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Chapter 18

Critical Study of Valvular Heart Diseases (VHD) W.S.R. To Ayurvedic Six Stages of Pathogenesis and Therapeutic Intervention (*Shat Kriya Kala*)

Prof. Dr. Subhash D. Waghe[1*] **and Dr. Avinash wade**[2]

[1]*Head of Department, Department Of Roga Nidan & V.V. SAM College of Ayurvedic Sciences and Hospital, Raisen, Bhopal, M.P., India.*
[2]*Nootan Ayurvedic College and Research Centre, Visanagar, Mehsana, Gujarat, India.*

Abstract

Valvular heart diseases cause significant morbidity and mortality across the globe with over 54 million cases of rheumatic heart disease and millions of degenerative cases. Valvular heart diseases lead to definite death by various complications if not treated early. Although it may start as the simple throat infection but eventually it may affect the heart valves if not treated early. Shat kriya Kala is a unique pathological concept in Ayurveda developed with aim of treating the diseases at various stages of pathogenesis. Ancient Ayurvedic scholars had stated 6 such stages of therapeutic intervention with reference to six stages of pathogenesis namely *sanchaya* (stage of accumulation of morbid humors), *prakopa* (stage of aggravation of morbid humors), *prasara* (stage of spread of morbid humors), *sthansanshraya* (stage of localization of morbid humors), *vyakti* (stage of manifestation of morbid humors) and *bheda* (stage of appearance of complication and differentiating features). If disease is treated in early stages, it does not lead to complications. There are *vishahra* and *aamhara* drugs (toxin alleviating drugs) in Ayurveda which could be potentially used to treat valvular affections. Hence, it is essential to apply the Ayurvedic concept of pathogenesis like '*Shat Kriya kala*' to valvular heart disease so as to study it from Ayurvedic pathological point of view and to evolve a strategy to deal with it based on the Ayurvedic principles of treatment particularly in terms of *shat kriya kalas*.

The study of valvular heart disease with reference to *Shat Kriya kala*, showed that the pathogenesis of valvular heart disease can very well be arranged in Ayurvedic six stages of *Shat Kriya kala* and treatment could be framed as per different stages. With the help of modern investigations, these six stages could be diagnostically confirmed.

Keywords: Shat kriya kala, Valvular heart disease.

1. Introduction

Valvular heart diseases cause significant morbidity and mortality across the globe with over 54 million cases of rheumatic heart disease and millions of degenerative cases. In 2021, an estimated 54.8 million cases of RHD, 13.3 million cases of non-rheumatic calcific aortic valve disease (CAVD) and 15.5 million cases of non-rheumatic degenerative mitral valve disease (DMVD) were reported globally [1].

Valvular heart diseases lead to definite death by various complications if not treated early. Although it may start as the simple throat infection but eventually it may affect the heart valves if not treated early. *Shat Kriya kala* is a unique pathological concept in Ayurveda developed with aim of treating the diseases at various stages of pathogenesis. Ancient Ayurvediac scholars have stated 6 such stages of therapeutic intervention with reference to six stages of pathogenesis namely *sanchaya*, *prakopa*, *prasara, sthansanshraya, vyakti and bheda*. If disease is treated in early stages, it does not lead to complications. There are *vishahra* and *aamhar* drugs in Ayurveda which could be potentially used to treat valvular affections. Hence, it is essential to apply the Ayurvedic concept of pathogenesis like '*Shat Kriya kala*' to valvular heart disease so as to study it from Ayurvedic pathological point of view and to evolve a strategy to deal with it based on the Ayurvedic principles of treatment particularly in terms of *Shat Kriya kalas*.

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Material and Methods

Literary method of research is adopted for the present study. Critical study of Ayurvedic as well as modern literature pertaining to the subject is carried out to come to the logical conclusion. Attempt is being made to organize the modern pathophysiology, diagnosis and treatment of Valvular heart diseases in the framework of Ayurvedic *Shat Kriya kala* and possible Ayurvedic treatment strategy is also given.

Review of Literature

Shat Kriya kala (Six Stages of pathogenesis and Treatment)

As per acharya Sushruta there are six stages of pathogenesis of the disease where physician can intervene with treatment. They are as follows: [2]

1. *Sanchaya* (Stage of Accumulation of Doshas)
2. *Prakopa* (Stage of Quantitative increase of Doshas)
3. Prasara (Stage of Spread of Doshas)
4. Sthansanshraya (Stage of localization of Pathology)
5. Vyakti (Stage of Appearance of Features)
6. Bheda (Stage of Differentiation and Complications)

As per acharya Sushruta, if the aggravated *doshas* (morbid material) are flushed out of the body during stage of accumulation then disease does not advance to the further stage. Hence it is essential to identify these stages properly and intervene appropriate time [3].

1^{st} Stage – Stage of accumulation of morbid doshas (*Sanchaya*)

In this stage, doshas gets accumulated causing disliking for the substances having similar properties with accumulated doshas. In this stage accumulated Vata causes abdominal distension, accumulated Pitta causes loss of appetite and yellowish hue whereas accumulated Kapha causes lethargy and stiffness in the body [4].

2^{nd} Stage – Stage of quantitative increase of morbid doshas

In this stage, doshas increase quantitatively sufficient enough to leave their respective place. At this stage, increased Vata causes abdominal bloating, pain. Increased Pitta causes heart burn, acid reflux, thirst. And quantitatively increased Kapha causes anorexia, nausea [5].

3^{rd} Stage – Stage of spread of morbid doshas (*Prasara*)

In this stage, quantitatively increased doshas leave their respective place and spread into the body. In this stage, spread of Vata causes abdominal gurgling due to reversal of flow. The Spreading Pitta causes heart burn if acid reflux and burning sensation in wounds. The Spreading Kapha causes vomiting, myalgia [6].

4^{th} Stage– Stage of localization morbid doshas (Sthansanshraya)

The sthansanshray *awastha* (stage of localization) of *Shat Kriya kala* give the idea about the prodromal features of the disease from which the future disease can be predicted. It also gives idea about the dosha involved. For e.g. Looking at prodromal features like elevation of body temperature, body ache, one can predict the future Fever (*Jwara*) disease. While looking at prodromal features like yawning (*Jrumbha*), one can predict it as *Vataj Jwara* (fever). Acharya Dalhana had said that, at this stage both *doshas* (morbid humours) and *dooshyas* (organs and systems) should be treated to get rid of the diseases [7].

5^{th} – Stage of accumulation of morbid doshas (*Vyakti*)

In this stage, the clinical features are well established. The features of fever, edema, tumour, abscess etc are well established. Hence, *Vyadhi Pratyanik* (disease opposing) treatment like *stambhak yogas* to arrest loose motions and *shita upchara* to bring down the elevated temperature needs to be done [8].

6^{th} – Stage of accumulation of morbid doshas (*Bheda*)

The *Bheda awastha* (stage of differentiation and complications) of shatkriyakala give the idea about the differential diagnosis, complications and chronicity of the disease. For e.g. the *Pratamak* and *Santamak bheda* of *Tamak Shwas* (Asthma) are well differentiated at this stage. From Shat Kriya Kal point of view, if the corrective measures are not taken at this stage, then it makes the disease incurable [9].

2. Valvular Heart Disease (VHD)

Infective endocarditis And Valvular Affection

It is a microbial infection of heart valves or the endocardium in proximity to congenital or acquired cardiac defects. Infection of the endothelial linings of arterial aneurysms or AV fistula produces a similar illness. It is increasingly seen inpatients of VSD, AR, MR, AS, PDA. Endocarditis leads to aggregation of fibrin, platelets, and other blood products at the site of infection. This produces a vegetation which is relatively avascular and tends to isolate the infective organism from the host defense and antimicrobial agents. Valve destruction

produces worsening regurgitation and leads to heart failure. In endocarditis caused by staphylococcus aureus valve destruction is rapid and local abscess formation occurs commonly. In less aggressive infection (from streptococcus viridians) the progression of disease is slower and large craggy vegetations develop which are prone to form embolism.

Endocarditis occurs at a site where blood flows through narrow orifice and at a high velocity, from a high to low pressure chamber. A decrease in lateral pressure lowers perfusion of the intima resulting in an area more susceptible to infection. This is the location where infective endocarditis initially develops. Hence, it occurs on the right side in VSD and on the pulmonary artery in PDA. Endocarditis does not usually occur when there is any small pressure gradient as in ASD or when the congenital defect is large enough to abolish the pressure gradient.

Infection occurs along the edges of the heart valves. It is more common on the left side with mitral and aortic regurgitation being the commonest valve lesion complicated by endocarditis. In drug addicts the valves in the right heart are usually affected. Hypertrophic cardiomyopathy, syphilitic aortic regurgitation, prolapsing mitral valve and atherosclerotic valve lesion may also be rarely complicated by endocarditis.

The extracardiac manifestations result either from the embolization or from the deposition of immune complexes. The later is responsible for arthralgia, Roth spots, focal glomerulonephritis and acute vasculitis. The pathological process of valvular involvement results after some years in the form of valve thickening, cusp fusion, calcium deposition, a narrowed (stenotic) valve orifice and progressive immobility of the valve cups. When the normal valve orifice area of 5 cm^2 is reduced to less than 1 cm^2, severe mitral stenosis results. In order to maintain the sufficient cardiac output, the left atrial pressure increases causing left atrial hypertrophy and dilatation. Consequently, pulmonary venous, pulmonary arterial and right heart pressures also increase. The increase in pulmonary capillary pressure is followed by the development of pulmonary oedema particularly when the atrial rhythm gets disturbed with fibrillation and tachycardia. This is partially prevented by alveolar and capillary thickening and pulmonary arterial vasoconstriction (reactive pulmonary hypertension). Pulmonary hypertension leads to right ventricular hypertrophy, dilatation, and failure. Right ventricular dilatation results in tricuspid regurgitation [11].

Symptoms

- Usually there are no symptoms until the valve orifice is moderately stenosed. Progressive severe dyspnoea because of pulmonary venous hypertension and recurrent infective bronchitis.
- A cough productive of blood-tinged, frothy sputum is quite common, and occasionally frank hemoptysis may occur.
- The development of pulmonary hypertension eventually leads to right heart failure and its symptoms of weakness, fatigue and abdominal or lower limb swelling.
- The large left atrium favours atrial fibrillation, giving rise to symptoms such as palpitations.
- Atrial fibrillation may result in systemic and pulmonary emboli, which give rise to cerebral, mesenteric, renal and pulmonary infarcts.

Signs

Face: Severe mitral stenosis with pulmonary hypertension is associated with the characteristic mitral facies or malar flush.
There is a bilateral, cyanotic or dusky pink discoloration over the upper cheeks that is due to arteriovenous anastomoses and vascular stasis.
Pulse: At first the pulse is regular (sinus rhythm) but later the irregular pulse of atrial fibrillation usually develops. The onset of atrial fibrillation often causes a dramatic clinical deterioration.
Jugular veins: If right heart failure develops there is obvious distension of the jugular veins, the 'a' wave will be prominent provided that atrial fibrillation has not supervened.
The severity of mitral stenosis is judged clinically on the basis of criteria such as:

The time between the closure of the aortic valve and the opening of the mitral valve. Thus, the shorter the A2-OS time the more severe the stenosis. This is because it takes less time for the left ventricular pressure to fall to the high left atrial pressure which occurs in severe mitral stenosis.

As the valve cusps become immobile, the loud first heart sound softens and the opening snap disappears.

When pulmonary hypertension occurs, the pulmonary component of the second sound is increased in intensity and the mitral diastolic murmur may become quieter because of the reduction of cardiac output [12].

Potential Ayurvedic drugs for valvular heart diseases

***Ankot* [Alangium salvifolium]**- It detoxifies the microbial toxins from blood circulation. It also brings down the throat pain [13].
***Yawa-kshara* [Potassi carbonas]** - It lowers the Kapha by its pungent and hot property. It cures the pain from toxins. It brings out the lysis of urinary calculus. It contains KCl2 [14].
***Kantakari* [Solanum xanthocarpum]** - It lowers the increased coughing and respiratory rate by its bitter, pungent and hot property. It cures the heart diseases [15].
***Sarpagandha* [Rauwolfia serpentine]** – It lowers the Kapha by its bitter, pungent and hot property. It also acts as antimicrobial agent [16].
***Manshila* [Arsenic rubrum]** - It is pungent, bitter, hot, nullifies the bacterial toxins and their fever attacks [17].
***Gandhaka* [Sulphur]** – It is pungent, bitter, hot, antimicrobial and kapha lowering agent [18].
***Bhargi* [Clerodandrum seratum]** - It lowers the Kapha and *meda* (lipids), *Aampachaka, Vishahara* [19].
***Vacha* [Acorus calamus]** – It lowers the Kapha by its bitter, pungent and hot property and also acts as diuretic. It also cures the heart disease [20].

3. Obsrvations

1. ***Sanchaya* (Stage of Accumulation in VHD)**
   - This stage characterizes with group A streptococcal pharyngeal infection. Features of pharyngitis like sore throat, cough, fever develops.
   - **Investigations To Diagnose The stage:**
   - CBC/ESR
   - **Treatment**
   - This is the first stage of treatment. Treatment in the form of gargling with Trifla decoction. Tablets of *sukshma Trifla* PO, *Khadiradi* and *Lavangadi wati* for sucking.
2. ***Prakopa* (Stage of Quantitative increase in VHD)**
   - This stage characterizes with production of pharyngeal exudates reflected as increased spitting tendency and cough.
   - **Investigations To Diagnose The stage:**
   - Throat swab culture and sensitivity
   - **Treatment**
   - This is second stage of treatment. Vamana (emesis) should be applied to get rid of the accumulated Kapha. Antibiotics to be given (combination of ampicillin and cloxacillin).
3. ***Prasara* (Stage of Spreading in VHD)**
   - This stage characterizes with immunological cross reaction between streptococcus antigen and myocardial sarcolema. This occurs after 2 weeks of initial infection. Polyarthritis, fever, carditis (murmurs) may occur.
   - **Investigations To Diagnose The stage :**
   - ASO titre
   - **Treatment.**
   - This is third stage of treatment. Treatment with penicillin group of antibiotics.
4. ***Sthansanshraya* (Stage of localization of pathology in VHD)**
   - This stage characterizes with formation of granulomatous lesion in the subendocardium of the left ventricle. Small warty vegetations may develop on the valves resulting in little regurgitation. This is fourth stage of treatment. Suitable dosage form of *Ankot, Vacha, Yawakshar, Manshil, Gandhak, Bharngi* may be instituted for the treatment at this stage.
   - **Investigations To Diagnose The stage :**
   - ASO Titre
   - ECG
   - **Treatment**
   - This is fourth stage of treatment.
   - Treatment with Injections of Benzyl Penicillin. Supportive Ayurvedic treatment in the form of *Ankol Kwatha, Arjuna Kwatha*.
5. ***Vyakti* (Stage of Manifestation of features in VHD)**
   - This stage characterizes with valve thickening, cusp fusion and calcium deposition and progressive immobility of the valve cusps. It may take years to develop. When the normal orifice area of 5 cm^2 is reduced to 1 cm^2, severe mitral stenosis occurs resulting in features like exertional dyspnoea, fatigue and features of heart failure. Other features like
     Soft first heart sound - due to partial closure of valve cusps.
     Pansystolic murmur – as regurgitation occurs throughout the systole.
     Mid systolic click – due to sudden prolapsed of the valve and tensing of chords.
     Third heart sound - because of the sudden rush of blood back into the dilated left ventricle in early diastole.
   - **Investigations To Diagnose The stage**
     ECG - The EC shows the features of left atrial delay (bifid p waves) and left ventricular hypertrophy as manifest by tall R waves in the left lateral leads, e.g. leads I, aVL and V6, and deep S waves in the right-sided precordial leads, e.g. leads V1and V2 (R >S in V1).
     X-Ray - The chest X-ray usually shows an enlarged left atrium with straightening of the left border and a double shadow on the border of the right and left atrium. Late in the course of the disease a calcified mitral valve may be seen on lateral view. The signs of pulmonary edema or pulmonary hypertension may also be seen with the severity. 2-D Echocardiography shows valvular stenosis or regurgitation.
   - **Treatment** - Treatment with diuretics provides symptomatic relief. Ayurvedic mutral dravyas (diuretic drugs) like Gokshura (Tribulus terrestris), Sahachara (Strobilanthes Cilliatus Nees), Punarnawa (Boerhavia diffusa) may be tried. Vacha (Acorus calamus), Sarpagandha (Rouvolfia serpentina) may be tried. Definitive treatment in the form of surgery like Valvotomy or Valve replacement may be done as per the condition.
6. ***Bheda* (Stage of complications WRT VHD)**
   - This stage characterizes with development of complications of stenotic valves like atrial fibrillation, pulmonary hypertension, chest infections and embolic infarcts.
   - **Investigations To Diagnose The stage :**
     2-D Echocardiography- The movement of the valve cusps and the rate of diastolic filling of the left ventricle may be measured by 2dimensional echocardiography. Severe mitral stenosis produces immobility of the valve cusps and slow filling of the ventricles. Continuous wave (CW) colour doppler is used to estimate peak mitral trans-valvular gradient and the valve area. The presence of tricuspid regurgitation can be used to estimate pulmonary arterial pressure. The echocardiogram appearances help in deciding surgical intervention to be done.

- **Treatment** - It is of the complications should be done. For. E.g. DC cardioversion for fibrillation, medical cardioversion with tablet digoxin. Oral Warfarin to prevent thromboembolism. Antibiotics as prophylaxis.

4. Discussion

With reference to pathogenesis of VHD, during the initial phase of pathogenesis, infection of pharynx with group A streptococci leads to local congestion and accumulation of inflammatory exudates. Features of pharyngitis like sore throat, cough, fever develops. Investigations like CBC/ESR could be done at this stage. This initial stage of pathogenesis is called as the *sanchaya awastha* (accumulation of morbid doshas) in Ayurveda. This is the first stage of treatment. Ayurvedic treatment in the form of gargling with Trifla decoction. Tablets of *sukshma Trifla PO, Khadiradi* and *Lavangadi wati for sucking*.

The next stage of pathogenesis of VHD characterizes with production of pharyngeal exudates reflected as increased spitting tendency and cough. This stage of pathogenesis may be called as the *Prakopa awastha* (stage of aggravation of morbid material). Throat swab culture and sensitivity could be done at this stage to know the type of microorganism and its sensitivity to the drugs. This is second stage of treatment. Vamana (emesis) should be applied to get rid of the accumulated Kapha. Antibiotics to be given (combination of ampicillin and cloxacillin).

The next stage of pathogenesis of VHD characterizes with immunological cross reaction between streptococcus antigen and myocardial sarcolema. This occurs after 2 weeks of initial infection. Polyarthritis, fever, carditis (murmurs) may occur. This stage may be called as the *Prasara awastha* (stage of spread of morbid material) in Ayurveda. Investigations like ASO titre could be done at this stage. This is third stage of treatment. Treatment with penicillin group of antibiotics.

The next stage of pathogenesis in VHD characterizes with formation of granulomatous lesion in the subendocardium of the left ventricle. Small warty vegetations may develop on the valves resulting in little regurgitation. This stage may be called as the *Sthansanshraya awastha* (stage of localization of morbid material) in Ayurveda. Investigations like ECG and 2D echocardiography could be done at this stage. This is fourth stage of treatment. Injections of Benzyl Penicillin. Supportive Ayurvedic treatment in the form of decoctions of *Ankol* (Alangium salvifolium) and *Arjuna* (Terminalia arjuna). The next stage of pathogenesis in VHD characterizes with valve thickening, cusp fusion and calcium deposition and progressive immobility of the valve cusps. It may take years to develop. When the normal orifice area of 5 cm^2 is reduced to 1 cm^2, severe mitral stenosis occurs resulting in features like exertional dyspnoea, fatigue and features of heart failure. This stage may be called as the *Vyakti awastha* (stage of manifestation of morbid material) in Ayurveda. Investigations like 2-D Echocardiography shows valvular stenosis or regurgitation. This is fifth stage of treatment. Treatment with diuretics provides symptomatic relief. Ayurvedic *mutral dravyas* (diuretics) like *Gokshur, Sahachar, punarnawa* may be tried. Definitive treatment in the form of surgery like Valvotomy or Valve replacement may be done as per the condition.

The next stage of pathogenesis in VHD characterizes with development of complications of stenotic valves like atrial fibrillation, pulmonary hypertension, chest infections and embolic infarcts. This stage may be called as the *Bheda awastha* (stage of complications and differentiation) in Ayurveda. Investigations like 2-D Echocardiography shows the advanced valvular stenosis or regurgitation depending upon the narrowing of the orifice area. Treatment of the complications should be done. For. e.g. DC cardioversion for fibrillation, medical cardioversion with tablet digoxin. Oral Warfarin to prevent thromboembolism. Antibiotics as prophylaxis.

5. Conclusion

Pathogenesis of Valvular heart disease can very well be arranged in Ayurvedic six stages of *Shat Kriya kala* and treatment could be framed as per different stages. Confirmation of these stages could be done with the help of modern investigations. If each stage of *Shat Kriya kala* is properly diagnosed with the help of modern investigations, then VHD can very well be managed at very earlier stage and overt mortality can be avoided with proper stagewise intervention. It is essential to study the diseases stated in modern medical science using unique Aurvedic *Shat Kriya kala* concept.

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