

Natural History of Functional Tricuspid Regurgitation

19

K.M. John Chan

Abstract

Functional tricuspid regurgitation is a common condition. It is benign in most people when only mild in severity, but when moderate or more in severity, tricuspid regurgitation is associated with reduced survival. If left untreated, moderate tricuspid regurgitation will progress, with impact on symptoms, functional capacity and survival.

Keywords

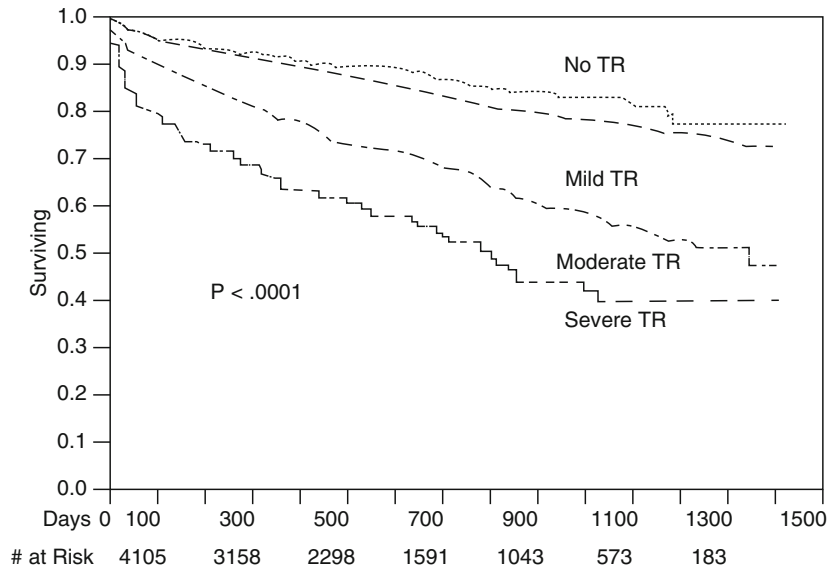
Functional tricuspid regurgitation, right ventricular function • natural history • survival • tricuspid annular dilatation

Tricuspid regurgitation (TR) is a common finding present in 80–90% of healthy individuals according to the Framingham study [1]. The most common cause of greater than mild TR, accounting for about 80–90% of cases, is secondary or functional TR, which occurs as a consequence of left sided heart valve disease, cardiomyopathy and atrial fibrillation [2]. Primary or organic TR is less common and is due to rheumatic heart valve disease, infective endocarditis, endocardial device leads, tricuspid leaflet prolapse, Ebstein's anomaly, carcinoid heart disease, and trauma, amongst others [2].

The presence of greater than mild TR carries an adverse prognosis. This was shown in a study by Nath, et al., who reported 1-year survival of 91.7% in those with no TR, 90.3% in mild TR, 78.9% in moderate TR, and 63.9% in severe TR (Fig. 19.1) [3]. Moderate or greater TR was associated with increased mortality independent of pulmonary artery systolic pressures and left ventricular ejection fraction. When adjusted for age, left ventricular ejection fraction, inferior vena cava size, and right ventricular size and function, survival was worse for patients with moderate and severe TR compared to those with no TR [3]. Similar findings were made by Topilsky, et al., who reported that the survival of patients with isolated severe TR was significantly worse compared to those with milder TR severity. The 10 year survival and freedom from cardiac events of those with severe TR was significantly worse compared to those with milder TR

K.M.J. Chan, BM BS, MSc, PhD, FRCS CTh
Department of Cardiothoracic Surgery,
Gleneagles Hospital, Jalan Ampang,
Kuala Lumpur 50450, Malaysia
e-mail: kmjohnchan@yahoo.com

Fig. 19.1 Survival curves according to severity of tricuspid regurgitation (From Nath et al. [3], with permission from Elsevier)



severity, and was independent of right ventricular size and function, pulmonary artery pressures, comorbidities, and lower than expected for the general population [4]. A strength of this study compared to others was that patients with left sided heart valve disease such as mitral regurgitation were excluded thus suggesting that the TR itself was an important cause of reduced survival and cardiac events independent of associated left sided heart valve disease and pathology [4]. Tricuspid regurgitation is therefore not a benign condition and has to be adequately managed and addressed.

Functional TR is a progressive disease and if left untreated, will progress with worse survival [5]. In a recent study by Song et al., involving 638 patients who underwent left sided heart valve surgery without tricuspid valve surgery, moderate or severe TR was present at 5 years in 7.3% of those who had none or trace TR at their initial surgery, and in 20% of those who had mild TR [6]. Survival was significantly worse in those who developed late TR. Similarly, Dreyfus et al. reported that significant late TR developed in 34% of patients who underwent mitral valve repair without tricuspid valve surgery and this was associated with worse NYHA functional class [7]. Matsunaga and Duran meanwhile reported an incidence of moderate or severe TR in 75% of patients 3 years after mitral valve repair for functional ischaemic mitral regurgitation [8].

Calafore et al. reported that TR progressed in 40% of patients following mitral valve surgery without tricuspid valve surgery and this was associated with worse survival and functional class [9]. Yilmaz et al. meanwhile reported that mean TR grade increased significantly from a mean of 1.84–2.11 ($p=0.03$) 5 years after isolated mitral valve surgery without concomitant tricuspid valve surgery, and 29.4% of patients had moderate or more TR at 5 years compared to 16.5% pre-operatively [10].

Important factors which may influence the progression of TR include the presence of annular dilatation, leaflet tethering and atrial fibrillation [11, 12]. TR is likely to progress if tricuspid annular dilatation or leaflet tethering are present and not addressed at the time of left sided heart valve surgery [11]. Conversely, TR is unlikely to progress in patients with mild TR and no significant annular dilatation, leaflet tethering or atrial fibrillation [11].

References

1. Singh JP, Evans JC, Levy D. Prevalence and clinical determination of mitral, tricuspid, and aortic regurgitation (the Framingham Heart Study). *Am J Cardiol.* 1999;83:897–902.
2. Ong K, Yu G, Jue J. Prevalence and spectrum of conditions associated with severe tricuspid regurgitation. *Echocardiography.* 2013;31:558–62.

3. Nath J, Forster E, Heidenreich PA. Impact of tricuspid regurgitation on long term survival. *J Am Coll Cardiol*. 2004;43:405–9.
4. Topilsky Y, Nkomo VT, Vatury O, Michelena HI, Letourneau T, Suri R, Pislaru S, Park S, Mahoney DW, Biner S, Enriquez-Sarano M. Clinical outcome of isolated tricuspid regurgitation. *JACC Cardiovasc Imaging*. 2014;7:1186–94.
5. Calafiore AM, Gallina S, Iaco AL, Contini M, Bivona A, Gagliardi M, Bosco P, Di Mauro M. Mitral valve surgery for functional mitral regurgitation: should moderate or more tricuspid regurgitation be treated? A propensity score analysis. *Ann Thorac Surg*. 2009;87:698–703.
6. Song H, Kim M-J, Chung CH, Choo SJ. Factors associated with development of late significant tricuspid regurgitation after successful left sided valve surgery. *Heart*. 2009;95:931–6.
7. Dreyfus GD, Corbi PJ, Chan KMJ, Bahrami TB. Secondary tricuspid regurgitation or dilatation: which should be the criteria for surgical repair? *Ann Thorac Surg*. 2005;79:127–32.
8. Matsunaga A, Duran CMG. Progression of tricuspid regurgitation after repaired functional ischemic mitral regurgitation. *Circulation*. 2005;112:1453–7.
9. Calafiore AM, Gallina S, Iaco AL, Contini M, Bivona A, Gagliardi M, Bosco P, Di Mauro M. Mitral valve surgery for functional mitral regurgitation: should moderate or more tricuspid regurgitation be treated? A propensity score analysis. *Ann Thorac Surg*. 2009;87:698–703.
10. Yilmaz OG, Suri RMS, Dearani JA, Sundt TM, Daly RC, Burkhart HM, Enriquez-Sarano M, Schaff HV. Functional tricuspid regurgitation at the time of mitral valve repair for degenerative leaflet prolapse: the case for a selective approach. *J Thorac Cardiovasc Surg*. 2011;142:608–13.
11. Van de Veire NR, Braun J, Delgado V, Versteegh MIM, Dion RA, Klautz RJM, Bax JJ. Tricuspid annuloplasty prevents right ventricular dilatation and progression of tricuspid regurgitation in patients with tricuspid annular dilatation undergoing mitral valve repair. *J Thorac Cardiovasc Surg*. 2011;141:1431–9.
12. Kwak J-J, Kim Y-J, Kim M-K, Kim H-K, Park JS, Kim HK, Kim K-B, Ahn H, Sohn D-W, Oh BH, Park Y-B. Development of tricuspid regurgitation late after left-sided valve surgery: a single center experience with long-term echocardiographic examinations. *Am Heart J*. 2008;155:732–7.