular incision, it is hard to understand how the pulmonary regurgitation could improve in these patients. It would be helpful if the authors could elaborate on this in the discussion.

Answer:

Thanks for the question. We did not have improvement of the degree of pulmonary regurgitation in patients with trans-annular patch. The reduction in PR occurred mainly in patients without TAP and we made this distinction evident throughout the manuscript as follows.

In the results:

“Pulmonary regurgitation regressed by one grade in 10 patients compared to the pre-discharge echocardiography and progressed by one grade in 2 patients, both had TAP. (p-value <0.001). (Table 4)”

In the discussion:

“The changes of pulmonary regurgitation in our series could be explained by the growth potential of preserved pulmonary valve leaflets.”

“Limited trans-annular pulmonary patch was required in 11 patients. We have observed no difference postoperatively and at follow up between patients with and without TAP regarding the decrease of the RVOT pressure gradient. Follow up was complete in 9 patients with TAP, 2 had progression of the degree of PR by one grade and the degree of PR remained stationary in 6 patients. On the other hand, the degree of PR improved in patients without TAP (n=9) by one grade. These results are consistent with Sen et, (5) who found improvement in PR with valve preservation or reconstruction by biological material compared to TAP.”
In the conclusion:

“Trans-annular patch is associated with increased postoperative pulmonary regurgitation and its progression and it should be avoided when possible.”