

# Reflections on the 24 years durability of an isolate tricuspid bovine pericardium IMC/Braile bioprosthesis

*Reflexões sobre a durabilidade de 24 anos de uma bioprótese IMC/Braile de pericárdio bovino em posição tricúspide isolada*

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## Abstract

We were challenged by the experience of one patient reoperation for a bioprosthetic bovine pericardium degenerative stenosis, 24 years after implantation. This bioprosthesis was implanted due to tricuspid valve bacterial staphylococcal endocarditis after septic abortion.

**Descriptors:** Endocarditis, bacterial. Tricuspid valve. Bioprosthesis. Cardiac surgical procedures.

## Resumo

Vivenciamos a experiência de reoperar uma paciente por estenose degenerativa de uma prótese biológica de pericárdio bovino, após 24 anos de implante. Essa prótese degenerada havia sido implantada devido à destruição da valva tricúspide por endocardite bacteriana estafilocócica após aborto séptico.

**Descritores:** Endocardite bacteriana. Valva tricúspide. Bioprótese. Procedimentos cirúrgicos cardíacos.

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## INTRODUCTION

Tricuspid valve replacement has been performed with mechanical or bioprosthetic valves. However, the relative advantages of the two types are incompletely known. In most cases of tricuspid valve disease, repair with annuloplasty is considered the procedure of choice. However, when tricuspid valve repair or annuloplasty is not feasible, or not successful, tricuspid valve replacement should be considered. There are limited numbers of reports about the long-term results of tricuspid valve replacement, and controversies still exist regarding prosthesis choice. Both bioprosthetic and mechanical valves revealed similar long-term outcomes. However, findings suggest that greater care is needed to prevent valve thrombosis in mechanical valves in the early postoperative period, and there is a greater chance for reoperation in bioprosthetic valves.

On this conjuncture we were challenged by the experience of one patient reoperation for a bioprosthetic bovine pericardium degenerative stenosis, 24 years after implantation. This bioprosthesis was implanted due to tricuspid valve bacterial staphylococcal endocarditis after septic abortion.

## CLINICAL SUMMARY

Female patient, 46 years-old who suffered a spontaneous abortion and underwent uterine curettage. Was discharged and developed perseverant fever treated with various antibiotics. After about one month presented severe sepsis with multisystem involvement, diagnosed as *Staphylococcus viridans* uterine infection. Because the severe situation underwent a total hysterectomy, bilateral salpingectomy and right oophorectomy. At that time already presented tricuspid systolic murmur and an echocardiogram showed valve regurgitation and vegetations. As the infection persisted, even after gynecologic surgery, it was opted for surgical treatment, in April 1987, and the tricuspid valve was replaced by bovine pericardium prosthesis (IMC / Braile M-31). The patient had regular follow-up until 1995, when she left to attend the scheduled appointment. She returned after 13 years, in 2008, with heart failure and underwent echocardiography and hemodynamic studies that diagnosed severe stenosis of the tricuspid valve bioprosthesis. The patient remained under regular outpatient follow-up, echocardiography persisted with the same characteristics, showing an increase of right atrium, but with normal performance of both ventricles. It is noteworthy that the patient had bronchial asthma and sometimes symptoms were associated to pulmonary dysfunction. As dyspnea deepened, associated with signs of venous congestion and

hepatomegaly, it was opted, in March 2011, for the prosthesis replacement. The surgery indication was based on clinical data suggestive of heart failure, but mainly based on echoDopplercardiography data that showed severe stenosis and degeneration of the bioprosthesis.

Surgical planning included left thoracotomy in the fourth space in semi-lateral decubitus (the previous surgery was performed through median sternotomy with infected dehiscence), cardiopulmonary bypass femoro-femoral, bicaval cannulation with cuffed cannulas and normothermia with heart beating. Under these conditions the degenerated prosthesis was replaced by another bovine pericardium bioprosthesis (Braile-M29).

The case illustrations are represented in a single composite figure (Figure 1).

## DISCUSSION

The decision as to whether a patient should undergo isolated tricuspid valve replacement is one of the most difficult challenges facing clinicians in the management of valvular heart disease. The clinical outcome of isolated tricuspid valve replacement is not well defined because this procedure is usually performed concomitantly with other valve surgery. Isolated tricuspid valve replacement is characterized by a poor short and long-term outcome. The only previous report that focused on isolated tricuspid valve replacement was limited to a selected group of patients with endocarditis; including a cohort of young drug addict patients without previous cardiac surgery [2].

Isolated tricuspid procedures are exceptionally rare. Prosthetic valve replacement is also seldom required. Generally, these patients face a high risk of operative mortality and long-term outcome is poor. Tricuspid valve repair is associated with better perioperative and long-term outcome than valve replacement. However, patients undergoing replacement showed a significant higher incidence of risk factors for operative mortality. The incidence of reoperation is low with no significant difference when the tricuspid valve has been repaired or replaced [3].

Tricuspid valve reoperation is associated with a high mortality rate. McCarthy et al. [4] reported hospital mortality rate of 37%. These authors emphasize that the discrepancy between the high recurrence rates of regurgitation and the low re-operation rates may be explained by the fact that reoperation is associated with a high mortality and thus, these patients are managed medically as long as possible before referral to surgery.

Controversy exists as to the most suitable prosthesis for the tricuspid position. Some authors have reported good results with bioprostheses, while others have shown good results with mechanical valves. Little is known of time-related outcome and comparative performance of biological

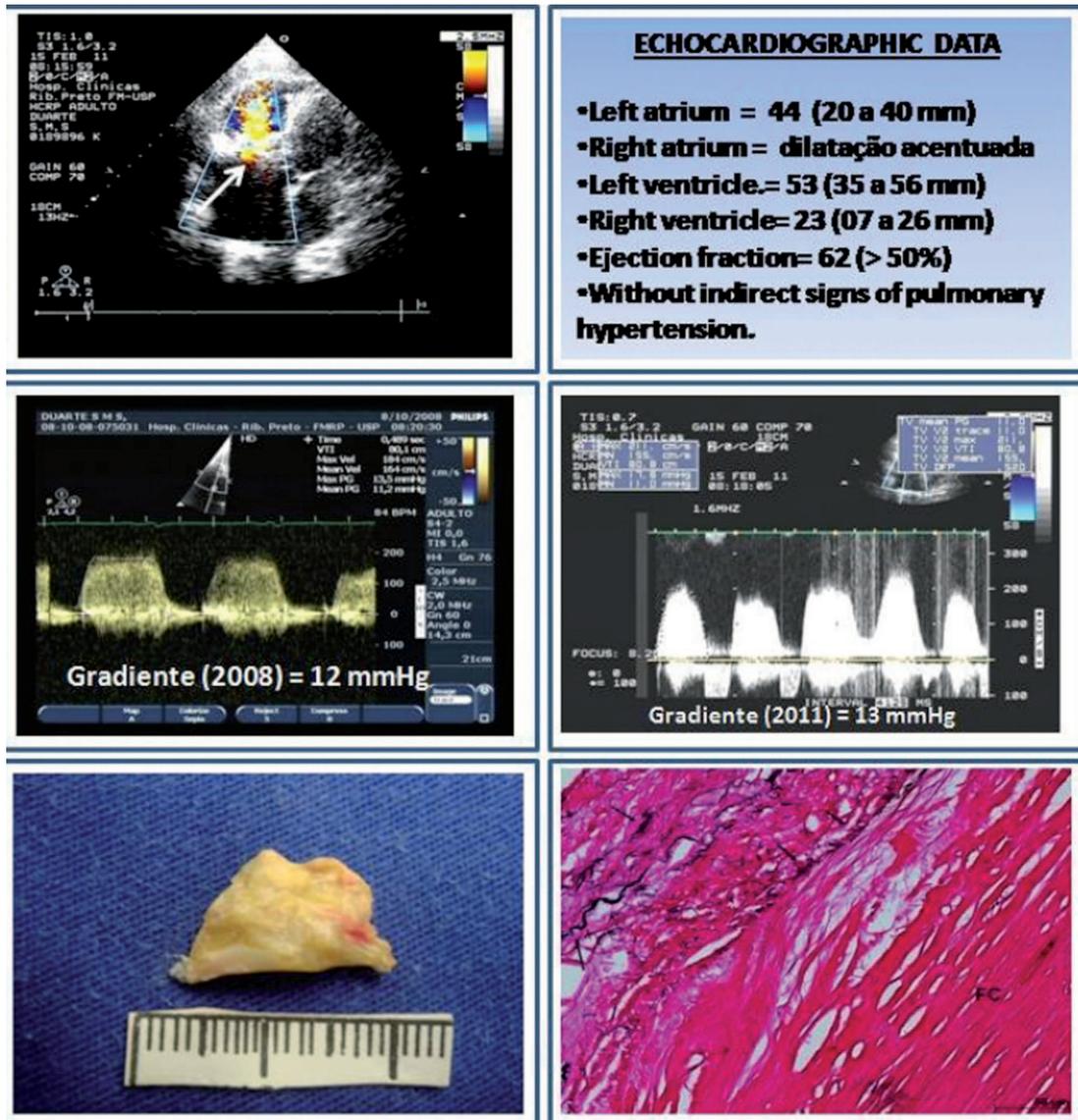


Fig. 1 - 1) Transesophageal echoDopplercardiogram showing prosthesis stenosis and cardiac measurements (upper panels), 2) transprosthetic gradients kept constant in a 3-year period (middle panels) and 3) macroscopic view of one of the replaced mitral prosthesis and histology photomicrograph histological section showing a thick fibrous connective tissue with a predominance of collagen fibers (CF) (red), and parallel to a ventricular connective tissue layer rich in elastic fibers (→) (in black). Verhoeff iron hematoxylin. 400x (lower panels)

and mechanical prostheses following tricuspid valve replacement. A retrospective UK Heart Valve Registry study (Jan 1, 1986 to June 30, 1997) concluded that tricuspid valve replacement carries high 30-day mortality and a poor longer term survival. No superiority could be identified for biological or mechanical prostheses in the tricuspid position for either survival or reoperation. Early mechanical prostheses (caged all or disc and tilting disc) were replaced by biological prostheses, which in turn are being challenged by the new generation of mechanical bileaflet prostheses.

Many have advocated the use of a bioprosthesis at the tricuspid position because of lower pressures and thus lower stress in the right heart leading, potentially, to a greater durability, without the need for higher levels of anticoagulation for mechanical prosthesis. In addition, it is prudent to take in consideration that the internal morphology of the right ventricle can, directly, infringe on the mechanism of mechanical valves at the tricuspid site. A less dogmatic approach to the choice of prostheses at the tricuspid site may, therefore, be emerging [5].

In a general overview, the vast majority of highly experienced surgical teams are inclined to use bioprostheses, since hemodynamic results are excellent, does not require anticoagulation, but this overview changes if the patient has other prosthetic devices that require treatment, or if is in atrial fibrillation. One possibility for the use of mechanical tricuspid prostheses would be the patient's age, since bioprostheses may have a shorter duration. However, as shown in the review of the literature, even when this situation arises, the vast majority of surgical groups prefer the use of bioprostheses [6].

The American and European societies in its latest guidelines indicate biological prosthesis in the tricuspid position [7-9]. It is noteworthy that the European directive recognizes that there are controversies, but still maintains the bioprosthesis indication. Clearly this is an outstanding matter. Thus, seems reasonable the exercise of the surgeon personal preference in the choice of biological or mechanical prosthesis for the tricuspid position [5]. The Society of Thoracic Surgeons Clinical Practice, in its guidelines for endocarditis surgical management keeps the American and European recommendations but, in the presence of intravenous drug use, more tissue valves are implanted because of anticipated noncompliance with anticoagulation therapy. Thus, the rate of reoperation for this group is higher. However, the only predictor for poor long-term survival was age [10]. After several discussions, this criterion was adopted in the case herein presented, when choosing by the implant of another bovine pericardium prosthesis.

Finally, it is necessary, a review of the bioprostheses durability in the tricuspid position. Outcomes exceeding 20 years are not uncommon in the literature, excluding patients with rheumatic heart disease and excluding patients stranded drug addicts, even after repeated episodes of bacterial endocarditis. A very recent publication describes a case of an unexpected Ionescu-Shiley bioprosthesis durability in the mitral and tricuspid positions, deployed to deal with endomyocardial fibrosis, suggesting that bovine pericardial valves may have excellent hemodynamic performance and durability over 20 years even in young patients [11]. In a period of more than 30 years at the Mayo Clinic, 333 surgical patients received biological prostheses and 45 received mechanical prostheses for surgical treatment of Ebstein Anomaly and, a comparative study concluded that the presence of a bioprosthesis is an independent predictor of increased survival [12]. Puig et al. reported three patients with tricuspid insufficiency who underwent valve replacement with homologous dura mater cardiac bioprostheses glycerol-preserved (Two patients were well 28 and 27 years later, and the third was lost to follow-up after 20 years) [13,14]. These reports strongly suggest the good results of isolated tricuspid valve bioprosthesis.

## CONCLUSION

It is curious that an unusual situation in cardiology services can generate interesting discussions and, when seeking assistance in specialized medical literature, is a subject fraught with controversy. This observation led to the present "Brief Communication" based on the apparently single isolated tricuspid valve bioprosthesis. The question of the surgical team, composed by the authors, was the same never end story: what kind of prosthesis to use? As already mentioned, biological prostheses were unanimous in relation to mechanical older prostheses (caged ball or disc and tilting disc), but have been "challenged" by the bileaflet mechanical prostheses.

Other considerations include: a) the high perioperative mortality (10-37%), highlighting the bias of prolonged medical treatment, and therefore, the surgical treatment should be indicated before the onset of heart failure, b) the choice of prosthesis for isolated tricuspid valve replacement tends to be less dogmatic, pointing out that, although the issue is an open discussion, the American and European guidelines recommend the use of bioprosthesis c) The durability of both types of prostheses, as far as we can study are similar in patients without rheumatic disease (endomyocardial fibrosis, congenital heart defects, more specifically the Ebstein's disease).

Finally, it is an anecdotal observation that the rheumatic inflammatory activity may be able to interfere with the process of calcic bioprosthetic degeneration. The reported patient had her prosthesis implanted due to bacterial endocarditis after septic abortion. The durability of bioprosthetic tricuspid valve is not clear in the literature, because the studied populations involves a vast majority of drug addicts, that are operated and return to use of drugs, therefore interfering with survival outcome. The case of the reported patient suggests that endocarditis, as well as other non-rheumatic diseases, seems not to interfere or, at least, be consistent with the durability of bioprostheses over 20 years.

In time, in her latest ambulatory appointment the patient was clinically well, but presenting atrial fibrillation. Anticoagulation was suggested, but she refused for experiencing serious anticoagulation complications in a friend.

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