

Editorial



Be Prepared: New Era of Heart-Team Approach for the Treatment of Tricuspid Regurgitation

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OPEN ACCESS

Received: Aug 7, 2023

Accepted: Sep 24, 2023

Published online: Oct 6, 2023

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Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

The authors have no financial conflicts of interest.

► See the article “Tricuspid Edge-to-Edge Repair Versus Tricuspid Valve Replacement for Severe Tricuspid Regurgitation” in volume 53 on page 775.

Generally speaking, it is reasonable to perform repair rather than replacement when a patient suffers from severe symptomatic tricuspid regurgitation (TR), regardless of the main etiology.¹⁾ For many years, tricuspid valve replacement (TVR) has been considered the last resort treatment option. As a consequence, TVR has shown poor clinical outcomes in terms of postoperative morbidity and mortality. Nowadays, early mortality of TVR is reported to be around 8% to 10%, which has remained relatively stable since the 1990's.²⁾ However, many cardiologists and surgeons agree that the intrinsic nature of severely morbid patient characteristics was the main cause of these poor results. Therefore, they have been continuously searching for better ways to address this problem, such as risk factor modification, development of new diagnostic modality, early surgery, and so forth.³⁾

Recently, transcatheter approaches to treat severe functional atrioventricular valve regurgitation have been evolving.⁴⁾ Although there are limitations to directly apply the transcatheter edge-to-edge (E2E) mitral valve (MV) repair technique using a clipping device to the tricuspid valve (TV), other unique and innovative techniques, such as orthotopic or heterotopic implantation of TV, are being continuously tested.⁵⁾ The E2E technique was originally introduced by Dr. Alfieri in 1995 for the treatment of functional mitral regurgitation (MR) with standard open heart surgery.⁶⁾ After long-term follow-up, the E2E technique has shown excellent durability in terms of recurrence.⁷⁾

In this issue, Kim et al.⁸⁾ present a retrospective comparative study entitled “Tricuspid Edge-to-Edge Repair Versus Tricuspid Valve Replacement for Severe Tricuspid Regurgitation.” The study analyzed the clinical outcomes of 230 patients with severe TR who underwent either edge-to-edge repair (E2E group, n=139) or tricuspid valve replacement (TVR group, n=91), using the inverse probability of treatment weighting (IPTW) technique. After a mean follow-up period of 106 months, the study revealed significant differences in overall survival (p=0.023), freedom from significant tricuspid stenosis (TS, trans-tricuspid pressure gradient ≥ 5 mmHg, p=0.021), and freedom from TV-related events (p<0.001). However, early mortality and morbidity showed no difference between 2 groups. Moreover, there was no significant difference in terms of TR recurrence or reoperation rate between two groups. Despite this, due to the statistically significant difference in late clinical outcomes, the authors concluded that the E2E repair might be a valuable option in the surgical treatment of severe TR, avoiding the need for TVR.

Data Sharing Statement

The data generated in this study is available from the corresponding author upon reasonable request.

Author Contributions

Conceptualization: Lim C; Data curation: Jung JC; Project administration: Lim C; Validation: Jung JC; Writing - original draft: Lim C; Writing - review & editing: Jung JC.

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

The reason why many surgeons hesitate to perform replacement rather than repair in the TV position is mainly based on the poorer clinical results observed after replacement. However, as previously mentioned, these poor results are often a consequence of pre-existing morbid conditions in the patients, particularly multiorgan failure such as right ventricular dysfunction and hepatic failure. As annular dilatation secondary to the left heart valvular disease or atrial fibrillation is the most common mechanism of functional TR, surgery is usually focuses on reducing the annular diameter.⁹⁾ In terms of the repair technique, there are numerous ways to achieve annular diameter reduction, including traditional techniques like Kay or De Vega annuloplasty and ring annuloplasty. On the contrary, the E2E repair is a relatively new and innovative technique, especially in the tricuspid position.⁴⁾⁵⁾

Even though the E2E repair has demonstrated excellent long-term clinical results in the mitral valve position, there have been relatively few reports regarding its application in the TV position. In theory, E2E repair in the TV can achieve positive outcomes since functional TR often arises from annular dilatation and/or tethering of TV chordae secondary to the right ventricular dilatation and dysfunction, which is a mechanism quite similar to that of functional MR. However, it is important to recognize that the functional anatomy of subvalvular structures differs between these 2 valves. Specifically, the chordae of TV directly attach to the right ventricle (RV) wall, and the geometric configuration of the RV septal wall varies among patients. For example, RV septal wall may be either convex or flat depending on RV pressure. When the RV pressure approaches that of the left ventricle (LV), the RV may assume a D-shaped configuration, leading to increased severity in the tethering of septal chordae.¹⁰⁾

In summary, the E2E repair for severe functional TR presents a promising alternative surgical technique for addressing severe TR and offers the potential to mitigate the risks associated with TVR. To further support the viability of E2E repair, there is a need for additional scientific evidence, including comprehensive three-dimensional analyses of tricuspid valve subvalvular functional anatomy, particularly in patients with elevated RV pressure. Such analyses would provide valuable insights for comparing and evaluating the clinical outcomes of other transcatheter techniques, such as TV clipping devices or caval implantation of heterotopic TV.

REFERENCES

1. Antunes MJ, Rodríguez-Palomares J, Prendergast B, et al. Management of tricuspid valve regurgitation: position statement of the European Society of Cardiology Working Groups of Cardiovascular Surgery and Valvular Heart Disease. *Eur J Cardiothorac Surg* 2017;52:1022-30.
[PUBMED](#) | [CROSSREF](#)
2. Chick W, Alkhalil M, Egred M, et al. A systematic review and meta-analysis of the clinical outcomes of isolated tricuspid valve surgery. *Am J Cardiol* 2023;203:414-26.
[PUBMED](#) | [CROSSREF](#)
3. Muraru D, Surkova E, Badano LP. Revisit of functional tricuspid regurgitation; current trends in the diagnosis and management. *Korean Circ J* 2016;46:443-55.
[PUBMED](#) | [CROSSREF](#)
4. Asmarats L, Puri R, Latib A, Navia JL, Rodés-Cabau J. Transcatheter tricuspid valve interventions: landscape, challenges, and future directions. *J Am Coll Cardiol* 2018;71:2935-56.
[PUBMED](#) | [CROSSREF](#)
5. Zaccone G, Di Pasquale M, Fiorina C, Curello S, Metra M, Adamo M. Transcatheter therapies for tricuspid valve regurgitation. *J Cardiovasc Med (Hagerstown)* 2020;21:964-74.
[PUBMED](#) | [CROSSREF](#)
6. Fucci C, Sandrelli L, Pardini A, Torracca L, Ferrari M, Alfieri O. Improved results with mitral valve repair using new surgical techniques. *Eur J Cardiothorac Surg* 1995;9:621-6.
[PUBMED](#) | [CROSSREF](#)

7. Bhudia SK, McCarthy PM, Smedira NG, Lam BK, Rajeswaran J, Blackstone EH. Edge-to-edge (Alfieri) mitral repair: results in diverse clinical settings. *Ann Thorac Surg* 2004;77:1598-606.
[PUBMED](#) | [CROSSREF](#)
8. Kim J, Lee H, Jung JH, Yoo JS. Tricuspid edge-to-edge repair versus tricuspid valve replacement for severe tricuspid regurgitation. *Korean Circ J* 2023;53:775-86.
[CROSSREF](#)
9. Kim K, Kim HJ, Jung SH, Lee J, Kim JB. Functional insufficiency of mitral and tricuspid valves associated with atrial fibrillation: impact of postoperative atrial fibrillation recurrence on surgical outcomes. *Korean Circ J* 2023;53:550-62.
[PUBMED](#) | [CROSSREF](#)
10. Hahn RT, Badano LP, Bartko PE, et al. Tricuspid regurgitation: recent advances in understanding pathophysiology, severity grading and outcome. *Eur Heart J Cardiovasc Imaging* 2022;23:913-29.
[PUBMED](#) | [CROSSREF](#)