The difficult decision of when and in whom to perform isolated tricuspid valve surgery

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EDITORIAL

The difficult decision of when and in whom to perform isolated tricuspid valve surgery

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This editorial refers to 'Isolated tricuspid valve surgery: impact of aetiology and clinical presentation on outcomes'†, by J. Dreyfus *et al.*, on page 4304.

In current times of continuous development of new, minimally invasive technologies to treat valvular heart disease, the question of when and in whom to perform isolated tricuspid valve surgery for severe tricuspid regurgitation remains unanswered. European clinical practice guidelines recommend surgery in patients with severe primary or secondary tricuspid regurgitation who undergo left-sided valve surgery (recommendation class I), whereas isolated tricuspid valve surgery is recommended in patients with symptomatic severe primary tricuspid regurgitation without severe right ventricular dysfunction (recommendation class I) and should be considered in patients with severe secondary tricuspid regurgitation after previous left-sided valve surgery who remain symptomatic or develop progressive right ventricular dysfunction (recommendation class IIa).[1] The American guidelines are more cautious for isolated tricuspid valve surgery and provide a recommendation class IIa for patients with severe primary tricuspid regurgitation and class IIb for patients with severe secondary tricuspid regurgitation after previous left-sided valve surgery.[2] The evidence supporting these recommendations is relatively limited and relies mostly on retrospective registries showing that the majority of tricuspid valve operations are performed concomitant with left-sided valve intervention, while only 14.3% are performed in isolation.[3] The in-hospital mortality of isolated tricuspid valve surgery remains relatively high (8.8%) and at 30 days the all-cause death rate ranged from 3.2% to 16%.[4,5] The characteristics of the patients undergoing isolated tricuspid valve surgery are partly responsible for the high mortality: patients are old, with associated comorbidities (coronary artery disease in 34%, atrial fibrillation in 50%, liver disease in 8%, and chronic kidney disease in 19%) and a Charlson comorbidity index ≥2 in more than 50% of them.[5] Data on echocardiographic characteristics are not consistently reported, but it could be expected that patients were referred late, presenting with heart failure symptoms and right ventricular dysfunction. This contrasts with data reported on aortic and mitral valve surgery, where patients are being referred earlier before left ventricular dysfunction occurs.

In the current issue of the *European Heart Journal*, Dreyfus *et al.*[6] provide additional data from 5661 consecutive patients treated with tricuspid valve surgery in 12 French tertiary centres between 2007 and 2017. Isolated tricuspid valve surgery on a native valve was performed in 466 (8%) patients. The characteristics of the patients undergoing isolated tricuspid valve surgery included relatively old age (mean age 60 years), 40% were women, 24% had previous left-sided heart surgery, 47% presented with New York Heart Association (NYHA) class III and IV heart failure symptoms, and 35% were admitted with heart failure within the year prior to surgery. In addition, 57% of patients presented with right heart failure (8% with ascites), while chronic kidney and chronic liver disease were present in 33% and 12% of patients, respectively. A Charlson comorbidity index ≥2 was present in 70% of patients. Importantly, the present article provides echocardiographic data which show that left ventricular ejection fraction was preserved in most of the patients (mean 58%), 17% had moderate and severe right ventricular dysfunction, and a systolic pulmonary artery pressure ≥50 mmHg was observed in 19%. The mechanism of tricuspid regurgitation was organic in 51% and functional in 49%. In terms of surgical treatment and outcomes, 59% of patients received tricuspid valve replacement, the in-hospital mortality was 10%, and at 1 and 5 years follow-up the rates of the combined endpoint of all-cause death and cardiovascular readmissions were 25% and 38%, respectively. Independent associates of in-hospital mortality were NYHA class III/IV heart failure symptoms, low prothrombin time, and moderate/severe right ventricular dysfunction. At mid-term follow-up, right congestive heart failure signs, low

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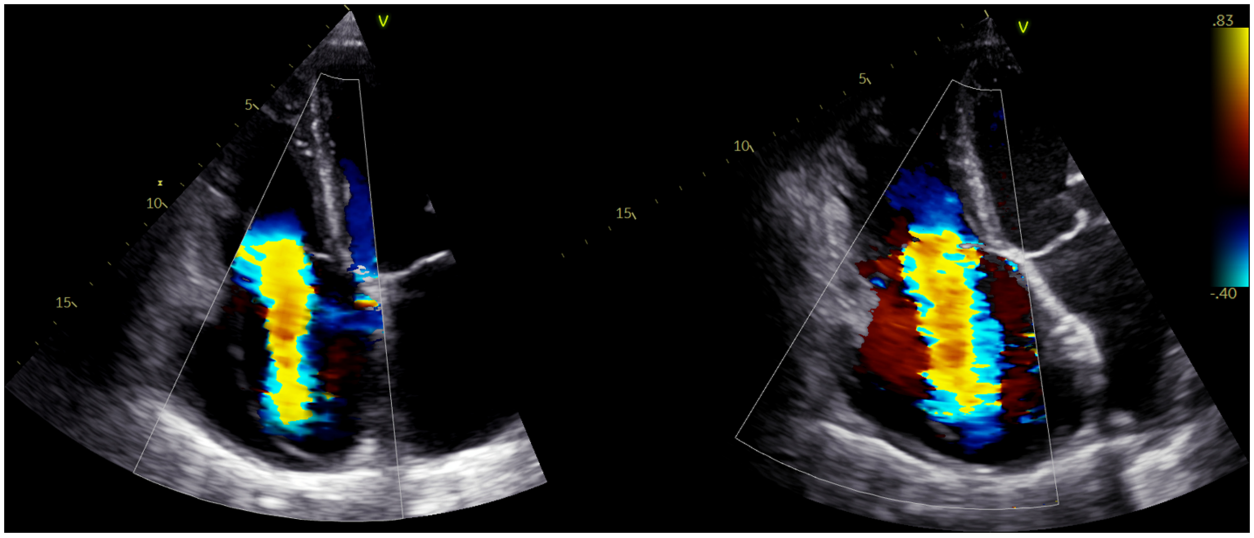

Figure 1 Progression of tricuspid regurgitation. In the left panel, the colour Doppler data show severe tricuspid regurgitation in an asymptomatic patient. The dimensions of the right ventricle are mildly increased and the systolic function is preserved. After 2 years of follow-up, the patient presents with severe heart failure symptoms (including ascites) despite high doses of diuretics. The right panel shows torrential tricuspid regurgitation, a severely dilated right ventricle, leftward deviation of the interatrial septum, and severely impaired right ventricular systolic function.

prothrombin time, and moderate/severe right ventricular dysfunction were independently associated with the combined endpoint. Interestingly, the mechanism of tricuspid regurgitation was not associated with the outcomes.

These data are welcome because they emphasize the importance of timely referral of patients with severe tricuspid regurgitation for intervention.[6] It is important to note that 22% of patients underwent urgent surgery, probably related to tricuspid valve endocarditis for which guidelines have clear recommendations. However, for the vast majority of patients with severe tricuspid regurgitation, symptoms are often neglected or relieved with diuretic treatment that eventually can lead to renal dysfunction. Chronic severe tricuspid regurgitation leads to right ventricular remodelling and dysfunction, and, when the patients present with symptoms despite medical therapy, it is often too late to refer them for intervention (*Figure 1*).[7] Do we need to perform isolated tricuspid valve surgery in asymptomatic patients with severe tricuspid regurgitation, so that we prevent right ventricular dysfunction, renal functional impairment, and liver dysfunction? It is hard to recommend such an intervention when the rates of in-hospital mortality are that high and when the patients are not going to notice any clinical improvement since they are asymptomatic. However, it is important to bear in mind that the available data on isolated tricuspid valve intervention outcomes originate from patients that are symptomatic.[4] Could minimally invasive interventions, such as novel transcatheter procedures, fill the therapeutic gap for asymptomatic patients? This is currently not being tested since the majority of the patients enrolled in prospective trials are those with high operative risk or contraindications for surgery.[8] However, it is logical to think that a less invasive, safe, and efficacious treatment may prevent further deterioration of tricuspid regurgitation and right ventricular function, further deterioration of renal and liver function, and better outcomes as compared with medical therapy and late referral to surgery.[9] While data on the efficacy and durability of current transcatheter therapies are awaited, granular data such as those reported in the present article by Dreyfus *et al.*[6] are important to highlight the need for early referral for isolated tricuspid valve intervention in patients with severe tricuspid regurgitation.

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Corrigendum

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Corrigendum to: Pedro Brugada and Peter Schwartz share the Lefoulon-Delalande Foundation Scientific Prize 2019 [*Eur Heart J* 2019;40:2670].

In this article the following text has been replaced:

The awardees were selected by a jury of the Scientific Committee composed of:

Margaret Buckingham,Member, French Academy of Sciences – President of the Jury
Kari Alto, Honorary Professor of Cardiology, University of Lille
Alain Carpentier, Member, French Academy of Sciences
Giovanni de Gaetano, Director, Research Laboratory, Catholic University of Campobasso, Italy
François Gros, Permanent Honorary Secretary, French Academy of Sciences
Michel Haissaguerre, Member, French Academy of Sciences
Michel Lazdunski, Member, French Academy of Sciences
Mona Nemer, professeur et conseillère scientifique en chef du Canada, Member, Royal Society of Canada
Denis Noble, Director, Physiology Laboratory, University of Oxford
David D. Sabatini, AssociateMember French Academy of Sciences
Bengt Samuelsson,Nobel Laureate medicine and Member French Academy of Sciences
Doris A. Taylor, Director, Department of RegenerativeMedicine, Texas Heart Institute, Houston, TX, USA

The replacement text reads as follows:

Candidates for the award were recommended by the Scientific Council of the Foundation (the jury) and decided upon by the Administrative Council of the Foundation.

Members of the Scientific Council:
Prof. Kari ALITALO, academy professor, director of the Wihuri Research Institute, University of Helsinki, Finland
Prof. Michel BERTRAND, past-president European Society of Cardiology, honorary professor of cardiology, Lille, France
Prof. Margaret BUCKINGHAM, member of the French Academy of Sciences, chair of the Scientific Council
Prof. Alain CARPENTIER, member of the French Academy of Sciences, emeritus chair
Prof. Giovanni de GAETANO, head of the department of Epidemiology and Prevention, IRCCS Instituto Neurologico Mediterraneo NEUROMED, Pozzilli, Italy
Prof. François GROS, permanent honorary secretary of the French Academy of Sciences
Prof. Michel HAÏSSAGUERRE, member of the French Academy of Sciences
Prof. Michel LAZDUNSKI, member of the French Academy of Sciences
Prof. Mona NEMER, chief science advisor to the Government of Canada, fellow of the Royal Society of Canada
Prof. Denis NOBLE, emeritus professor of cardiovascular physiology, University of Oxford, fellow of the Royal Society of London, UK
Prof. David D. SABATINI, member of the National Academy of Sciences (USA), associate member of the French Academy of Sciences
Prof. Bengt SAMUELSSON, Nobel prize for medicine, associate member of the French Academy of Sciences
Prof. Doris A. TAYLOR, director Regenerative Medicine Research, Texas Heart Institute, senior member National Academy of Inventors (USA)