

Functional Systolic Murmurs

Milton Boniuk, '56

Although it is generally agreed that the diastolic murmur with rare exceptions denotes a cardiac valvular pathologic lesion, the role and significance of the systolic murmur have not been fully established. The various opinions given concerning its value range from complete acceptance as a pathognomonic indication of an organic lesion to almost total disregard of it as an aid in the diagnosis of heart disease. Because the nature of the murmur has been unsettled this has been a frequent cause of cardiac neurosis.

Although no attempt can be made to elucidate this problem which has baffled clinicians for years, I would like to review some of the literature which has been written on the systolic murmur and this article will briefly deal with the following:

(1) Frequency of systolic murmurs; (2) Opposing views on significance of systolic murmurs; (3) Classification and Causes; (4) Aids in Diagnosis; (5) Pathologic Study and Evaluation; (6) Conclusions.

Frequency:

The frequency of the physical finding of the systolic murmur in routine examinations is not generally realized. Walter showed that of 400 routine examinations of the heart 29.75% or 119 showed systolic murmurs. Levine examined 1000 normal persons engaged in various occupations and found 19.6% with a systolic murmur. In a group of

University students, Reid found 20% with a systolic murmur.

Opposing Views:

However, such a frequent routine physical finding as this has not yet been clearly understood and opposing views on this matter have been expressed by some of our best known clinicians. Some of those expressing a poor prognostic view were:

1. Laennec, who introduced auscultation in physical diagnosis in 1819, thought that all murmurs were positive indications of presence of cardiac valvular lesions.

2. White reported on 100 patients with apical systolic murmurs including some with accompanying diastolic murmur. Although stating that slight apical systolic murmurs are frequent and are in themselves of little or no importance in the absence of other signs of heart trouble, he found that only 19% of patients had normal hearts, and that 6% were doubtful. The rest of the patients had organic heart disease. Furthermore the evidence of an organic lesion increased with the intensity of the systolic murmur, ranging from 56% in patients with slight murmurs to 98% in those with loud ones.

3. Levine also stated that a systolic murmur is not common in normal individuals and the louder ones are always associated with some form of cardiovascular disease.

On the other hand, some of the more favorable prognostic outlooks

were expressed by the following:

1. Cabot, "systolic murmurs without presence of other signs of heart disease is of no importance."

2. White, at another occasion, said that most systolic murmurs do not indicate presence of organic heart disease.

3. J. S. Blumenthal followed 100 patients with a systolic murmur for 7 years. After this time 4 patients developed other cardiac abnormalities. Blumenthal stated "if we find in a heart of normal size and rhythm a systolic murmur with absence of any signs that would indicate that it is definitely organic in origin, and with a good functioning organ, then we may conclude that the heart is perfectly normal."

4. Contratto reported on 127 Harvard students with apical or basal systolic murmurs, the significance of which was uncertain after the first examination. After follow-up of 2 to 3 years, he was unable to make a diagnosis on any case and several of the patients had played football and other strenuous sports.

Classification and Causes:

It has become evident that systolic murmurs are caused not only by deformity of valves but also by other factors present, thus the systolic murmur has become divided into two categories, organic and functional. Of course, this is not a practical division as there is no definite distinction to be made between such murmurs clinically.



There are immediate requirements for Medical Doctors in the

Royal Canadian Air Force

Permanent or Short Service Commission

One year post graduate training during each five years of service using civilian teaching facilities.

For full information, write the:

R.C.A.F Recruiting Unit

254 Barrington Street

Halifax, Nova Scotia

Telephone 3-6945

Herrick has given the pathological and clinical causes of murmurs of the organic type as:

- 1 Stenosis or insufficiency of valves.
- 2 Congenital deformities including patent ductus Botalli (ductus arteriosus),
Patent interauricular septum,
Patent interventricular septum,
Muscular bands,
Anomalous chordae tendinae and papillary muscles.
- 3 Vegetations & Sclerotic changes of valves.

Causes of Functional Murmurs are:

Stretching of valve rings,
Dilatation of chambers,
Hypertrophy,
Anemia,
Tachycardia,
Fevers,
Neurocirculatory asthenia,
Decreased cardiac tone and contraction,
Drugs — such as epinephrine.

Aids in Diagnosis:

What can aid us in distinguishing the organic from the functional murmurs?

1 First of all, a complete and thorough history and physical examination may reveal information and physical signs which will help to explain the nature of the murmur. This requires no elaboration.

2 Secondly, a thorough study of the murmur — William Evans describes some very important clinical characteristics which help to disting-

uish the functional murmur from the organic ones.

(a) Most organic murmurs are better heard with patients reclining; this is also true of innocent murmurs but when the murmur is decidedly louder in upright position it is innocent.

(b) A functional murmur is neither long nor loud; one exception occurs when the murmur is late in systole and placed as near to the second sound as the first, it can be loud and yet be innocent.

(c) When a trivial systolic mitral murmur becomes louder in reclining posture and a murmur develops as at the base of the heart and particularly in the pulmonary area, the murmur is innocent.

(d) Any heart murmur is loudest at expiration, but if a murmur disappears during expiration it belongs to the innocent type.

(e) A systolic murmur of organic nature gains intensity, but the innocent often weakens, as the heart rate increases.

3 Thirdly, laboratory aids. Parker and White using three types of murmurs — systolic murmurs found in mitral stenosis, functional systolic murmur — systolic murmur occurring in mitral regurgitation.

Law showed the following in their reviews of laboratory aids for diagnosis:

(a) The anatomical changes associated with mitral stenosis were found to be reflected in the electrocardiogram; a P wave of 3.0 m.m. in height

in the second lead being found in 23%; and a P wave .12 seconds or more in width in any lead being found in 27% of cases. The changes in organic systolic murmurs were too small to be of diagnostic value. P wave is due to spread of impulse from SA node over auricles. It is normally upright in leads I and II but may be flat, diphasic or inverted in lead III. P wave is not more than 2.5 or 3.0 m.m. high or more than .10 seconds in duration.

(b) Enlargement of the left auricle usually demonstrated by fluoroscopy, was found in 5% of subjects with functional systolic murmurs, in 43% with organic systolic murmurs, and in 72% with mitral stenosis, thereby establishing itself of considerable value as a diagnostic criterion.

(c) Exercise tolerance tests were found to be of no value in differentiating between functional and organic systolic murmurs.

(d) Heart sound tracings were found to be of value in isolated instances where the precise timing of a murmur or sound was important. This was particularly true in regard to reduplication of the first heart sound and duration of systolic murmurs. These were too uncommon to warrant widespread use of stethographic equipment.

Thus, in the presence of mitral regurgitation certain x-ray and electrocardiographic abnormalities frequently occur. The percentage is not sufficiently high, nor are the changes highly specific, to constitute a basis for diagnosis to the exclusion of auscultation. On the other hand,

these changes were considered as a part of the entire clinical picture, are frequently helpful.

Pathological Study and Evaluation:

A pathological survey by Rednick at Grasslands Hospital, New York may throw some light on the problem under discussion. This study included an examination of autopsy records of 1148 consecutive cases of whom 268 or 23.1% had shown systolic murmurs.

(1) 44 cases or 16.4% showed valvular incompetence due to, rheumatic fever, arteriosclerosis, syphilis, and congenital malformation. These patients had shown additional signs and symptoms of heart involvement, precordial thrills, diastolic murmurs, blood pressure changes, cardiac enlargement and serological reaction.

(2) 136 or 58% showed valvular deformity but were still competent. Changes noted were (a) vegetation nodules and calcification of valve leaflets; (b) stretched and scarred valves. Some of these represented a mild stage of rheumatic involvement or various degrees of arteriosclerotic changes which had become arrested and which were generally regarded as functional. These conditions were compatible with long life and the average age was 73 to 74 years.

(3) Aneurysms were found in 1.4% and cardiac hypertrophy in 9.3%.

(3) In 18.1% of cases the heart was anatomically normal and the appearance of a systolic murmur was attributed to fever, tachycardia, anemia or hypertension.

Thus in 209 cases or 78.2% some pathological cause.

Thus in 49 cases or 18.1% some clinical cause.

Thus in 10 cases or 3.7% no pathological or clinical cause.

Conclusions:

In conclusion, I should like to emphasize:

(1) The frequency of the systolic murmur, occurring in 20-30% of normal adults.

(2) Importance of—

(a) complete history and physical examination in the evaluation of such a murmur.

(b) complete cardiac study including effect on murmur of changes in posture, breathing and exercises, also of importance is the loudness and duration of the murmur.

(c) X-ray and electrocardiographic in distinguishing the systolic murmur, mitral stenosis and mitral regurgitation from the functional murmur; and finally I think from the above information we can safely say that,

(3) A heart of normal size and rhythm and with a systolic murmur but with the absence of any signs or symptoms that would indicate it is definitely organic must be regarded as perfectly normal.

*The Dalhousie Medical Journal has the support and best regards
from the members of*

Alpha Eta of Phi Rho Medical Fraternity

101 Inglis St., Halifax, N. S.

President, Eddy Lund

Vice-President, Ross Langley

Treasurer, Ron Hurley

Secretary, John Sutherland