

Non-cardiac Surgery in Valvular Heart Disease

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Abstract

Background- Valvular heart disease is one of the common complications of acute rheumatic fever, which manifests its clinical complications one or two decades after the primary attack of the disease in adults.

The disease may involve one or more valves as stenosis or regurgitation or both and may cause congestive heart failure due to chronic volume or pressure overload.

Method- This prospective study was performed from March 1999 to February 2001 in university affiliated medical centers. 53 patients (28 females and 25 males) who suffered from valvular heart disease in the form of mitral and aortic stenosis or regurgitation were studied. Most of the patients were in functional class I or II (44) and the rest (9) in class III and IV. Non-cardiac surgery procedures were laparotomy, orthopedic surgery, and thoracotomy.

Results- Class I patients were able to easily tolerate the surgery without any significant problems. Only 2 patients had atrial fibrillation with rapid ventricular response in this class. In class II, one case had paroxysmal supraventricular tachycardia after thoracotomy and 3 patients had atrial fibrillation with rapid ventricular response. Another patient in this class had acute pulmonary edema. In class III, one patient had atrial fibrillation with rapid ventricular response after vaginal delivery. Of the two class IV patients, one patient needed reoperation due to prosthetic valve malfunction in the 26th week of pregnancy and the other had no significant hemodynamic problem.

Discussion- Supraventricular arrhythmia, which occurs as atrial fibrillation or paroxysmal supraventricular tachycardia or sinus tachycardia mostly in the first 24 hours after surgery, is preventable with sufficient analgesic prescription. Careful monitoring is necessary in patients with severe mitral or aortic stenosis and double valve disease during surgery or the first 24 hours after surgery. As a result, the important factor in patient prognosis is the functional class of heart disease rather than the type of valvular disease. (*Iranian Heart Journal. 2002; 2(4)&3(1): 44-47*)

Key words: rheumatic heart disease< valvular disease< atrial fibrillation

Valvular heart disease, the clinical manifestations of which occur mostly in adults, is mainly a complication of acute rheumatic fever in our country. Cardiac involvement after acute rheumatic fever usually presents as stenosis or regurgitation of one, two or rarely three valves.¹ Complications of congenital valvular heart disease such as aortic or

pulmonary stenosis are mostly discovered in childhood or even infancy on clinical examination.² Multi-valvular diseases such as mitral or aortic stenosis and regurgitation are characteristically sequelae of rheumatic heart disease.³ Some valvular diseases such as mitral and tricuspid stenosis are very rare in congenital form; therefore, the presence of

such disorders even in isolated forms can

be indicative of rheumatic fever in the

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past. Valvular diseases such as aortic and mitral stenosis cause pressure overload on the heart. Such disorders have severe hemodynamic complications and lead to symptoms sooner. In contrast, diseases such as chronic mitral and aortic regurgitation, which cause cardiac volume overload, are tolerated for a long period even without specific treatment.⁵ In mitral stenosis, left ventricular filling is obstructed, which causes an increase in left atrial pressure and consequently pulmonary venous pressure and pulmonary capillary wedge pressure (PCWP) are elevated, and in the long-term, it can cause pulmonary hypertension and right heart failure.⁶ On the other hand, cardiac output decreases due to impeded ventricular filling. In mild or moderate aortic stenosis no significant problem occurs. But in severe stenosis with a valve orifice area of 1 cm² or less, angina, syncopal attacks or left ventricular systolic dysfunction occurs. Management of such patients is difficult during non-cardiac surgeries such as laparotomy, thoracotomy, delivery, cesarean section, etc. Because due to static stenosis as a result of fibrosis, calcification and cusp deformity, the patient has a fixed cardiac output owing to fixed left ventricular outflow tract obstruction and cannot increase it in stressful conditions, such as surgical operations. Therefore, excessive fluid therapy causes volume overload and acute pulmonary edema and high dose diuretic administration decreases cardiac output with its possible complications, such as acute tubular necrosis. In valvular lesions in the form of aortic or mitral regurgitation, there is no significant problem with preserved LV systolic function. So special effort is not necessary before surgery and such patients have no significant hemodynamic problem

for general anesthesia and surgical operations.⁸

In all valvular heart diseases, prophylaxis against infective endocarditis should be done before surgery.⁸ Due to high prevalence of valvular heart diseases as a sequel of acute rheumatic fever, the necessity of this study is obvious. The goal of this study is to determine high-risk patients with valvular heart problems undergoing non-cardiac surgery. New York Heart Association (NYHA) classifies cardiac patients into four groups: class I and II patients tolerate surgical operations and general anesthesia easily without a significant problem. In class III underlying factors of heart failure exacerbation such as anemia, infection, arrhythmia, etc. should be corrected before surgical operations. Thus the degree of heart failure decreases one or two classes, and it is probable that the patient be prepared for surgery. In class IV it is recommended that cardiac disease be treated before non-cardiac surgical operations due to the etiology of disease. Of course, in these cases exacerbating factors of heart failure should be corrected.

Methods and Materials

This prospective descriptive analytic study was done over a 2-year period from March 1999 to February 2001 in medical centers affiliated to Isfahan University of Medical Sciences. 53 patients (28 female and 25 male) with an age average of 35.57±11.3 years male, 35.17±11.7 years female, ranging from 17 to 59 years, were studied. 39 had mitral stenosis and regurgitation, 11 had mitral stenosis and aortic regurgitation, 5 mitral stenosis, aortic stenosis and regurgitation and 5 had pure mitral stenosis. 19 patients were in class I,

25 in class II, 7 in class III and 2 in class IV. The type and severity of valvular disease were assessed by one cardiologist with echo Doppler study. The surgical operations performed on the patients were as follows: 24 laparotomies, 17 cesarean sections, 7 vaginal deliveries, 2 orthopedic operations, 3 thoracotomies. Of the 24 laparotomies, 21 were elective and 3 were urgent (2 appendicitis, 1 ectopic pregnancy). Three thoracotomies were performed for bronchiectasis.

Results

Among 19 class I patients, 16 tolerated surgical operations easily, one case suffered from sinus tachycardia 12 hours after cholecystectomy with a heart rate of 130 bpm and recovered with analgesic administration, and two of the patients who showed atrial fibrillation with rapid ventricular response in the first 24 hours after surgery were controlled with digitalis administration. Among 25 class II patients, one had paroxysmal supraventricular tachycardia (PSVT) after thoracotomy. This patient had mitral stenosis plus aortic regurgitation and sinus rhythm. Three showed atrial fibrillation with rapid ventricular response, two of whom had controlled atrial fibrillation before surgery and the other, who had sinus rhythm, showed atrial fibrillation after surgery but ventricular response was controlled. One patient had acute pulmonary edema after extubation and recovered with prompt treatment. This patient had mitral stenosis and regurgitation and a valve orifice area of 1.45cm^2 . Other class II patients (20 patients) had no significant hemodynamic or rhythm problem. Among 7 class III patients, six had double valve disease and one had severe mitral stenosis and moderate mitral regurgitation (valve area = 1.1cm^2). The latter showed atrial fibrillation with rapid ventricular response after vaginal delivery, which was controlled. Six other patients did not show

significant hemodynamic changes during and after laparotomy and with preventive medical care such as heart failure treatment. From the 2 class IV patients, one underwent MVR and therefore had a metallic mitral valve and was under treatment with heparin during pregnancy. This patient showed acute pulmonary edema in the 26th week of gestation and was reoperated on with a diagnosis of prosthetic valve malfunction. The other case rose to class III with correction of anemia and heart failure treatment and had no complications during and after laparotomy.

Discussion

Among 19 class I patients, one had sinus tachycardia after surgery and two showed atrial fibrillation with rapid ventricular response, which is mainly thought to be due to the pain of the incision site and can be prevented with analgesic administration. In Diker's study, valvular patients show supraventricular arrhythmia in the form of atrial fibrillation or PSVT (paroxysmal supraventricular tachycardia) in the first 24 hours after surgery and prophylactic analgesic administration is recommended in such patients.⁹ In class II patients, supraventricular arrhythmia also occurred, which is completely logical due to the severity of heart disease in this class compared to class I. In two patients, atrial fibrillation with rapid ventricular response was controlled after surgery, which is considered to need a higher dose of β -blockers or digitalis or verapamil. Of course, other exacerbating factors of arrhythmia such as anemia, fever, infection and pain should be considered. One patient with mitral stenosis and regurgitation developed acute pulmonary edema after extubation. It has been mentioned in Eagle's study that in cardiac patients, especially those with mitral stenosis, acute pulmonary edema may occur due to an increase in wedge pressure (PCWP) after

extubation in the recovery room. That is because the positive pressure caused by mechanical ventilation stops fluid leakage from pulmonary capillaries to interstitial space and later to alveoli.¹⁰ Among 7 class III patients, only 1 who had severe mitral stenosis (valve area 1.1cm²) showed atrial fibrillation with rapid ventricular response after vaginal delivery. This is a result of overload and fluid shift from the extracellular to intravascular space and is the beginning of imminent acute pulmonary edema. In the study of David and colleagues it has been mentioned that some valvular diseases, especially severe mitral and aortic stenosis, should be monitored carefully during surgery.¹¹ In aortic stenosis it is necessary for the patient to have a Swan-Ganz catheter to maintain the PCWP near 18mmHg so that cardiac output will be high enough to tolerate surgery and prevent pulmonary edema in case of an increase in wedge pressure.¹² Patients with severe mitral or aortic stenosis should first undergo valve repair or replacement, then be prepared for surgical operations or pregnancy. Lack of mortality in this study is probably due to low functional class of patients (class I and II in 83%, class III and IV only 17%). In Norman's study, mortality of surgical operations in severe mitral stenosis was 7%.¹³ In this study, all patients with aortic stenosis had mild to moderate disease. Therefore, aside from severity of valvular disease, which is a determining factor in surgical prognosis in such patients, functional class is a more important factor.

Conclusion

Patients with valvular heart disease should have the severity of their valvular disease and functional class determined by a cardiologist before urgent or elective surgical operations or pregnancy. The cardiologist can then determine if the patients can undergo the operation with an acceptable risk. If the valvular lesions are

far advanced, first cardiac and later the non-cardiac surgery should be done.

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