

# Surgical treatment of aortic valve stenosis

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## Abstract

This study has the general objective to analyze the proper treatment in different cases of aortic stenosis, focusing on the surgical treatment, more specifically in Percutaneous Transcatheter Aortic Valve (VATP) and aortic valve replacement without suture. This work was a review of the literature conducted in August 2018. After the selection of jobs that met the inclusion criteria, the selected material was analyzed, and the results presented in tables, carrying out a qualitative study to characterize the publications found. The study showed that surgery is indicated for symptomatic patients, requiring that care be taken for those patients who are in the risk allo group, asymptomatic patients the most appropriate option is the vigilant monitoring, as it does not offset the risk brought by surgery. It should be noted that the TAVI was indicated as the most used technique for performing surgery in patients with aortic stenosis.

## Introduction

Aortic valve stenosis is configured as a narrowing of the valve that is located between the heart and the aorta, preventing the structure function properly, preventing this structure to function properly, its manifestation occurs when blood flow is reduced for the rest of the body, with the heart needing to work harder to meet this function. Thus, the development starts a ventricular hypertrophy by chronic and progressive overload ventricle [1].

According to the Guidelines 2017 Brazilian Valve Disease, elaboradoras by Tarasoutchi et al, aortic valve stenosis has been increasing in prevalence in recent years, which is justified by the increase in life expectancy of Brazilians, consequently, population aging. It is one of the most common and serious valve diseases which are known problems [2].

According to Luna, age, sex and ethnicity, socioeconomic factors, salt intake, obesity, alcohol consumption, smoking, physical inactivity and stress are risk factors for high blood pressure. So as advancing age, the prevalence is likely to increase. The combination of risk is greater in the population where economic power is less [3].

It explains that over the years, the body wears out in varying degrees due to aggression caused by poor nutrition, smoking, excessive consumption of fat and alcohol, sedentary lifestyle, stress, pollution, diseases, medicine and other factors. In addition, the elderly body loses called functional reserve, ie the ability to respond properly to be required beyond normal, as during surgery or a disease that can possibly afflict it. The elderly need greater flexibility in health care because the aging process brings as a consequence less expedient for the elderly seek health services and move in different levels of care. For the elderly, especially the most needy, any difficulty becomes a motto to block or disrupt continuity of care to your health [4].

Important to mention that the heart consists of a body with muscular structure that has the pulse function distributing blood throughout the body. The heart muscle contracts relaxes at the same rate all the time, when it is overloaded shall be liable to the emergence of diseases, especially cardiovascular. The aortic valve is the last of the

four valves through which blood passes before leaving the heart. By the time the blood got there, he has passed through the lungs and took another round of oxygen to your body [5].

In general, cardiovascular disease initially present with shortness of breath, fatigue, chest pain, palpitations, swelling and spots the body. In presenting symptoms is essential to seek a doctor for the diagnosis can be given as soon as possible. In order to give the diagnostic tests are performed as the electrocardiogram, exercise stress test, echocardiography, and after diagnosis are made detailed examinations so that you can see the evolution of the disease [5].

Whereas the increase in the elderly population in Brazil and that old age is a complex period for the maintenance of health, it can be said that talking about treatment for aortic stenosis is social relevance, moreover, has its professional relevance and academic since it contributes to better understanding of the topic discussed, focusing on the surgical treatment for this cardiovascular disease.

In this context, this study has as main objective to analyze the proper treatment in different cases of aortic stenosis, focusing on the surgical treatment, more specifically in Percutaneous Transcatheter Aortic Valve (VATP) and aortic valve replacement without suture.

## Methodology

This study was a literature review, which according to Gil (2007), is developed from already prepared material, consisting mainly of books and scientific articles. According Markoni and Lakatos the literature consists of eight stages, including: a) determining the objectives; b) preparing the work plan; c) Identification of sources; d) location of the sources and obtaining the material; e) reading material; f) taking notes; g) preparation of sheets; h) drafting work.

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In the same way we proceeded with this research. The bibliographic occurred on secondary sources in Virtual Health Library (VHL) and included articles indexed in the databases LILACS (Latin American Literature in Health Sciences), in articles library SciELO (Scientific Electronic Library Online) and CAPES. During the research the following descriptors were used: Aortic Valve Stenosis; Aortic Valve (Aortic Valve) Replacement and Transcatheter Aortic Valve.

The inclusion criteria of definite articles were: full research article and be available electronically. And exclusion criteria: repeated items in the databases mentioned above.

It is emphasized that this research took place in August 2018. After the selection of jobs that met the inclusion criteria, the selected material was analyzed, and the results presented in tables, carrying out a qualitative study to characterize the publications found.

### Results and discussion

According to the Brazilian Guidelines for Valvular Heart Diseases (DBV) determined in 2017, are made recommendations for treatment decision to be used in aortic valve stenosis, these parameters consist of five steps that must be followed for evaluation of valve disease. Initially we have the diagnosis, which is done either by physical examination and by laboratory tests (Table 1).

Thus, the tests to be performed depend on the case of each patient, being necessary to consider the clarity of the results so that you can decide on the need for further tests. After diagnosis of aortic stenosis, the next step is to evaluate the etiology, as these characteristics influence in decision making on the treatment to be performed. Step 2 is shown in Table 2.

The evaluation of symptoms, in turn, is configured as the third step suggested by the Guidelines 2017 Brazilian of heart valve defect, especially the dyspnoea, the angina and syncope, which are best described in Table 3.

The aortic stenosis complicating factors also need to be considered and analyzed by the doctors, these complications can be identified from echocardiography, and exercise stress test as shown in Table 4.

Thus, as can be seen, the poor prognosis is considered when identifying an aortic valve area <0,7cm<sup>2</sup>, moreover, it is considered the maximum speed of the aortic jet > 5.0 m / s left ventricle gradient > 60

**Table 1.** Diagnosis Stenosis Aortic Valve

	Mitral Stenosis Characteristics
Physical exam	• mitralis Facies • Early opening Flick • First sound hyperphonic • Second sound hyperphonic • Blowing diastolic rumble on, with pre-systolic reinforcement if the patient is in sinus rhythm • pulmonary congestion signs and right heart failure • Presence of tricuspid regurgitation
Electrocardiogram	• Left atrial overload • Overload right chambers • Atrial Fibrillation
Chest X-ray	• Normal • cardiothoracic index increased left atrial signals: Rise of the left main bronchus ("Mark of the dancer") Double atrial contour to right bow in cardiac silhouette to the left • Signs of pulmonary congestion
echocardiography	• mitral area <1.5 cm <sup>2</sup> • Gradient average diastolic left atrial / left ventricular • ≥ 10 mmHg pulmonary artery systolic pressure ≥ 50 mmHg at rest • systolic pulmonary artery pressure ≥ 60 mmHg with stress
hemodynamic study	• As in the case of inconsistency between clinical and echocardiographic left atrial diastolic findings • Gradient / left ventricle ≥ 10 mm Hg (spontaneous or after trial with atropine and volume) • systolic pulmonary artery pressure ≥ 50 mmHg

Source: Tarasoutchi et al. (2017).

**Table 2.** Evaluation of etiological features

	Etiological features
Rheumatic fever	• > 90% of cases in developing countries • Symptoms between the third and fourth decades of life • commissural fusion, cusp thickening • Commitment of subvalvular • Opening dome of the anterior leaflet and reduced mobility of the posterior leaflet • Mitroaortic involvement
Degenerative (calcification of the valve apparatus)	• 12-26% of cases in developed countries • More common in the elderly • You can reach 60% of cases in patients over 80 years old • Calcification of the mitral valve annulus • commissural fusion of Absence • Relationship with aortic calcification and coronary
Rare causes	• Congenital • rheumatic diseases (lupus and rheumatoid arthritis) • Drugs (methysergide and appetite suppressants) • carcinoid syndrome • Fabry disease • actinic injury - after radiotherapy

Source: Tarasoutchi et al. (2017).

**Table 3.** Evaluation of symptoms

Symptoms	
Dyspnea (NYHA II-IV)	• Main symptoms • Initially with events that increase pulmonary venocapillary pressure (physical effort, atrial fibrillation and pregnancy) • Dyspnea at rest and paroxysmal nocturnal dyspnea • Can be accompanied by palpitations, hemoptysis, dysphonia, dysphagia and cough • It may be accompanied by events embolic (cerebral, mesenteric and extremities)

Source: Tarasoutchi et al. (2017).

**Table 4.** Evaluation of complicating

Complicating	
Pulmonary hypertension	• systolic pulmonary artery pressure ≥ 50 mmHg at rest • systolic pulmonary artery pressure ≥ 60 mmHg to stress (stress testing or pharmacological stress echocardiography)
new-onset atrial fibrillation	• Relationship with remodeling of the left atrium • Maintain international normalized ratio from 2.0 to 3.0

Source: Tarasoutchi et al. (2017).

mmHg. The exercise test can be seen in hypotension complicating levels and the presence of symptoms at low loads.

From the knowledge generated by the previous four steps, it is possible that the doctor initiates the most appropriate treatment to the needs of every patient. The considerations for choice of each process are presented in Table 5.

The Brazilian Guidelines of Valvular Heart Diseases 2017 bring also the recommendations related to the interventions of Aortic Stenosis, presented in Table 6.

On the forms of intervention of aortic valve stenosis surgical treatment, it is worth mentioning the study by Baumgartner (2005) where patients with severe symptoms were affected by higher operative mortality than those without symptoms or had only mild symptoms. In addition, urgent or emergent valve replacement carries a significantly higher risk than elective surgery. However, operational risk, no matter how small, should always be weighed against the potential benefit. While operative mortality can ideally be in the range of 2-3% can reach 10% in the elderly and even in the presence of significant comorbidity.

Baumgartner (2005) mentions that one should consider not only the operative risk, but also the morbidity and mortality related to long-term prosthetic valve. Thromboembolism, bleeding, endocarditis, valve thrombosis, regurgitation for valve and valve failure occur at a rate of at least 2-3% per annum and death directly related to the prosthesis was reported at a rate of up to 1% per year [6].

Thus, it points that the surgery cannot be justified early when an obvious benefit is not proven for the patient. To that end, Otto (2006) believes that the risks posed by surgery outweigh not be taken for asymptomatic patients, vigilant monitoring longer valid [7].

**Table 5.** Types of intervention

Mitral valvuloplasty balloon catheter	<ul style="list-style-type: none"> <li>• treatment of choice in rheumatic disease indications • Symptoms functional class (FC) II-IV and / or complicating echocardiographic factors score <math>\leq 8</math>. (Subvalvular apparatus and calcification <math>\leq 2</math>)</li> <li>• In pregnant women or patients with high surgical risk, consider: echocardiographic score = 9-10 (subvalvular and calcification <math>\leq 2</math>)</li> <li>• Contraindications: Thrombus in left mitral insufficiency lobby or important recent embolic phenomenon.</li> </ul>
Surgery (commissurotomy / valve replacement)	<ul style="list-style-type: none"> <li>• rheumatic mitral stenosis functional class III-IV with contraindications to the mitral valvuloplasty balloon catheter • with rheumatic mitral stenosis complicating factors, not eligible for mitral valvuloplasty balloon catheter • degenerative mitral stenosis refractory to surgical treatment</li> </ul>
Transcatheter mitral valve implantation	<ul style="list-style-type: none"> <li>• degenerative mitral stenosis refractory to medical treatment, high risk or with contraindications to surgery (study)</li> </ul>

Source: Tarasoutchi et al. (2017).

**Table 6.** Recommendations for intervention in Aortic Stenosis

Intervention	clinical condition	SBC	AHA	ESC
Mitral valvuloplasty balloon catheter	• rheumatic mitral stenosis functional class II-IV, in the absence of contraindications	IA	IA	IB
	• asymptomatic rheumatic mitral stenosis with complicating factors, in the absence of contraindications	IC	Ib C (AF)	Ia C (high thrombotic risk or hemodynamic deterioration)
surgery (commissurotomy /valve replacement)	• rheumatic mitral stenosis functional class III-IV with contraindications to the mitral valvuloplasty balloon catheter	IB	IB	IC
	• rheumatic mitral stenosis with asymptomatic complicating factors, not eligible for mitral valvuloplasty balloon catheter	Ia C	Ib C (recurrent embolism)	-
	• refractory degenerative mitral stenosis to clinical treatment	Ib C*	-	-
	• asymptomatic rheumatic mitral stenosis programming another heart surgery	IC	IC	-
transcatheter mitral valve implantation	• refractory degenerative mitral stenosis to clinical treatment, with contraindications or high risk surgical treatment	Ib C*	-	-

Source: Tarasoutchi et al. (2017).

Given the doubts that still hover over it, Katz, Tarasoutchi and Grinberg (2010) conducted a study on this dilemma, as it found that patients with severe aortic stenosis asymptomatic are part of a heterogeneous group of clinical point of view, laboratory and echocardiography. It stands out within this group, a portion of patients classified as high risk [8].

high risk criteria are altered stress test, aortic valve area less than or equal to 0.7 cm<sup>2</sup> or less indexed valve area than or equal to 0.4 cm<sup>2</sup> / m<sup>2</sup> jet velocity aortic transvalvular rapidly progressive, moderate aortic valvular calcification intense, excessive ventricular hypertrophy. For the patients in this group, the authors consider that the surgical strategy should be considered against the conservative approach [8].

The implant bioprosthesis Aortic Transcatheter, English, Transcatheter Aortic Valve Implantation (TAVI) has been the most used surgical technique for aortic stenosis intervention, however, according to Eusanio and Phan (2015) due to recent technological developments the international community It has used minimally invasive alternative option that prevents the placement and tying of sutures, known as rapid deployment of aortic valves or without suture. The potential benefits of aortic prostheses seamlessly include reducing the cross-clamp time and cardiopulmonary bypass, facilitating minimally invasive surgery and complex cardiac interventions, maintaining satisfactory hemodynamic results and low paravalvular leak rates.

Comparing the aortic valve without replacement with conventional suturing techniques Hanedan et al. (2018) treated 70 elderly patients with cardiac surgical procedures cited concomitantly. The authors found in their results that elderly patients and high risk who have undergone various cardiac surgical procedures and RAT sutureless had

better hemodynamic results and shorter ischemic times than patients undergoing conventional RVA [9].

In contrast, the Folliguet study (2017) showed that TAVI was superior to treatment in high-risk patients with severe aortic stenosis. Transfusion via TAVI was also found in randomized controlled trials to be as good as, if not superior to standard RVA to five years in high-risk patients. In patients with intermediate risk, TAVI was found in randomized clinical trials as an alternative to surgery not less with a different pattern of adverse events associated with each procedure [10].

In retrospect propensity analysis combined use of TAVI in patients with intermediate risk profile to high it was associated with a significantly higher incidence of perioperative complications and decrease in the short- and medium-term survival, when compared to conventional surgery and sutureless valve implant. More data are needed to draw a firm conclusion by comparing the two treatments in intermediate-risk patients. The bioprosthesis without sutures may represent a viable alternative to standard bioprosthesis for intermediate and high-risk patients when making a conventional surgery [10].

In this sense, it appears that TAVI is still the most widely used and safest in relation to the results, however, the sutureless technique yields a positive result, requiring the completion of new clinical case studies for better definition of adequacy of intervention to be fulfilled.

## Conclusion

In this study it was found that aortic stenosis has been growing number of cases due mainly to the increase in the elderly population and the population life expectancy, making it necessary that studies

to better understand the techniques to be employed in surgical intervention.

The study showed that surgery is indicated for symptomatic patients, requiring that care be taken for those patients who are in the risk allo group, as for asymptomatic patients the most appropriate option is the vigilant monitoring, as it does not offset the risk brought by surgery.

It is noteworthy that TAVI was indicated as the most used technique for performing surgery in patients with aortic stenosis, although the technique seamlessly already show how potential alternative there are not enough studies to point out the fact that safety of its use, with TAVI to date showing up with the best option.

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