



Algorithm for primary care physicians in the management of valvular heart disease in India

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Abstract

In India, the burden of valvular heart disease (VHD) is high due to rheumatic heart disease (RHD). Factors like poverty, overcrowded dwellings, under-nutrition, cultural constraints, and suboptimal medical care contribute to the high prevalence of RHD. The diagnosis of VHD is a problem in routine practice and many cases are either missed in early stages. Also, late identification/ referral of complications in post valvular surgery patients of VHD by physicians working in the periphery to a large extent but not limited to periphery only. Hence, the need of the hour is to enhance the knowledge of Primary care physicians and create an easy-to-use algorithm for physicians to facilitate early identification and diagnosis of VHD and complications in post cardiac surgery patients for timely referral to reduce mortality and morbidity associated with VHD. The algorithm will act as a tool to recognize early signs and symptoms of VHD for early diagnosis of VHD & its management. The algorithm will also facilitate early referral to specialist and identification of post-operative complications in patients who have undergone surgery for VHD. Valvular heart disease patients after prosthetic valve implantation are at a risk of thrombo-embolic and therefore require lifelong follow up and anticoagulant therapy in order to alleviate morbidity and mortality which also needs to be cascaded down to the primary care physicians based on evidence-based recommendations on anti-coagulation management. This easy-to-use guide/algorithm will help physicians better their clinical practice in India, ultimately benefiting the patient outcomes.

Keywords: valvular heart disease, algorithm, India

Introduction

Heart valve diseases are one of the major causes of cardiovascular morbidity and mortality in India, which further creates a burden on healthcare specialists ^[1]. The burden of Valvular Heart Disease (VHD) is growing worldwide due to the high incidence of rheumatic heart disease (RHD), especially in developing countries, and due to the increase in degenerative etiologies in industrialized nations. Further, various socio-economic factors such as poverty, low socio-economic status, overcrowded dwellings, under-nutrition, poor sanitation, cultural constraints, and suboptimal medical care contribute to the increasing prevalence of RHD in developing countries like India ^[1, 2, 3].

The diagnosis of VHD is a difficult problem in everyday clinical practice and challenge of such cases being either missed in early stages or delayed diagnosis. Also, late identification/referral of complications in post valvular surgery patients of VHD by physicians working in the periphery to a large extent but not limited to periphery only. Majority of the patients in India are more comfortable visiting the Primary Care Physician (PCP) instead of a specialist. Hence, the need of the hour is to further increase the knowledge of PCPs and create an easy-to-use algorithm for physicians that provides further

education for early identification and diagnosis of VHD along with information about the early identification of complications in post cardiac surgery patients for timely referral so that mortality and morbidity rate associated with VHD can be reduced ^[1, 2, 3]. The algorithm will act as a tool to recognize early signs and symptoms of VHD for early diagnosis of VHD & its management. The algorithm will also facilitate early referral to specialist and identification of post-operative complications in patients who have undergone surgery for VHD.

Methodology

Several meetings, including one national meeting with a panel of cardiologists and cardiothoracic surgeons and eight regional meetings involving experts in the therapy area were held. Detailed discussions and expert opinion led to the development of the algorithm for the management of VHD in primary care context.

The experts were of the opinion that there are 2 aspects for the management of VHD patients 1) Diagnosis, and 2) Management and Follow up.

Each of these are discussed in detail below.

Discussion

Diagnosis of Valvular Heart Diseases

The assessment of presence or absence of VHD should be based on history, signs and symptoms, clinical examination, and tests for diagnosis of VHD. The common symptoms to diagnose VHD include dyspnoea on exertion, palpitation, cough, swelling of limbs, easy fatigue, embolism, sudden coldness of limbs, weakness in parts of the body, and paroxysmal nocturnal dyspnea during later stages [4]. Experts suggest that the increase in temperature and weight gain are not specific signs of VHD. Clinical examination observations such as changes in pulse and blood pressure (of critical importance with type of valvular lesion like mitral stenosis, aortic stenosis and aortic regurgitation), presence of murmurs, symptoms of congestive heart failure, and prominent neck vein are considered to be most valuable signs for the diagnosis of VHD. Any murmur is a red flag for VHD and should be referred promptly to tertiary care centre. Signs of congestive heart failure such as breathlessness, rales, engorgement of neck veins and liver enlargement should be evaluated to rule out VHD.

Risk Factors

For the evaluation of VHD, the following risk factors should be

taken into consideration: rheumatic fever, history of endocarditis, history of heart failure/myocardial infarction/coronary artery disease, history of thrombo-embolic episodes, and atrial fibrillation. If the following aspects are present in a patient along with positive signs and symptoms and co-morbidities such as obesity, diabetes, hypertension, smoking and abnormal lipid profile, then the possibility of VHD is high.

Diagnostic Tools

ECG, chest X-ray, hematological tests, renal function tests, liver function tests, C-reactive protein, and ASO titer assessed by the PCP are considered to be the best approached for the investigation of VHD. ECHO should be assessed by the PCP in a symptomatic patient. In case of an abnormality, the patient should be immediately referred to a specialist for scaling severity (mild, moderate, severe) of the condition. In post-operative follow ups, if there are no symptoms of progression, then ECHO can be done once-a-year with a follow up done by the PCP. If there are signs or symptoms of progression during the follow up period, then ECHO should be performed once in 3 or 6 months and should be referred back to a specialist only.

The following figure (Table 1) represents the diagnostic tools which will aid in the management of VHD.

Table 1: Diagnostic tools for Management of VHD

Diagnostic tests	Interpretation
Electrocardiogram (ECG)	Rate Rhythm LV hypertrophy
Chest X-ray (CXR)/ radiological findings	Cardiomegaly Chamber dilation Evidence of pulmonary congestion
Stress testing / treadmill tests	Measure blood pressure, heart rate, ECG changes and breathing rates during exercise
ECHO	Annually Periodic transthoracic echocardiography (TTE) to check valve which is replaced and to follow progression in other valves. For Post-surgery at 3 months, 6 months and at 12 months.
Haematology	CBC, PT-INR
Serum Biochemistry	Serum Creatinine, Serum Electrolytes, LFT
Renal function test	Creatinine clearance for CKD

Management and follow up of VHD

The following algorithm is suggested by experts for stratification of the VHD cases for their management. The patients may be divided into 2 subgroups - those with a history of VHD and those without any history of VHD. According to experts, in patients with native valve, injectables can be administered. However, in patients with valve replacement, oral penicillin is a more practical approach as the recurrence rate decreases after valve replacement.

The following algorithms can be used for management of VHD in patients with and without a prior history of VHD (Figure 2, Figure 3 and Figure 4)

- In case of Rheumatic fever with no valvular lesion, secondary penicillin prophylaxis and follow-up will be required to manage the patient.
- In mild lesions secondary prophylaxis for Rheumatic heart disease (RHD) will be required, and if clinical signs and symptoms are present such as palpitations, then rate control medications like digoxin, beta blockers, and calcium channel blockers can be initiated with a follow up in 6 months or as and when symptoms occur.
- In moderate-severe lesions rate control medications, secondary prophylaxis for RHD, anti-coagulation management in case of atrial fibrillation, diuretics and

further referral to specialist for further evaluation are suggested.

For cases where conservative therapy has to be used to treat VHD, assess the type of valvular lesion. In mild to moderate cases, monitor the disease progression with ECHO report and other diagnostic tools as described and review the symptoms after 6 months. If signs of progression occur, then refer to a specialist. If there is no progression of lesion, then the medication should be prescribed as per protocol with standard follow up. In severe lesion, refer to a specialist for further evaluation and management / follow-up (as per algorithm).

For surgically managed cases, review the clinical evaluation after 3-6 months or when symptoms occur. It is recommended to check for post valvular surgery complications such as heart failure, thrombo-embolic episodes, bleeding (patients on anti-coagulation), endocarditis, hematuria, anemia, valve thrombosis, valve dehiscence and change in symptoms.

There should be immediate referral to the tertiary hospital if the patient has valve thrombosis. In case patient has active bleeding, there should be discontinuation of anticoagulant and assess the PT/INR test with immediate referral to a tertiary hospital. Immediate referral to tertiary care centers for any valve complications is essential.

Recommended medications for VHD

Medications for rate control, secondary prophylaxis for rheumatic fever, anticoagulants, antiplatelets, diuretics, and

concurrent treatment for the associated comorbidities should be leveraged according to the types of VHDs. The following table represents the recommended medications for VHD.

Table 2: Suggested medications for VHD

Rate control (digoxin, beta blockers, calcium channel blockers)
Secondary prophylaxis for Rheumatic fever
Anticoagulants- Vit K Antagonists (Acenocoumarol/Warfarin)
Antiplatelets
Diuretics

The combined use of Vit K antagonists (VKAs) and low-dose aspirin appears to reduce the risk of valve thrombosis and systemic embolism. However, oral anticoagulants such as Warfarin cause fetal embryopathy in pregnant females associated

with VHD /Valve replacement. Hence, several guidelines have provided the following recommendations for antithrombotic management of patients with prosthetic valves, and antithrombotic therapy in various situations [6, 7, 8].

Table 3: Recommendations for Antithrombotic Therapy for Patients with Prosthetic Heart Valves

Recommendation in mechanical prosthesis	<ul style="list-style-type: none"> ▪ Vitamin K Antagonists (VKA) therapy with a target INR range of 2.0 to 3.0 is recommended in patients with mechanical aortic valve replacement without risk factors ▪ VKA therapy with a target INR range of 2.5 to 3.5 is recommended in patients with mechanical aortic valve replacement with risk factors - AF, previous thromboembolism, LV dysfunction, or hypercoagulable conditions <ul style="list-style-type: none"> ▪ In mechanical mitral valve replacement, VKA therapy with a target INR range of 2.5 to 3.5 is recommended in patients with and without additional thromboembolic risk factors ▪ With mechanical valves in both the aortic and mitral position, a target INR range of 2.5 to 3.5 is recommended ▪ VKA therapy in combination with antiplatelet therapy (aspirin 75- 100mg) is recommended for long-term management over no antiplatelet therapy with mechanical valve prosthesis
Recommendation in bioprosthesis	<ul style="list-style-type: none"> ▪ VKA therapy is recommended in bioprosthetic aortic valve and mitral valve replacement, with a target INR range of 2.0 to 3.0 over no VKA therapy for 3 months ▪ In patients with dual valve replacement (aortic, mitral) VKA therapy is recommended with a target INR range of 2.5 to 3.5 ▪ After bioprosthetic aortic or mitral valve replacement, antiplatelet therapy at a dose of 75 to 100 mg/day is recommended
Recommendation in Transcatheter aortic valve replacement ((TAVR)	<ul style="list-style-type: none"> ▪ Life-long aspirin 75-100 mg/day along with clopidogrel 75 mg daily is recommended for 3- 6 months.
Bridging Anti-coagulation recommendations	<ul style="list-style-type: none"> ▪ It is not recommended to interrupt VKA therapy during minor dental procedures (cleaning), dermatological procedures, and cataract surgery due to minimal bleeding. ▪ In patients with low thrombotic risk (bileaflet AVR without atrial fibrillation and no other risk factors for stroke), it is recommended to interrupt VKA therapy without bridging. ▪ Bridging anticoagulation is recommended in patients with high risk of thromboembolism during temporary interruption of VKAs ▪ When interruption of VKA therapy is required, it is recommended to stop for 2–4 days before the procedure. After stopping VKA therapy, INR should be checked after 2 days and maintained < 2. The VKA therapy should be restarted 12–24 h after surgery. ▪ The reversal of VKA therapy during emergency surgeries can be achieved by administration of FFP. FFP requirement depends on the PT/INR value, liver function tests, and body weight of the patient. ▪ Interruption of VKA therapy with bridging anticoagulants is recommended for not more than 2 days in case of elective major surgeries

Table 4: Recommendations for Antithrombotic Therapy in Pregnant Females or Planning Pregnancy as per AHA Guidelines

Before 36 gestational weeks	<p>Oral (VKA): Can be used throughout pregnancy (class IIa) with substitution by unfractionated heparin / low-molecular-weight heparin (UFH/LMWH) during weeks 6-12 of gestation if</p> <ul style="list-style-type: none"> ▪ preferred by the patient ▪ dose of warfarin required to achieve target INR >5mg (class IIa)* ▪ just before planned delivery to be replaced by UFH or LMWH (class I) <ul style="list-style-type: none"> ▪ strongly recommended in MPV in 2nd and 3rd Trimesters
Heparin Derivatives	<ul style="list-style-type: none"> ▪ 1) Subcutaneous use (SC) of LMWH and UFH throughout pregnancy 2) SC UFH in the 1st trimester completely removed in 2014 guidelines ▪ The patients who prefer: **LMWH administered twice daily and the dose should be adjusted to attain peak anti-factor Xa levels: 0.8–1.2 U/mL approx. 4–6 hours after the Injection ▪ Alternatively, continuous IV UFH (with aPTT at least twice that of the control) during the 1st trimester is permissible if the

	dose of warfarin >is 5 mg/day*.
Aspirin	<ul style="list-style-type: none"> IV UFH in the first trimester is difficult from a practical standpoint, as a three-month hospital admission is required. <p>Low dose (75-100mg/day) given in second and third trimesters (Class I)</p>
After 36 gestational weeks	<ul style="list-style-type: none"> The ACC/AHA guidelines suggest discontinuing warfarin at 36 weeks and starting continuous IV UFH with a PTT monitoring, which should be continued until approximately 2–3 weeks before the planned delivery. Additionally, they recommend that UFH be discontinued 4–6 hours before the planned delivery and restarted 4–6 hours after delivery. <ul style="list-style-type: none"> In the absence of significant bleeding, oral warfarin should then be initiated 24 hours after the birth.

* (or for equivalent acenocoumarol dose)

Table 5: Recommendations for Routine INR Monitoring and Anticoagulation

Indication	INR
For the prophylaxis & treatment of venous thrombo-embolism	2.0–3.0
Prophylaxis of venous thrombosis (high-risk surgery)	2.0–3.0
Prevention of systemic embolism in tissue heart valves, acute myocardial infarction, valvular heart disease & atrial fibrillation	2.0–3.0
Bi-leaflet mechanical valve in aortic position	2.0–3.0
Mechanical prosthetic valves (high risk)	2.5–3.5
Systemic recurrent emboli	2.5–3.5

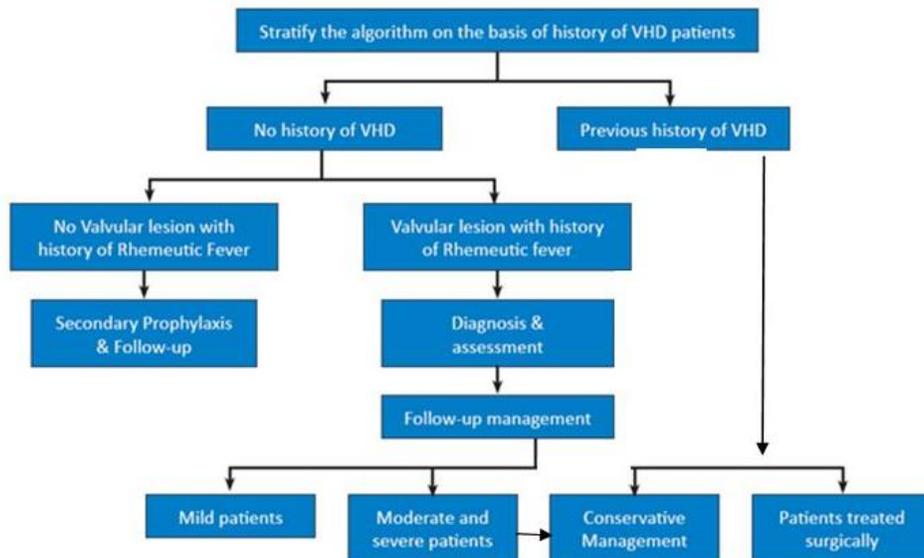


Fig 1: Organization of Algorithm

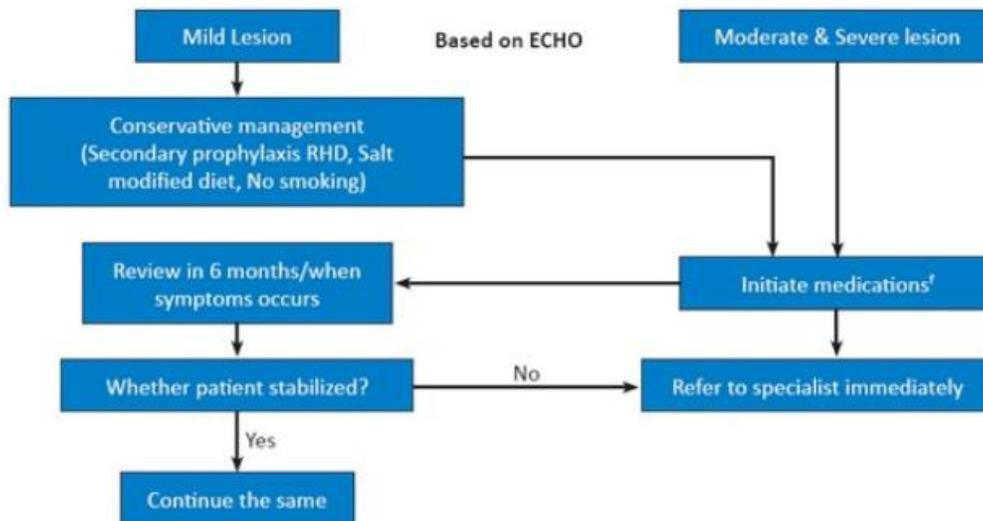


Fig 2: Treatment Algorithm for Patients with No History of VHD (having RF history & valvular lesion on ECHO)

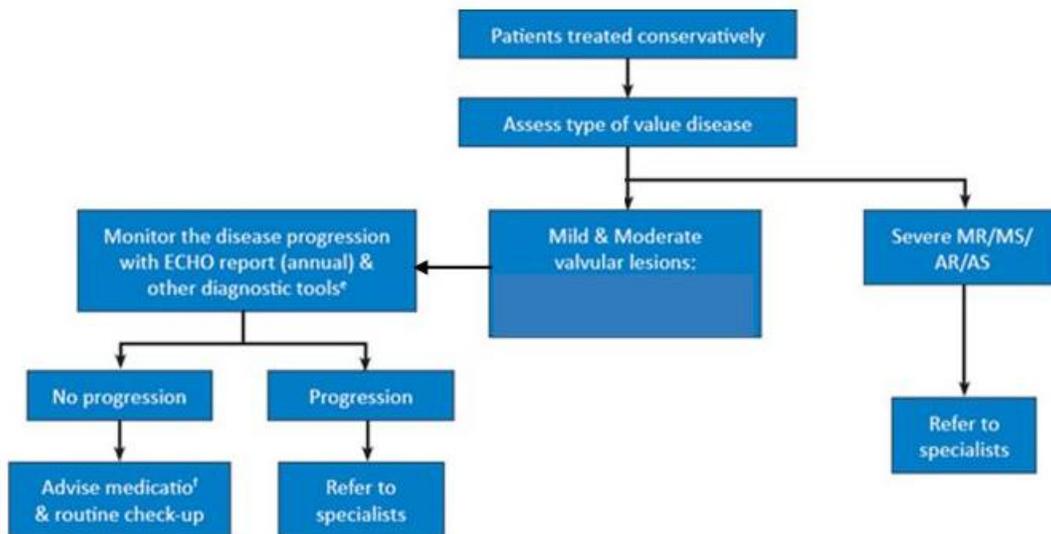


Fig 3: Treatment Algorithm for Patients with History of VHD (patients on conservative management)

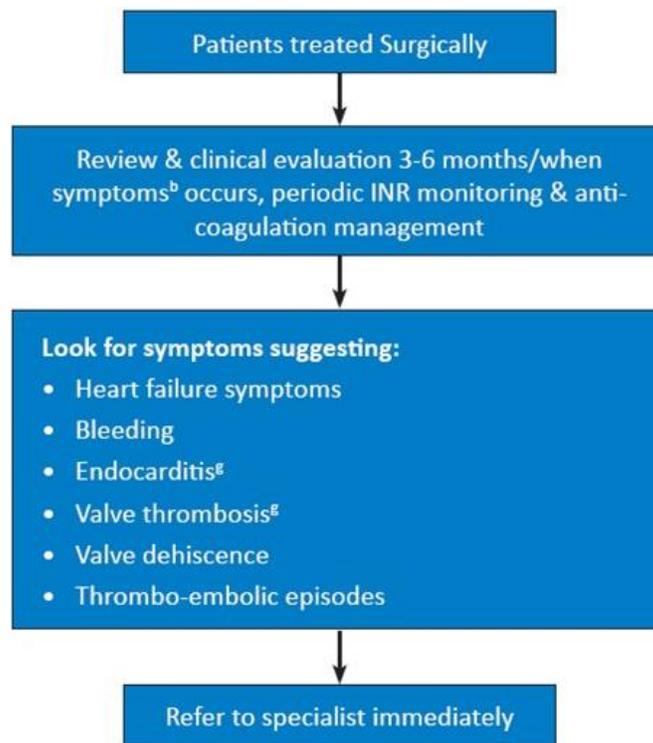


Fig 4: Treatment Algorithm for Patients with History of VHD (Patients undergone surgical management)

Conclusion

The diagnosis of VHD is a challenge in clinical practice owing to which there is a risk of delayed diagnosis and late identification/referral of complications in post valvular surgery. Authors have suggested that patient education is important, however it is more crucial to educate the physician and GP's on management & follow-up of VHD/Valve replacement patients. Severe cases should be referred to a specialist and should not be managed by the GP or PCP. This easy-to-use guide/algorithm will help physicians better their clinical practice in India, ultimately benefiting the patient outcomes. Valvular heart disease patients after prosthetic valve implantation are at a risk of

thrombo-embolic and therefore require lifelong follow up and anticoagulant therapy in order to alleviate morbidity and mortality which also needs to be cascaded down to the primary care physicians based on evidence-based recommendations on anti-coagulation management. Follow-up care of patients with prosthetic valve has a paramount role in reducing the morbidity and mortality. PCPs follow-up with the VHD patient's post-surgery will reduce the chances of post-surgical complications and thrombo-embolic events and will also ensure that the patients are continuing their courses as recommended. It is also recommended to refer to a specialist in case a VHD post-surgery patient desires to undergo elective procedures such as a tooth

extraction or an orthopedic procedure post valve surgery. Authors have also recommended a centralized helpline will be useful for patients and physician which can be managed by trained physicians only.

Disclosure

The authors have declared and confirmed that there is no conflict of interest with respect to this authored publication. The views expressed and stated in this article are the independent views of the authors and not of Abbott Healthcare Pvt Ltd.

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