



# First Case of Triple Valve Replacement in the Andre Festoc Center in Bamako

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**Abstract:** Triple valvulopathy refers to triple valve dysfunction: mitral, aortic and tricuspid. Most are of rheumatic origin. The specificity of these triple disorders derives from the great variability of the pictures encountered, associating to varying degrees leakage and stenosis in each orifice. The aim of this work was to establish the specific features of this surgery, to determine the operative indications, and to evaluate the operative results in a developing country. We report the case of a 25-year-old female patient with a history of recurrent angina during childhood, who underwent therapeutic termination of pregnancy 03 years ago for exertional dyspnea and edema of the lower limbs, revealing this cardiopathy. Cardiac ultrasonography revealed a tight mitral narrowing with a mitral surface area of 0.7 cm<sup>2</sup> and a mean gradient of 15 mmhg; tricuspid disease combining severe tricuspid insufficiency and tricuspid narrowing with a mean gradient of 7 mmhg; and a tight calcified aortic narrowing with a mean gradient of 51 mmhg. Operability tests were normal. She underwent triple valve replacement: mechanical mitral valve replacement with a No. 33 prosthesis; mechanical aortic valve replacement with a No. 24 prosthesis; and biological tricuspid valve replacement with a No. 25 bioprosthesis. Extracorporeal circulation time was 217 min, clamping time 132 minutes and assistance time 66 minutes. Post-operative follow-up was marked by left and right ventricular dysfunction, which progressed well on drugs.

**Keywords:** Triple Valve, Replacement, Bamako

## 1. Introduction

Triple valvulopathy refers to triple valve dysfunction: mitral, aortic and tricuspid. Most are of rheumatic origin. They are less common in Western countries, due to the

decline in rheumatic heart disease, which remains a frequent pathology in our country. The specificity of these triple disorders lies in the great variability of the pictures they present, associating to varying degrees leakage and stenosis in each of the orifices. As a result, their clinical and

evolutionary profiles are highly varied. Ultrasound and cardiac Doppler are essential for diagnosing and assessing the impact of these valvulopathies.

This pathology has greatly benefited from the development of cardiac surgery. Nevertheless, indications for surgery remain poorly codified. Moreover, despite advances in surgical techniques, myocardial protection and postoperative resuscitation, tri-valvular surgery is still associated with a high mortality rate, due to the long extracorporeal circulation (ECC) time required in the context of advanced disease [3].

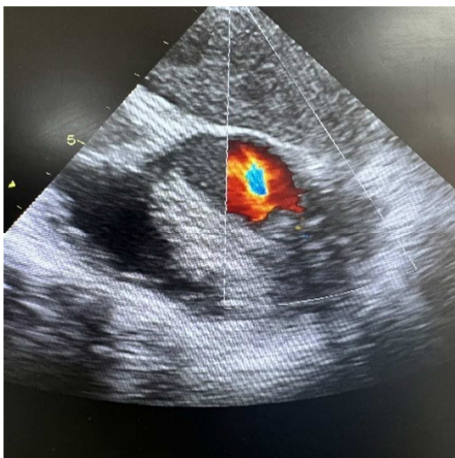
## 2. Case Report

This is a 25-year-old female patient with a history of recurrent angina in childhood who had undergone therapeutic termination of pregnancy 03 years ago for NYHA stage 3 dyspnea and edema of the lower limbs revealing this heart disease.

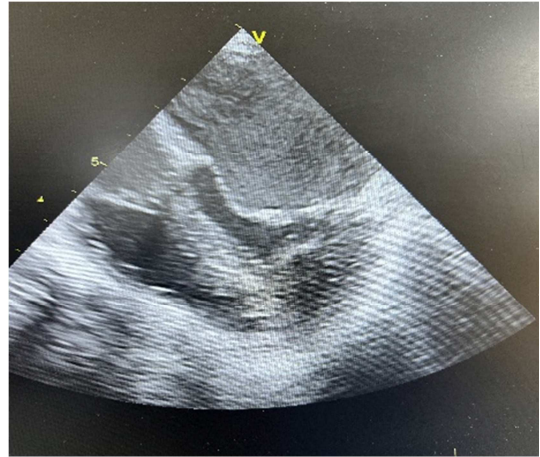
Cardiac echography revealed a tight mitral narrowing with a mitral surface area of  $0.7 \text{ cm}^2$  and a mean gradient of 15 mmhg (figures 3-4); tricuspid disease combining severe tricuspid insufficiency and tricuspid narrowing with a mean gradient of 7 mmhg (figure 5); and a tight calcified aortic narrowing with a mean gradient of 51 mmhg (figures 1-2). Operability tests were normal.



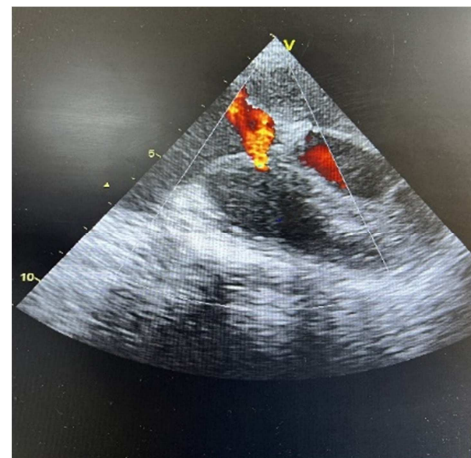
**Figure 1.** Cardiac ultrasound (aortic calcifications).



**Figure 2.** Cardiac ultrasound (aortic regurgitation and sténosis).



**Figure 3.** Cardiac ultrasound (mitral stenosis + left atrial dilatation + spontaneous contrast).



**Figure 4.** Cardiac ultrasound (mitral regurgitation).



**Figure 5.** Cross-sectional cardiac ultrasound (massive tricuspid regurgitation and stenosis).

She underwent triple valve replacement: mechanical mitral valve replacement with a No. 33 prosthesis (figure 8 and figure 9), plus mechanical aortic valve replacement with a No. 24 prosthesis (figure 9) and biological tricuspid valve replacement with a No. 25 bio prosthesis (figure 10). Extracorporeal circulation time was 217 min, clamping time



132 minutes and assistance time 66 minutes.

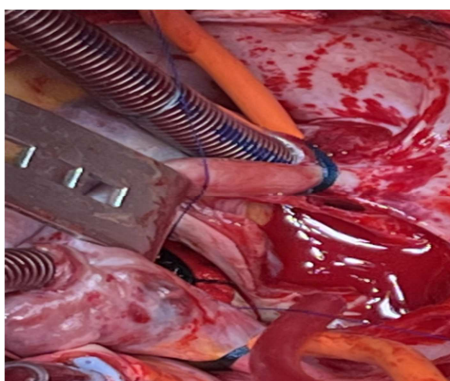
The post-operative course was marked by bi-ventricular dysfunction, which progressed well on drugs.



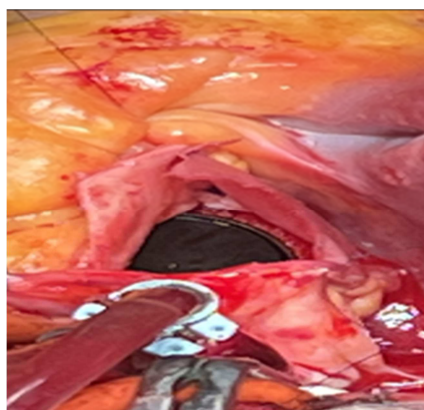
**Figure 6.** Calcified mitral and aortic valves (atrial side).



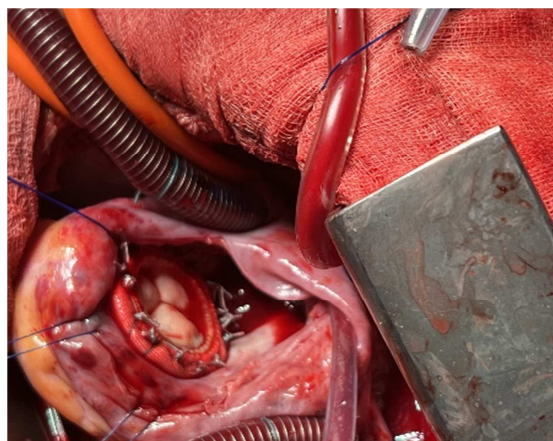
**Figure 7.** Calcified mitral and aortic valves (ventricular side).



**Figure 8.** Mitral prosthesis in position.



**Figure 9.** Aortic prosthesis in place with widening of the aortic annulus.



**Figure 10.** Biological tricuspid prosthesis in place.

### 3. Discussion

Our patient's age was 23 years, which is lower than the average age of Western series such as Alsoufi's [4] with an average of 58.2 years, or Mullany's [9] with an average of 54 years, Akay's [3] with an average age of 40 years and Han's [6] with an average age of 42 years.

Thus, triple valvulopathy occurs mainly in young, active adults in developing and emerging countries, in contrast to developed countries where it occurs in an older population. In Boulanouar's series of 861 patients [1], 3 patients underwent triple mitro-aortic and tricuspid valve replacement.

Our patient is female. In several series, female predominance has been noted; as in that of Carrier [7] with 63% women, that of Shinn [14] with 68% and that of Han [6] with 75% women. This predominance can be explained by the fact that rheumatic pathology is a highly female-dominated disease.

As regards comorbidity in the surgical management of triple valvulopathy, the series by Han [6] noted 16% hypertension and 11% diabetes. Our patient was neither hypertensive nor diabetic.

In our patient, the etiology was rheumatic. The same is true of the series by Alsoufi [4], Carrier [7] (98.7%) and Yilmaz [12] (100%). The study by Han [14] focused exclusively on surgery for triple valve disease of rheumatic origin. Rheumatic fever remains the major cause of valvular heart disease in France and other developing countries. It represents a real public health problem. Primary prevention is therefore essential, as is secondary prevention of rheumatic fever, to avoid relapses and progression to rheumatic heart disease.

Clinically, our patient presented with stage 3 dyspnoea, which was found in 65.5% of cases in Shinn [14] and in 64.7% of cases in the series by Yilmaz [12].

On electrocardiogram, in the context of advanced valvulopathy, it is not uncommon to find a high percentage of atrial fibrillation, as in our case. Fibrillation was found in 79% of cases in Mullany's series [5] and 62% in Shinn's [14].

This is explained by the impact of left valvular damage on the left atrium, which is usually dilated or even ectatic.

Our patient presented with severe mitral stenosis. Han's series [6] also showed a majority of mitral stenosis. In Alsoufi's series [4], patients were evenly divided between mitral narrowing, insufficiency and disease.

With regard to the aortic valve, our patient presented with severe aortic narrowing. In some series, this was predominantly aortic disease, as in the series by Garg [8] and Alousfi [4], or aortic insufficiency in the series by Han [6].

With regard to the tricuspid valve, in our patient there was a combination of insufficiency and narrowing. In Alsoufi's series [4], 87% of patients had tricuspid insufficiency.

In the first developed countries, cardiac valve replacement surgery mainly concerns aortic valve cardiopathies, while mitral valve cardiopathies are less and less treated by valve replacement [2].

They are repaired by conventional or transcatheter plastic surgery, or even dilated percutaneously.

In our country, due to the preponderance of rheumatic etiology and the young age of our population, valve replacements are usually performed by mechanical prosthesis.

In addition, the aortic valve now benefits from new techniques such as TAVI (Transcatheter Aortic Valve Implantation), currently performed in numerous surgical centers in Europe and the USA [16]. The high cost of these techniques makes them unfeasible in our country.

Extracorporeal circulation time in our patient was 217 minutes. This is identical to the average in Ekouhen's series [15], but longer than in Han's [6] and Garg's [8] series.

Clamping time was 132 minutes. This is longer than the series average of Ekouhen [15], Han and Garg [6-8].

According to European guidelines 116 on surgery for polyvalvular heart disease, the indication for surgery is based on an overall assessment of the consequences of the various valve impairments, i.e. symptoms or consequences on LV dimensions and function. Moreover, the decision to intervene must take into account the additional risk of combined surgeries. The indication for surgery is usually given to symptomatic polyvalvular patients. However, in asymptomatic or paucisymptomatic patients, certain parameters pointing to the myocardial or pulmonary impact of polyvalvulopathy suggest that surgical treatment should not be deferred [10]. For example, significant cardiomegaly on radiology and/or ultrasound, low cardiac output and impaired LV EF are among the factors influencing the decision to undergo surgery [11].

Any valvular disease with significant repercussions must be corrected. Minor damage to a valve orifice may be overlooked, although the increased risk of further surgery should be borne in mind [13].

With regard to tricuspid surgery associated with left-sided valve surgery, according to the recommendations of the Société Française de Cardiologie [9]: In the context of functional tricuspid insufficiency, the indication is accepted in the case of voluminous functional tricuspid insufficiency (grade III) with PAH secondary to left-sided valve damage requiring surgical cure. For organic tricuspid insufficiency, it recommends surgery in cases of moderate or organic

tricuspid insufficiency (Grade II or III) associated with left-sided valve damage requiring surgical cure. The indication is debated in cases of moderate organic tricuspid insufficiency (Grade I) associated with left-sided valve damage requiring surgical cure. Some authors recommend systematic tricuspid annuloplasty associated with mitral surgery when the tricuspid annulus is dilated in isolation, even in the absence of significant tricuspid insufficiency, or when the echographic diameter of the annulus is greater than 21mm/m<sup>2</sup> or 30mm/123. Finally, in the case of tricuspid narrowing, surgery is indicated in cases of significant tricuspid narrowing or narrowing with tricuspid insufficiency associated with left-sided valve damage that has reached the surgical stage [9].

Aortic replacement has also been the rule in national and international series, with the exception of the Alsoufi series [4], where 8% of patients underwent aortic plasty.

Several authors have studied the influence of tricuspid valve replacement versus plasty, and have not identified the surgical management of triple valve replacement disease as an independent risk factor for early or late mortality [4-6].

Mortality rates in these series are higher with 6.9% in Shinn [14], 12.6% in Alsoufi [4] 13.7% in Carrier [7] and 21% in Mullany [5] and 28.5% in Garg [8] (high rate may be explained by more advanced clinical stage and more severe PAH).

## 4. Conclusion

Valve replacement surgery is a reality in our rheumatically endemic context and gives good results. However, mechanical prostheses still require lifelong anticoagulant treatment. Moreover, lifelong anticoagulation requires a favourable family, social and economic environment, so as to institute genuine compliance with the rules and recommendations by the patient and ensure good medical follow-up. However, triple replacement remains a very invasive surgery and other less aggressive alternatives are available in developed countries, such as TAVI. Hence the need for greater political involvement to make these procedures accessible in our countries.

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## Biography

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