

Tricuspid regurgitation: Navigating the least settled valve decision

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The tricuspid valve, often termed the 'forgotten valve,' has emerged from the shadow of its left-sided counterparts, presenting clinicians with one of the most vexing decisions in valvular heart disease. Severe tricuspid regurgitation (TR) carries significant morbidity and mortality, but identifying the right patient for intervention, and the optimal timing for that intervention, is far from straightforward. The field grapples with a lack of definitive, large-scale evidence to guide practice, leaving many questions unanswered for European GPs and specialists.

KEY TAKEAWAYS

- **The Pivot:** The focus has shifted from managing severe tricuspid regurgitation as a secondary consequence to considering it a primary target for intervention, even in asymptomatic patients.
- **The Data:** While specific trial data is not available, observational studies consistently link severe TR to increased mortality and heart failure hospitalizations.
- **The Action:** Clinicians should consider earlier referral for specialist evaluation in patients with progressive tricuspid regurgitation, particularly those with right ventricular dysfunction or symptoms, rather than waiting for advanced disease.

Severe tricuspid regurgitation (TR) is a prevalent condition, often developing secondary to left-sided heart disease, pulmonary hypertension, or right ventricular dysfunction. Its natural history is one of progressive right ventricular (RV) remodelling, leading to RV failure, systemic venous congestion, and ultimately, a significantly impaired quality of life and reduced survival. For years, TR was largely managed conservatively, or addressed only as an afterthought during left-sided valve surgery. The prevailing wisdom held that TR would resolve once the primary left-sided pathology was corrected. This approach, however, has proven insufficient for many patients, as persistent or worsening TR after left-sided surgery is a common and ominous finding.

The patient population affected by severe TR is heterogeneous, ranging from those with functional TR secondary to dilated right ventricles to patients with primary TR due to leaflet abnormalities, pacemaker lead-induced damage, or rheumatic disease. Functional TR accounts for the vast majority of cases, driven by annular dilation and leaflet tethering from RV enlargement and dysfunction. Identifying patients who will benefit most from intervention requires a careful assessment of symptoms, RV function, pulmonary artery pressures, and the severity and mechanism of TR. The decision is further complicated by the fact that many patients with severe TR are elderly, have multiple comorbidities, and present with advanced heart failure symptoms, making them high-risk candidates for traditional open-heart surgery.

The evolving understanding of tricuspid disease progression

The traditional view of TR as a benign condition or a mere bystander to left-sided heart disease has been thoroughly challenged. Evidence from numerous observational cohorts demonstrates that even moderate TR, if progressive, can lead to significant adverse outcomes. The right ventricle, while often considered a passive conduit, is a crucial component of the circulatory system, with the actual stake being patient survival. Chronic volume overload from TR leads to progressive RV dilation and dysfunction, which in turn exacerbates TR in a vicious cycle. This RV remodelling can become irreversible, even if the TR is subsequently corrected. This understanding underpins the growing argument for earlier intervention, before irreversible RV damage occurs.

The progression of TR is often insidious. Patients may remain asymptomatic for extended periods, masking significant underlying RV pathology. When symptoms do emerge, they are typically non-specific, including fatigue, peripheral oedema, abdominal distension, and dyspnoea, often attributed to other comorbidities or left-sided heart failure. This delay in symptom recognition contributes to patients presenting at a late stage, when surgical risk is higher and the potential for RV recovery is diminished. Regular echocardiographic surveillance is therefore critical for patients at risk, particularly those with known left-sided heart disease or pulmonary hypertension.

Diagnostic precision and risk stratification

Accurate assessment of TR severity and its impact on the right ventricle is paramount for patient selection.

Echocardiography remains the cornerstone, providing detailed anatomical and functional information. It allows for quantification of TR severity, assessment of RV size and function (e.g., tricuspid annular plane systolic excursion (TAPSE), fractional area change (FAC), global longitudinal strain), and estimation of pulmonary artery pressures. But echocardiography has limitations, particularly in patients with poor acoustic windows or complex RV geometry. Cardiac magnetic resonance imaging (CMR) offers a more comprehensive and reproducible assessment of RV volumes, function, and myocardial fibrosis, providing valuable prognostic information. The Oxford Handbook of Cardiology provides a concise overview of these diagnostic modalities.

Beyond imaging, biomarkers such as N-terminal pro-B-type natriuretic peptide (NT-proBNP) and high-sensitivity troponin can offer additional insights into myocardial stress and injury, correlating with TR severity and RV dysfunction. Exercise testing, particularly cardiopulmonary exercise testing, can unmask functional limitations and symptoms that are not apparent at rest, helping to identify patients who are truly symptomatic despite a seemingly stable clinical picture. Risk stratification models for tricuspid valve surgery are still evolving, but generally incorporate factors such as age, comorbidities (renal dysfunction, liver disease), previous cardiac surgery, and the severity of RV dysfunction. These models aim to balance the risks of intervention against the potential benefits, guiding shared decision-making with patients and their families.

Surgical and transcatheter approaches

For decades, surgical tricuspid valve repair or replacement has been the standard of care for severe TR. Repair, typically involving annuloplasty, is preferred when feasible, as it preserves the native valve and avoids the complications associated with prosthetic valves. Replacement is reserved for cases with extensive leaflet damage or severe annular dilation that precludes effective repair. Surgical outcomes for isolated tricuspid valve surgery have historically been associated with higher mortality rates compared to left-sided valve procedures, largely due to the advanced disease state of patients

referred for intervention. This perception has contributed to the reluctance to intervene early.

The advent of transcatheter tricuspid valve intervention (TTVI) has revolutionized the market landscape, offering less invasive options for high-surgical-risk patients. These devices broadly fall into two categories: tricuspid valve repair (TTVr) and tricuspid valve replacement (TTVR). TTVr devices, primarily edge-to-edge repair systems, aim to reduce TR by coapting the tricuspid leaflets, similar to transcatheter mitral valve repair. These devices have shown promising results in reducing TR severity and improving functional status in carefully selected patients. Transcatheter tricuspid valve replacement (TTVR) involves implanting a prosthetic valve within the native tricuspid annulus or a previously placed surgical ring. This approach offers the potential for more complete TR elimination but is technically more challenging and carries its own set of risks, including device embolization and conduction disturbances. Our previous coverage on tricuspid repair outcomes and transcatheter tricuspid valve replacement highlights some of these developments.

The challenge of timing and patient selection

The central dilemma remains: when to intervene, and in whom? Current guidelines, while acknowledging the importance of TR, often provide less definitive recommendations compared to left-sided valve diseases. This reflects the paucity of large, randomized controlled trials specifically addressing the optimal timing of TR intervention. The general consensus leans towards intervening before irreversible RV dysfunction or severe symptoms develop, but the precise thresholds for these indicators are still debated. For patients undergoing left-sided valve surgery, concomitant tricuspid annuloplasty is recommended for moderate or greater functional TR, or for mild TR with significant annular dilation, to prevent future progression.

For isolated severe TR, the decision is more complex. Intervention is generally recommended for symptomatic patients with severe TR and progressive RV dilation or dysfunction, in the absence of severe pulmonary hypertension or other contraindications. But what about asymptomatic patients? This is where the decision becomes most unsettled. Some argue for early intervention in asymptomatic patients with severe TR and progressive RV dysfunction, believing that preventing irreversible RV damage will lead to better long-term outcomes. Others advocate for a more conservative approach, citing the risks of intervention and the lack of robust evidence for prophylactic repair. The absence of a clear consensus highlights the need for individualized patient assessment, multidisciplinary heart team discussions, and careful consideration of patient preferences and comorbidities. The field is still awaiting definitive trial data to clarify the role of early intervention in asymptomatic or mildly symptomatic patients.

Where the evidence falls short

The primary limitation in guiding patient selection for tricuspid intervention is the lack of prospective, randomized clinical trials comparing different management strategies (e.g., early intervention vs. watchful waiting, surgical vs. transcatheter approaches) in well-defined patient populations. Most of the current evidence comes from retrospective analyses, observational studies, and single-centre experiences, which are inherently prone to selection bias and confounding. These studies, while valuable for generating hypotheses, cannot establish causality or provide definitive guidance on optimal timing. The heterogeneity of TR aetiologies, patient comorbidities, and surgical techniques further complicates the interpretation of existing data.

Another significant gap is the lack of standardized definitions for RV dysfunction and progression in TR. Different imaging modalities and parameters are used across studies, making it difficult to compare results and establish consistent

criteria for intervention. The long-term durability of transcatheter devices is also an area requiring more data, as these technologies are relatively new. While initial results are encouraging, the true longevity and potential for re-intervention remain to be fully elucidated. The challenge of selecting patients for tricuspid intervention highlights the complexity of this often-overlooked valve.

The field also needs better tools for predicting which patients with functional TR will progress and which will remain stable. Biomarkers and advanced imaging techniques are showing promise, as they offer improved risk stratification, but their integration into routine clinical practice for risk stratification is still evolving. Without these predictive tools, the decision to intervene early in an asymptomatic patient remains largely empirical. The ongoing development of patient decision aids, as discussed in IPDAS 5.0 Updates, may help bridge some of these communication gaps.

CLINICAL IMPLICATIONS

The shift in perspective on tricuspid regurgitation demands a more proactive approach from clinicians. Waiting for overt symptoms or advanced right ventricular failure before considering referral for specialist evaluation is no longer tenable. GPs and specialists need to be vigilant for subtle signs of progressive TR, particularly in patients with known left-sided heart disease or pulmonary hypertension.

The emergence of transcatheter options has broadened the therapeutic landscape, offering hope for many patients previously deemed too high-risk for surgery. But this also places a greater burden on the heart team to meticulously select patients who will truly benefit. The temptation to intervene simply because a less invasive option exists must be tempered by a clear understanding of the patient's overall prognosis and the potential for meaningful improvement.

For industry, the focus must remain on generating robust, randomized data. The current reliance on observational studies leaves too much room for clinical equipoise and hinders the development of definitive guidelines. Without head-to-head comparisons of early versus late intervention, or surgical versus transcatheter approaches in specific patient cohorts, the field will continue to operate in a grey area. This is not a sustainable position for a condition with such significant impact on patient outcomes.

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REFERENCES

1. LE Ruz R, Hahn RT. Tricuspid regurgitation: a contemporary review. *Panminerva Med.* 2024;66(4):392-407. doi:10.23736/S0031-0808.24.05216-9
2. Ambrosino M, Sangoi M, Monzer N, et al. Tricuspid Regurgitation: A Review of Current Interventional Management. *J Am Heart Assoc.* 2024;13(6):e032999. doi:10.1161/JAHA.123.032999
3. Hahn RT. State-of-the-Art Review of Echocardiographic Imaging in the Evaluation and Treatment of Functional Tricuspid Regurgitation. *Circ Cardiovasc Imaging.* 2016;9(12). doi:10.1161/CIRCIMAGING.116.005332
4. Hahn RT. Tricuspid Regurgitation. *N Engl J Med.* 2023;388(20):1876-1891. doi:10.1056/NEJMra2216709

5. Hahn RT, Lawlor MK, Davidson CJ, et al. Tricuspid Valve Academic Research Consortium Definitions for Tricuspid Regurgitation and Trial Endpoints. J Am Coll Cardiol. 2023;82(17):1711-1735. doi:10.1016/j.jacc.2023.08.008
6. Ricci F, Bufano G, Galusko V, et al. Tricuspid regurgitation management: a systematic review of clinical practice guidelines and recommendations. Eur Heart J Qual Care Clin Outcomes. 2022;8(3):238-248. doi:10.1093/ehjqcco/qcab081

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