

# Prevention, Sign, Symptom and Etiologies of Mitral Stenosis and its management and Herbal treatment

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## Abstract.

Although once rheumatic fever and its penalty were the major cause of valvular heart disease in the developed world, this disease has become exceedingly rare today. As a consequence, mitral stenosis, which is usually caused by rheumatic fever, has also become uncommon. In fact, MS is most commonly found in the United States in patients who have emigrated here from areas where rheumatic fever is still endemic. However, »1500 balloon mitral valvotomies (BMVs) were performed in the various countries last year, which provides a rough index of severe disease prevalence. The following is a review of the current understanding and management of this disease.

## A. Introductions Mitral valve and Mitral Stenosis.

The mitral valve separates the left atrium from the left ventricle (LV) and, as such, is an integral part of the high-pressure systemic circulation. Therefore, any pathology of the valve can have critical physiological effects that the anesthetist must be aware of. Anesthesia alters the way in which the heart, valve, and circulation interact and control of these changes needs to be both understood and anticipated.

The mitral valve is a complex structure that incorporates not only the two main leaflets, but an annulus, tendinous cords, and papillary muscles connecting the valve leaflets to the LV. The mitral valve's annulus is a saddle-shaped structure which is shaped more like a 'D' than an 'O'. The aortic valve is wedged into the straight side of the 'D' and there is fibrous continuity between the two valves. This means that one can be easily affected by surgery on the other.

The circumflex artery follows the line of the annulus as it passes anteriorly around the base of

the heart, a position that places it at risk during any mitral valve surgery. Damage or ligation of the artery will result in lateral wall ischaemia, and this is an important area to assess on perioperative echocardiography.

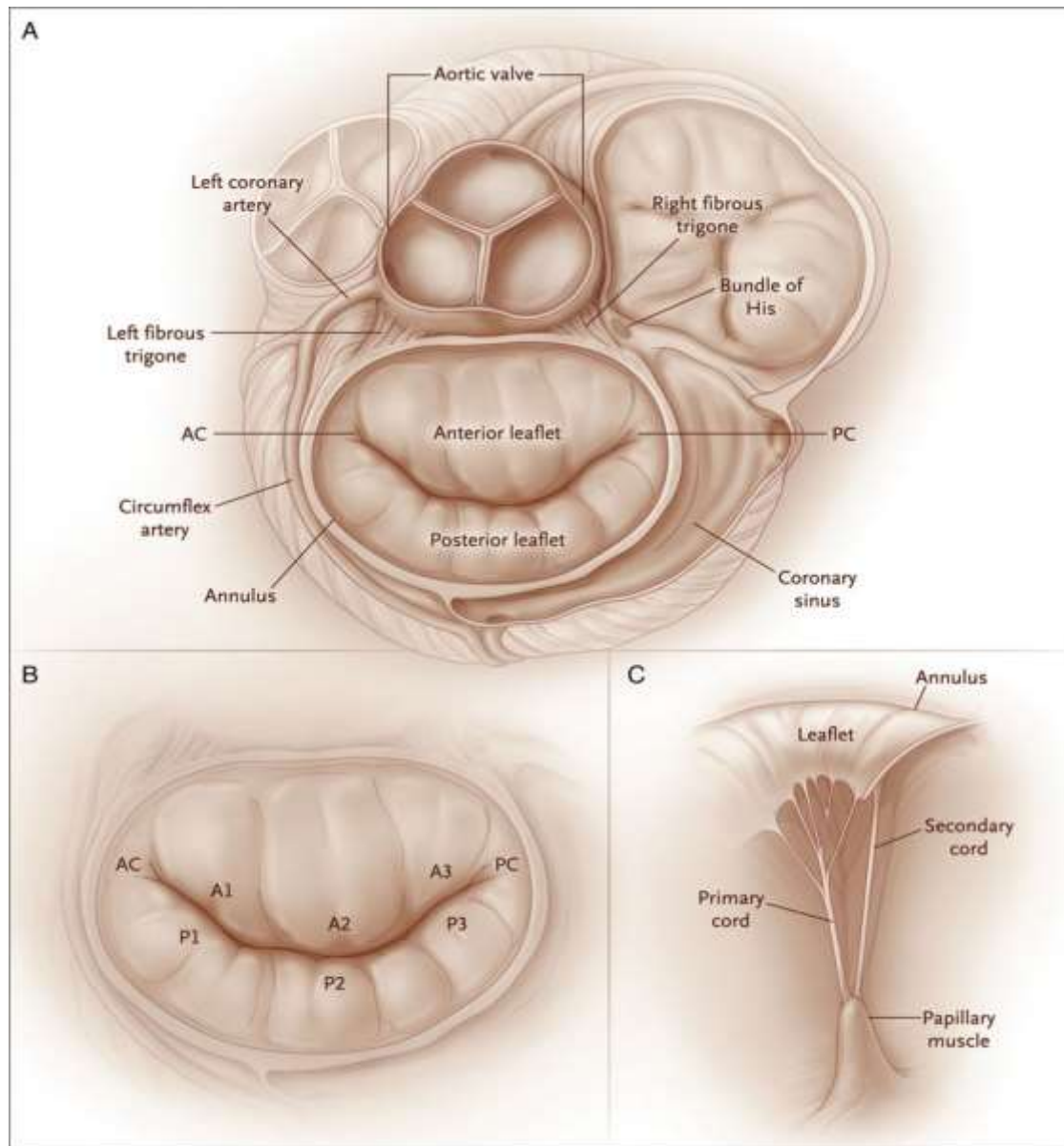


Fig 1 The mitral valve and surrounding structures. The valve is in the ‘surgeon’s view’ orientation with the heart tilted to the left.

(□) AC, anterior commissure; PC, posterior commissure.

(□) The mitral valve leaflets, each of which usually consists of three discrete segments or scallops. These are designated A1, A2, and A3 for the anterior leaflet and P1, P2, and P3 for the posterior leaflet.

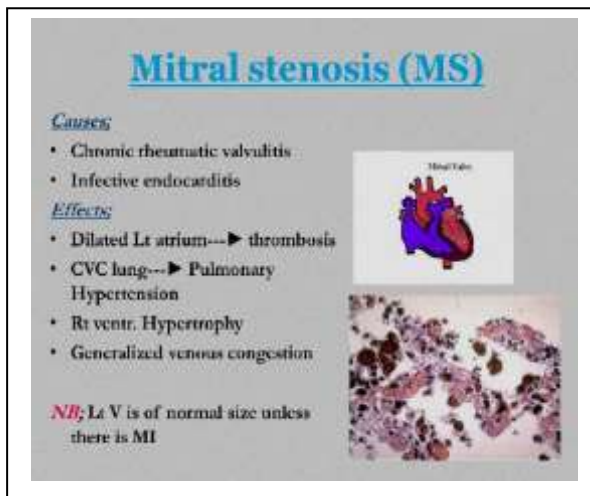
(□) Primary chordae are attached to the free edge of the valve leaflet, and secondary chordae are attached to the ventricular surface of the leaflet. Reprinted with permission from Massachusetts

Medical Society. Descending and the circumflex artery, the posteromedial is supplied solely by the right coronary artery in the more common right dominant circulation. As it is usually only supplied by a single artery, infarction and rupture of the posteromedial muscle is much more likely, as could be seen in the context of an inferior myocardial infarction.

A normal mitral valve will have an area of  $>4 \text{ cm}^2$ , but symptoms are usually only present once the stenosis is moderate–severe. Grading into mild, moderate, or severe disease is based on both the pressure needed to drive blood across the valve and the valve area.

## B. What is Valve Stenosis?

- The common meaning of stenosis is obstruction or narrowing of the at the way.
- Stenosis at valve of heart, term means, that valve's doesn't open properly.
- There are two or three flaps at valve, so it's known as Bicuspid and Tricuspid.
- When these flaps of valve becomes thicken, or becomes stiff or becomes calcified or fuse with each other or becomes fibrosis at flaps, which results OBSTRUCTION in valve opening. So the situation / condition known as stenosis at valves of heart.



**Fig. 2 Mitral stenosis**

TABLE 1. CAUSES OF MITRAL STENOSIS	
■	Rheumatic
■	Radiation therapy
■	Congenital
■	Parachute mitral valve
■	Supravalvular mitral ring
■	Systemic disease
■	Carcinoid
■	Systemic lupus erythematosus
■	Rheumatoid arthritis
■	Mucopolysaccharidosis
■	Previous endocarditis
■	Mitral valve calcification

**Fig. 2 Causes of Mitral stenosis**

## C. Causes of Valve Stenosis.

1. Age Factor: Some diseases caused related or increasing age.
2. Congenital: Some diseases may caused by birth, which known as congenital valve disease or defect's of heart.
3. Calcification: Deposition of calcium at valve is also common cause of stenosis.
4. Rheumatic heart disease & infective endocarditic. Rheumatic fever is inflammatory reaction due to infection. Due to Rheumatic fever heart damages permanently which is known as Rheumatic Heart Disease.

5. Coronary Artery Diseases
6. Myocardial Infraction
7. Cardiomyopathy
8. Syphilis
9. Hypertension
10. Aortic Aneurysm
11. Connective tissue disease
12. Radiation

## D. Sign & Symptom's of Mitral Stenosis.

### (A) patient's symptom

- Doe-dyspnea on exertion (Breathlessness)
- Palpitation, occasionally chest pain,
- Sweating, semi-unconsciousness
- Dry-coughing
- Congestion chest and Discomfort
- Dryness in mouth and throat
- Semi Unconsciousness
- Fatigue
- Giddiness
- Shortness of breath after exertion, exercise
- Shortness of breath after lie down

### (B) Clinical symptoms

- Increased hearth rate (Normal 72/min)
- Increased blood pressure (Normal 120/80)

## E. Etiology

Rheumatic fever is by far the largest cause of mitral stenosis, although it is relatively rare in developed countries where degenerative calcification or endocarditic are more likely causes. Disease progression is usually around  $0.1\text{--}0.3\text{ cm}^2\text{ yr}^{-1}$ , but this is greatly increased in cases of repeated valve inflammation such the development of atrial fibrillation will lead to a rapid progression of the pathophysiology, and development of symptoms. In pregnancy, any compensation is overcome by the large increase in blood volume, as discussed later. This is one reason why rheumatic heart disease follows a more indolent course when contracted in developed countries where the disease

is less common. The inflammation results in a thickened, nodular valve that can become fused at the leaflet edges and into the commissural. The chordae can also become shortened or thickened, and because blood flows around these cords on entering the LV, this can cause a subvalvular obstruction to flow. Other causes are much less common. These include infiltrating diseases, and congenital deformities, or diseases that affect multiple systems, such as sarcoidosis.

Although the attack rate for rheumatic fever is roughly equal among genders, MS is 2 to 3 times more common in women. It is generally believed that the M protein antigen held in common between the heart and group A hemolytic Streptococcus results in an autoimmune attack of the heart in response to streptococcal infection.<sup>1–3</sup> What factors cause susceptibility to the illness remain unclear. Likewise, factors responsible for the decline in MS incidence in developed countries are also obscure. Although the decline may be due in part to the introduction of antibiotics, a fall in the attack rate of rheumatic fever began well before antibiotics were widely available.

Once begun, the rheumatic process leads to inflammation in all 3 layers of the heart: endocardium, myocardium, and pericardium. However, the disease primarily affects the endocardium, leading to inflammation and scarring of the cardiac valves. Although the process is punctuated by acute episodes of rheumatic fever, chronic inflammation and scar-ring continue well after the last attack, leading to severe valve damage years later. The mechanism of this chronic process is debatable and is thought to be due either to a continuing low-grade rheumatic process or to hemodynamic stresses on the now-injured valve. Elevated C-reactive protein levels, indicative of ongoing generalized inflammation, are found in many patients before BMV, which supports an inflammatory origin for MS. Although all of the cardiac valves may be involved by the rheumatic process, the mitral valve is involved most prominently and in virtually all cases. Stenosis of this valve occurs from leaflet thickening, commissural fusion, and chordal shortening and fusion. Occasionally, mitral annular calcification rather than disease of the valve leaflets and chordae tendineae is the cause of mitral stenosis. Annular calcification appears to be closely related to aortic and aortic valve calcification, which have recently been associated with atherosclerosis rather than with rheumatic fever. Other exceedingly rare causes of MS include use of anorectic drugs and carcinoid syndrome

## F. Diagnosis

In mild disease, the patient may be entirely asymptomatic. With worsening stenosis, the symptoms of dyspnea on exertion, orthopnea, and paroxysmal nocturnal dyspnea occur, although many patients may remain asymptomatic despite very high left atrial pressure. Lymphatic hyper function in such patients may help prevent pulmonary congestion and its attendant symptoms. Increasing left atrial pressure may result in hemoptysis as pulmonary venous hypertension results in rupture of anastomoses between bronchial veins. The enlarged left atrium may impinge on the left recurrent laryngeal nerve, causing hoarseness. In some patients, the new onset of atrial fibrillation may be the first clue that MS is present. In other patients, the physiological stress of pregnancy

may cause symptoms for the first time.

The physical examination of the patient with MS is characteristic and usually diagnostic. In advanced disease, the pulse pressure may be reduced, which indicates reduced stroke volume. There may be typical “mitral” facies with plethoric cheeks punctuated by bluish patches, a condition probably related to impaired cardiac output. Neck vein elevation is seen if there is right heart failure. Lung examination may demonstrate rales.

Cardiac examination finds a right ventricular lift if pulmonary hypertension has developed. A diastolic thrill may be palpated in the left lateral decubitus position. There is increased intensity of the  $S_1$  that occurs because the transmitral gradient holds the mitral valve open for all of diastole, so that ventricular systole closes the mitral valve from a long moment arm. In far-advanced disease,  $S_1$  may become soft because the valve is so diseased it neither opens nor closes well. The pulmonic component of the second sound will be increased in intensity if pulmonary hypertension is present. After  $S_2$ , the mitral valve opens with a snap. The distance from  $S_2$  to the opening snap is a good clue to MS severity. The higher the left atrial pressure (and the more severe the stenosis), the sooner the mitral valve opens. An  $S_2$ -opening snap interval  $<0.08$  seconds usually indicates severe disease. A low-pitched mitral rumble follows the opening snap and may be punctuated by presystolic accentuation if the patient is in sinus rhythm. A high-pitched blowing murmur may be heard at the cardiac base. Although often this murmur is thought to be secondary to the pulmonic regurgitation of pulmonary hypertension, in reality the murmur is more often due to concomitant aortic regurgitation. In patients with pulmonary hypertension, other findings may include a tricuspid murmur, hepatomegaly, ascites, and edema. Although physical examination of the patient with MS should lead to the correct diagnosis, as with many heart diseases, diagnostic errors are not uncommon. The presence of AF with a rapid ventricular response may obscure the cardiac findings. A soft murmur from low cardiac output may be missed until it is made obvious with hand-grip exercise. Left atrial myxoma tricuspid stenosis and even atrial septal defect may be confused with MS.

## G. Treatment of Mitral Stenosis.

(I) **Atrial fibrillation.** In severe MS, up to 40% of patients will develop AF. An increased ventricular response rate decreases diastolic time and increases atrial pressure, further worsening symptoms. Rate control reduces symptoms and is generally easier to achieve than rhythm control in a heart with dilated atria and fibrosis from previous inflammation. It can be achieved with either  $\beta$ -blockers or calcium channel blockers.

(II) **Dyspnoea.** Dyspnoea is a common presenting complaint with symptomatic MS. Diuretics are used to reduce this, and long-acting nitrates can also provide some relief of symptoms.

(III) **Anticoagulation.** While there is little evidence to justify anticoagulation in MS alone, patients with AF, prior embolic events, or with a demonstrated left atrial thrombus should be anticoagulated with Warfarin or Heparin.

## H. Surgical Treatment of Mitral Stenosis.

Surgical options, either open or percutaneous, are the treatment of choice in severe symptomatic MS. In patients with valves with mobile leaflets that are free of calcium, percutaneous mitral commissurotomy (PMC) is the preferred option. This is performed by passing a balloon across the valve and inflating it, thereby splitting the fused commissural edges. PMC achieves an MV area  $>1.5 \text{ cm}^2$  with no worse than moderate mitral regurgitation (MR) in 80% of cases, with emergency surgery rates of  $<1\%$ . Surgery is recommended in the presence of atrial thrombus, heavy valve calcification, or when another open cardiac procedure needs to be performed. Mitral valve replacement is now the preferred treatment due to improved valve and clinical outcomes. Mitral valve replacement has an operative mortality of 3–5%, but long-term outcomes are highly variable and related to multiple patient-related factors.

### I. Management of Mitral Stenosis.

#### (I) Pregnancy

Owing to the increase in blood volume and heart rate in pregnancy, MS is poorly tolerated, and frequently will first present at this time. In normal pregnancy, cardiac output increases  $\sim 50\%$ , although the fixed cardiac output state of MS results in a Worsening of pressure through the pulmonary circulation and into the right heart. The risk of decompensation depends on severity. Anything worse than moderate disease frequently results in heart failure, which usually develops in the second or third trimester and is progressive.

Medical management through pregnancy involves aggressive control of tachycardia and AF, with  $\beta$ -blockers the mainstay of treatment. Diuretics are also added if symptoms of pulmonary congestion develop. If symptoms are not controlled with medical therapy, percutaneous commissurotomy is the surgical treatment of choice as it avoids bypass with the attendant risk to the fetus.

#### (II) Delivery

Haemodynamic goals for delivery remain afterload maintenance, heart rate and rhythm control, and care with fluid administration. Vaginal delivery is well described, but is carefully managed. Neuraxial analgesia is placed early to block any tachycardia due to sympathetic stimulation. Block is achieved slowly and any hypotension is managed with  $\alpha$ -agonists. Epidurals are titratable, with a mixture utilizing opioids achieving analgesia with fewer haemodynamic effects. The second stage is assisted, limiting labour duration andValsalva. In patients with pulmonary hypertension, or NYHA III/IV symptoms despite maximal medical therapy, Caesarean section is considered.

Post-delivery, patients with MS are at risk of developing pulmonary edema. This can occur precipitously as a result of decompression of the inferior vena cava along with autotransfusion due to uterine compression causing a sudden increase in preload. This ‘flash’ pulmonary edema can be initially managed with head-up positioning, and the institution of 100% oxygen. This may necessitate intubation and ventilation if severe, with sufficient PEEP.



**Fig. 3 Management of Mitral stenosis in Delivery**



**Fig. 4 Management of Mitral stenosis in pregnancy**

Also of note, oxytocin should be administered with great care in the MS population due to its vasodilating properties on the systemic circulation and propensity to increase pulmonary vascular resistance. Ergometrine is contraindicated due to its pulmonary vasoconstricting effects.

## J. Medications for Mitral Valve Stenosis

- **Diuretics:** Drugs that help reduce fluid accumulation in your body by increasing fluid loss through urination
- **Blood thinners** (anticoagulants): Drugs that help prevent blood clots from forming
- **Anti-arrhythmias:** Drugs to control an irregular heartbeat, such as the too-fast heart rhythm of atrial fibrillation.
- **Antibiotics:** Drugs to prevent bacterial infection of your heart valve, which you need to take before surgery or teeth cleaning

Even if you are taking medications, you may notice an increase in fatigue or shortness of breath. If this occurs, you should let your doctor know immediately.



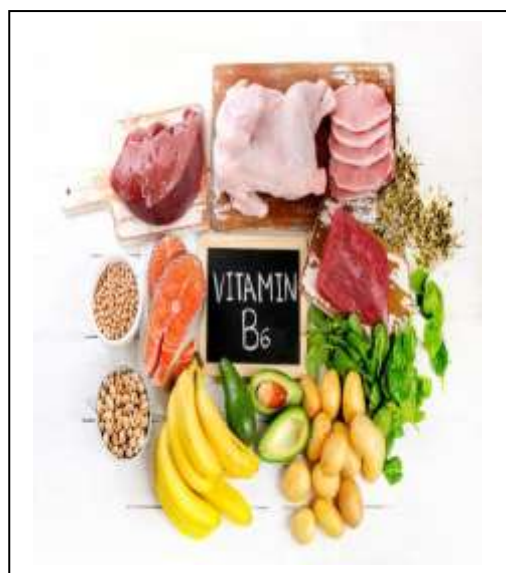
## K. Herbal and natural remedies for mitral valve prolapse.

### 1. Magnesium

Magnesium supplementation is reportedly one of the best natural MVP treatments. This is probably because a high percentage of people with prolapsing mitral valves are deficient in the mineral. A number of studies have linked low magnesium levels in the body to mitral prolapse. In humans, magnesium is vital. It affects nearly every bodily system, maintaining muscle and nerve function, keeping the heart rhythm steady, and much more. Magnesium for mitral valve prolapse may boost health and reduce symptoms such as fatigue, breathlessness, anxiety, and palpitations. The recommended daily allowance with magnesium is between 300 and 600 milligrams for adults, although some patients may need more. This includes the amount that you get from your diet from foods like tuna, nuts, white beans, and avocados. Stores usually sell supplements in tablet form.



**Fig. 5 Magnesium food for Mitral stenosis**



**Fig. 6 Vitamin B 6 for Mitral stenosis**

### 2. B vitamins

Vitamin B is said to be effective in staving off symptoms of MVP syndrome, and it tends to work in concert with other natural remedies for mitral valve prolapse. One can find B vitamins abundantly in green vegetables, whole grains, meats, and dairy. They are also available in supplement form. Niacin (B3) and thiamin (B1) may alleviate anxiety and panic by lowering lactic acid levels. Pyridoxine (B6) increases serotonin production and regulates homocysteine, so it may work as a sedative and promote heart health. Inositol (formerly vitamin B8) may also have calming effects.

### 3. Kava

Kava (kava-kava), which falls into the category of herbal natural remedies for mitral valve prolapse, also appears to be helpful in dealing with common MVP syndrome symptoms. In actual fact, there are medical studies that point its effectiveness as a calming agent for anxiety relief. Kava-kava is a plant that is native to the islands of the South Pacific. Companies use the root and stems to produce beverages and supplements that have tranquilizing effects on the nervous system. This may relieve anxiety, restlessness, and insomnia, as well as pain, dizziness, and palpitations.



**Fig. 7 Kava Harb for Mitral stenosis**



**Fig. 8 Kava Extract for Mitral stenosis**

### 4. Hops

Hops (the seed cones of the humulus lupulus hop plant) are an ingredient in beer that acts as a flavoring agent and preservative. They are also used in natural remedies for mitral valve prolapse and numerous other disorders to fight illness and provide relief for certain symptoms. The hop is widely used in herbal medicine, as it may relieve anxiety, relax muscles, and induce sleep, as well as fight inflammation, reduce body weight, and more. In cases of mitral prolapse, the main benefits are the herb's sedative effects on the nervous system and its clot-preventing antiplatelet activity. Various forms of hops are available to reduce MVP symptoms, including capsules, tablets, liquid extracts, and tinctures. The appropriate dosage varies according the form and individual. Users should not combine hops with alcohol or sedative medications. It is not suitable for pregnant women.

### 5. Valerian

Last but not least of the natural remedies for mitral valve prolapse is valerian, also known as garden heliotrope. Valerian is a plant. The root of the plant is processed to use as an herbal remedy to battle different

ailments and symptoms. Users often combine valerian with hops and other herbs. Valerian is most commonly used to treat insomnia and sleep disorders, as it increases gamma aminobutyric acid levels in the brain. But, it also reportedly relaxes muscles, reduces stress, lowers blood pressure, and calms anxiety, which may benefit users with a mitral prolapse.



**Fig. 9 Hope plant for Mitral stenosis**

**Fig. 2 Valerian plant for Mitral stenosis**

Patients can purchase valerian as a capsule, tea, tincture, or fluid extract. Supplements appear to be most effective after two weeks. For anxiety, experts generally recommend a dosage of 120-200 mg three times daily

## L. Discharge Instructions for Mitral Valve Stenosis

You have been diagnosed with mitral valve stenosis. This means that the mitral valve in your heart is stiff and doesn't open right. Because of this, blood must move through a smaller opening. In severe cases, fluid can build up in the lungs, leading to coughing and breathing problems. You can also develop heart rhythm problems such as atrial fibrillation. Over time, mitral valve stenosis may slowly get worse.

Many people with mitral valve stenosis do not need treatment. Some cases can be controlled with medicines. In a few cases, surgery is needed. Here are things you can do at home for prophylactic ally.

- Maintain a healthy weight. Get help to lose any extra pounds.
- Cut back on salt.
  - Limit canned, dried, packaged, and fast foods.
  - Don't add salt to your food at the table to control Hyper Nitremia.
  - Season foods with herbs instead of salt when you cook.
  - Request no added salt (Sodium Chloride) to your order at restaurants.

- Begin an exercise program. Ask your doctor how to get started. You can benefit from simple activities such as walking, gardening, swimming, or dancing and various Gym Activities
- Break the smoking habit. Enroll in a stop-smoking like cigarettes, Gutakha, Bedi and other pan masala program to improve your chances of success.
- Check with your doctor before taking any over-the-counter medicines, herbal products, or vitamin supplements.
- Take your medicines exactly as directed. Don't skip doses.
- Keep all follow-up appointments. Some people with mitral valve stenosis don't have symptoms. Others need close follow-up and surgery.

## Summary

Mitral Stenosis is usually caused by rheumatic fever, a disease rare in developed countries today but that still persists in a large part of the American and European countries. When complicated by AF, rate control and anticoagulation are mandatory in the absence of pressing contraindications. Once more than mild symptoms exist or once asymptomatic pulmonary hypertension occurs, mechanical relief of Mitral Stenosis is indicated. In most cases, such relief is provided by the durable commissurotomy created at BMV. In other cases, surgical correction is needed. After these interventions, prognosis is excellent.

Herbal medicine like Hope, Kava Kava, Plant rich in Magnesium and containing Vitamin B6 (Pyridoxine), Valrian are generally used in the treatment to control the Mitral stenosis. Medicine is generally prescribed for Mitral Stenosis are Diuretics, Anticoagulants and Beta Blockers.

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