



OPEN ACCESS

Images in cardiology

Repair of very severe tricuspid regurgitation following detachment of the tricuspid valve

Ahmed Mahgoub¹, Hassan Kamel², Walid Simry¹, Hatem Hosny^{1,*}

¹Aswan Heart Centre, Department of Cardiac Surgery, Aswan, Egypt

²Aswan Heart Centre, Department of Pediatric Cardiology, Aswan, Egypt

*Email: hatemhosny@gmail.com

ABSTRACT

We report on the case of 5-year-old girl with severe tricuspid regurgitation following previous repair of double outlet right ventricle with subaortic ventricular septal defect, performed through trans-atrial approach using detachment of tricuspid valve leaflet. The severe tricuspid regurgitation was found to be due to dehiscence at the site of the previous detachment and was repaired using a pericardial patch. In this report, we discuss the relative merits and risks of using this technique.

[http://dx.doi.org/
10.5339/gcsp.2015.14](http://dx.doi.org/10.5339/gcsp.2015.14)

Submitted: 5 December 2014

Accepted: 26 February 2015

© 2015 Mahgoub, Kamel, Simry, Hosny, licensee Bloomsbury Qatar Foundation Journals. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

BACKGROUND

The most common congenital heart disease in childhood is ventricular septal defect (VSD), occurring in 50% of all children with congenital heart diseases and in 20% as an isolated lesion.¹ Double-outlet right ventricle (DORV) is a conotruncal malformation found in a group of complex heart lesions, which are unified by the characteristic that both great arteries arise predominantly from the right ventricle. The physiology of DORV after birth is determined mainly by the location of the ventricular septal defect (VSD) in relation to the great arteries, as well as the presence or absence of outflow tract obstruction.^{2,3} Patients with DORV with a simple subaortic VSD (VSD-type) present with clinical signs of over-circulation from an unrestrictive VSD and usually require a one-stage biventricular repair within the first 6 months of life, some units in developing countries continue to practice a staged approach using pulmonary artery banding. The VSD can be closed through the right atrium or through a right ventriculotomy. Importantly, VSD enlargement may be required. The frequent requirement for a VSD enlargement and a right ventricular approach distinguishes this lesion from other VSDs. These maneuvers add relatively little risk to the surgical procedure.⁴

In closing a VSD, temporary detachment of the tricuspid valve leaflets may provide better exposure of the defect in the usual trans-atrial approach.⁵ However, this technique carries the risk of tricuspid valve dysfunction, which is discussed below.

CASE REPORT

A 5-year-old girl presented with dyspnea on exertion, cyanosis and ascites. The girl had been previously diagnosed at the first month of age as DORV, subaortic VSD with normally related great vessels for which she had pulmonary artery banding at 2 months of age, then complete repair (VSD closure through a trans-atrial approach with detachment of the tricuspid valve) at the age of one year.

On examination, the patient had mild central cyanosis, congested neck veins, pan-systolic murmur over the precordium and marked hepatosplenomegaly.

Echocardiography revealed hugely dilated right side of the heart with compressed left side, borderline function of the right ventricle, free tricuspid regurgitation, mainly via a defect between the base of anterior leaflet and the free wall (Figures 1, 2), normal pulmonary artery pressure and right to left shunting across a small residual atrial septal defect.

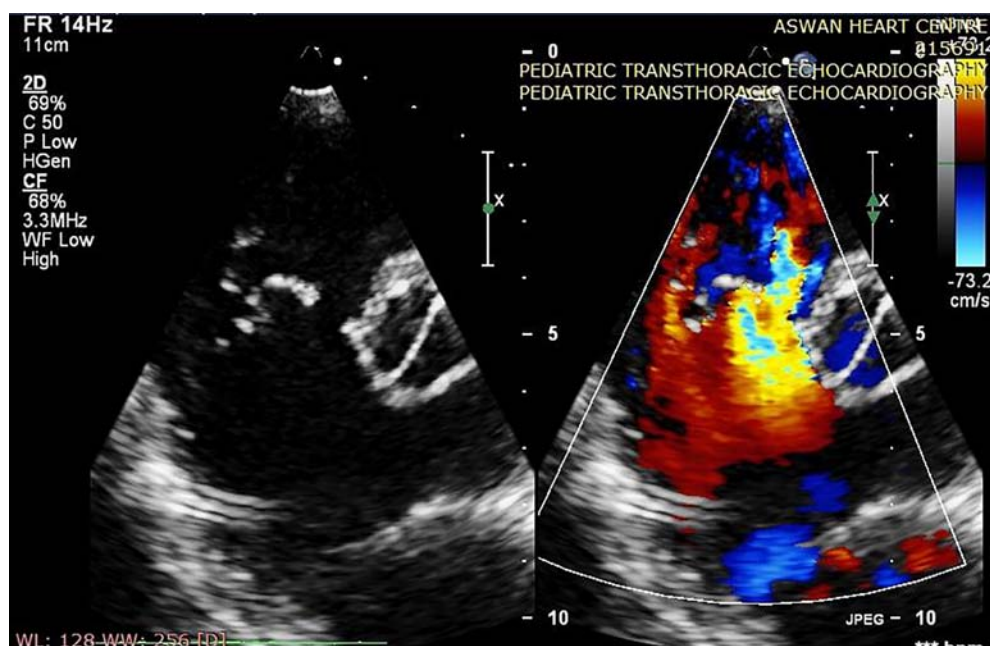


Figure 1. Pre-operative echocardiography showing the diastolic flow through the tricuspid valve into the right ventricle. Note that there are two jets of flow (through the valve orifice and through the gap in the anterior leaflet)

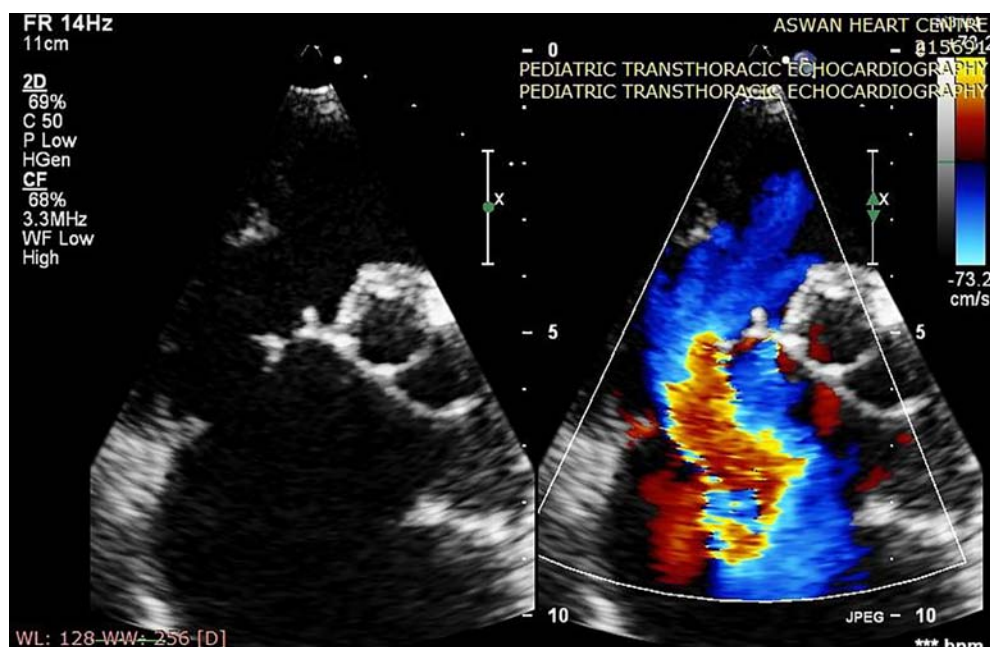


Figure 2. Pre-operative echocardiography showing severe tricuspid regurgitation mainly through a gap between the anterior leaflet and the annulus.

In surgery, the anterior leaflet of tricuspid valve was found to be dehiscent from the annulus at site of detachment that was done in the previous operation leaving a large gap (about 2.5 cm). In addition, the tricuspid valve annulus was significantly dilated (Figure 3).

The gap between the anterior leaflet and the annulus was closed by a fresh autologous pericardial patch. Annuloplasty was then performed using two pericardial strips (Figure 4). Post-operative echocardiography showed trivial tricuspid regurgitation with mean diastolic gradient of 1 mmHg (Figures 5, 6). The postoperative course was uneventful and the patient was discharged from hospital after 5 days.

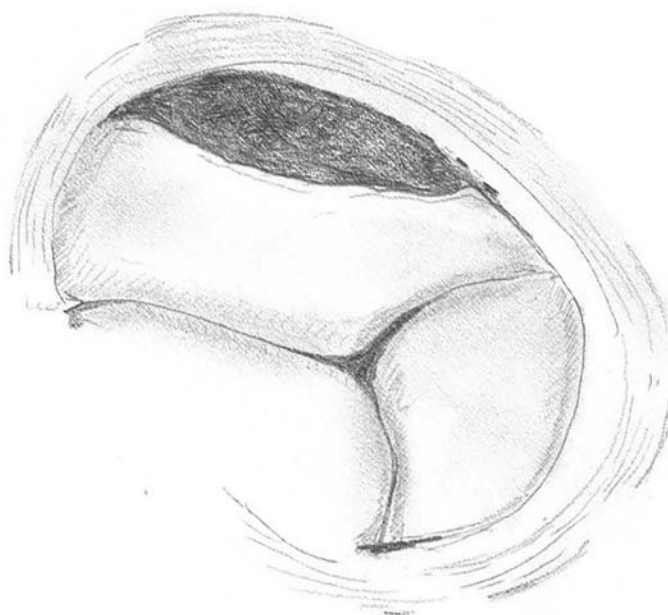


Figure 3. Diagram showing the tricuspid valve with the gap between the anterior leaflet and the annulus.

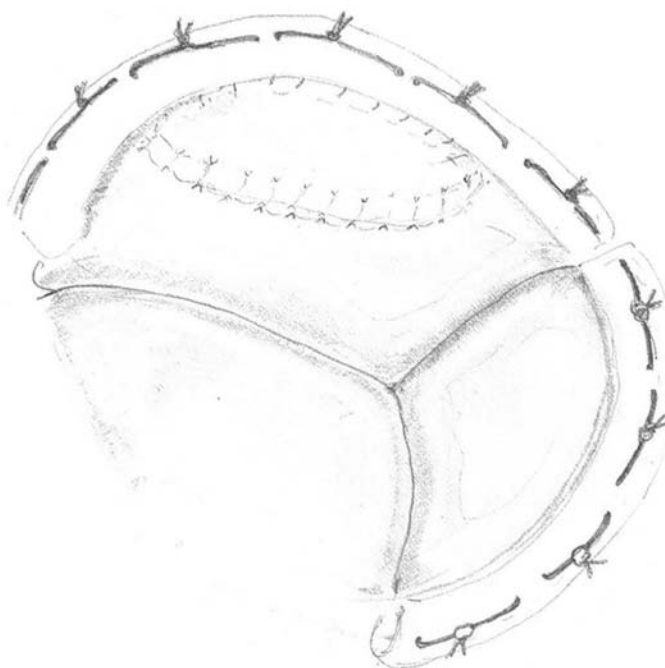


Figure 4. Diagram showing the tricuspid valve after the repair, with a patch closing the gap in the anterior leaflet and the annuloplasty bands.

DISCUSSION

The trans-atrial approach for VSD closure is a safe and effective method for most of the cases. It necessitates, however, working through the tricuspid valve orifice. Although temporary tricuspid valve detachment may improve the visualization of the ventricular septal defect, liberal use of this adjunct is not widely supported, mainly because of concerns about iatrogenic complications such as tricuspid valve dysfunction and heart block.⁵

We believe that in most of the cases, the VSD can be effectively closed using the less damaging technique, through the tricuspid valve orifice, even in the presence of chordal attachments that cross

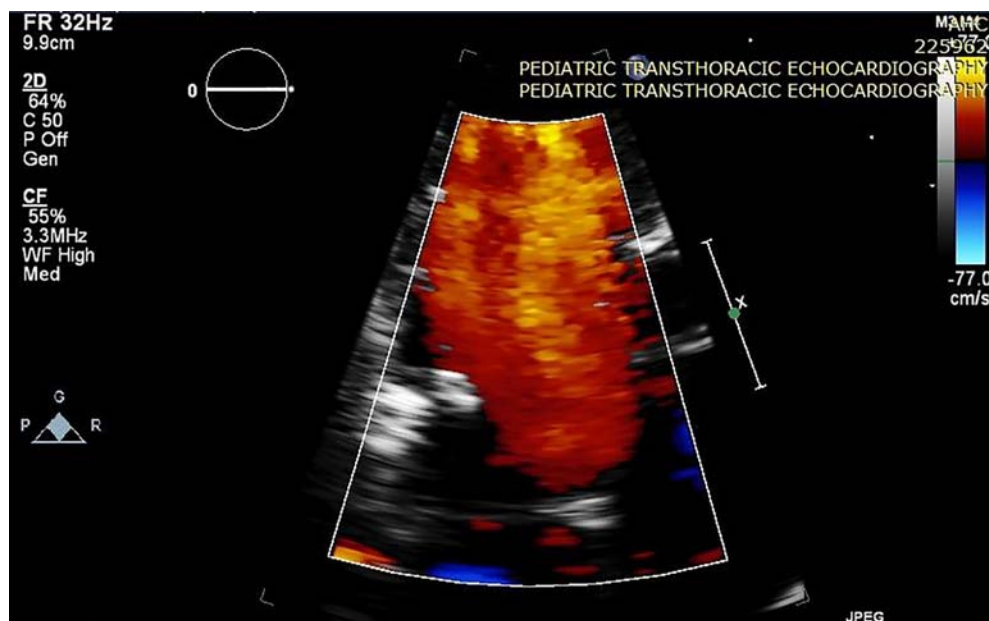


Figure 5. Post-operative echocardiography showing the normal diastolic flow through the tricuspid valve orifice after the repair.

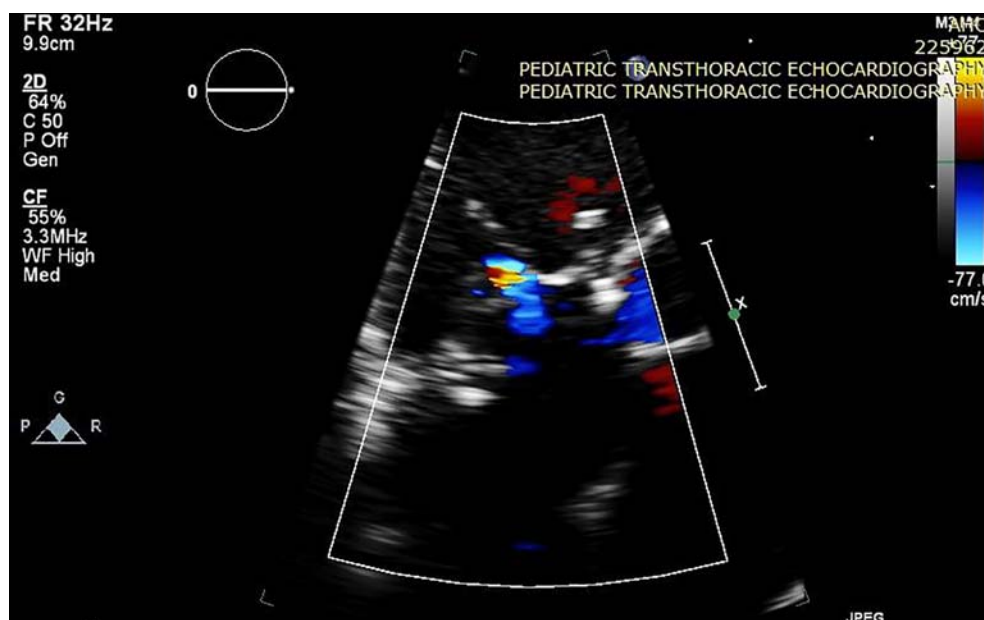


Figure 6. Post-operative echocardiography showing trivial tricuspid regurgitation following the repair.

the VSD. The patch can be placed to cover the VSD with the sutures carefully positioned to avoid entangling the chords, always respecting the structural and functional integrity of the valve.

The technique of tricuspid valve detachment is usually reserved to the relatively rare cases when the VSD is almost totally covered by aneurysmal tissue from the tricuspid valve with many residual defects that cannot be reliably closed separately.

In the reported case, the long-standing gap in tricuspid valve caused severe regurgitation with secondary changes around the edges of the gap and dilatation of the tricuspid valve annulus. We elected to close the gap between the anterior leaflet and the annulus using a patch of autologous pericardium instead of directly suturing the leaflet to the annulus it to avoid undue tension at the site of the gap.

CONCLUSION

The routine use of tricuspid valve detachment for closure of ventricular septal defects should be avoided because of the increased risk of unnecessarily affecting the tricuspid valve function. Trans-atrial approach through the tricuspid valve orifice offers a safe and effective method in most cases.

REFERENCES

- [1] Moller JH, Moodie DS, Bles M, Norton JB, Nouri S. Symptomatic heart disease in infants: comparison of three studies performed during 1969–1987. *Pediatr Cardiol.* 1995;16:216–222.
- [2] Kim N, Friedberg MK, Silverman NH. Diagnosis and prognosis of fetuses with double outlet right ventricle. *Prenat Diagn.* 2006;26:740–745.
- [3] Yacoub MH, Radley-Smith R. Anatomic correction of the Taussig-Bing anomaly. *J Thorac Cardiovasc Surg.* 1984;88(3):380–388.
- [4] Artrip John H, Sauer Henning, Campbell David N, Mitchell Max B, Haun Christoph, Almodovar Melvin C, Hraska Viktor, Lacour-Gayet Francois. Biventricular repair in double outlet right ventricle: surgical results based on the STS-EACTS International Nomenclature classification.
- [5] Aeba R, Katogi T, Hashizume K, Koizumi K, Iino Y, Mori M, Yozu R. Liberal use of tricuspid valve detachment for transatrial ventricular septal defect closure. *Ann Thorac Surg.* 2003;76:1073–1077.
- [6] Sasson L, Katz MG, Ezri T, Tamir A, Herman A, Bove EL, Schachner A. Indications for Tricuspid Valve Detachment in Closure of Ventricular Septal Defect in Children. *Ann Thorac Surg.* 2006;82:958–963.