

Innocent Systolic Murmurs in Healthy 40-year-old Men

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The incidence of innocent systolic murmurs in adults is unknown, information being available only in selected groups of mainly young adults such as university students[1], and young women attending family planning clinics[2].

During an epidemiological survey of metabolic risk factors associated with ischaemic heart disease in randomly selected asymptomatic 40-year-old men in Edinburgh[3] the incidence and significance of systolic murmurs was assessed.

Subjects and Methods

The names of 210 males were obtained from the General Register offices in Edinburgh on a random basis. Of these, 33 were not identifiable on NHS registers in the city; a further 25 were found to have left the city; 4 were on night shift and one was ill. An approach was made to GPs to allow the remaining 147 men to collaborate in the study.

They deemed nine to be unsuitable because of pre-existing cardiovascular disease or for psychological reasons, and a tenth man with asthma on prednisolone was also excluded. Of the 137 men remaining, 30 did not reply to the request for collaboration. Consequently 107 men actually participated in the study.

All 107 subjects had a short history taken from them, and then a clinical assessment, aided by the London School of Hygiene questionnaire on smoking and angina[4], was made.

Each subject had a 12-lead ECG recorded at rest. An exercise tolerance test with ECG recording was carried out using bicycle ergometry with three or four increments of 50 W/min at five minute intervals starting at 50 W/min and continuing until a heart rate of 160 beats/min was achieved[5]. During exercise, bipolar

chest-head leads 2, 4 and 6 were recorded continuously. A 12-lead-ECG was recorded for 10 minutes after exercise.

In those with murmurs, echocardiography was performed using an Echoline 20 ultrasonography with an ultrasonic beam (frequency 2.25 MHz, repetition frequency 1000/s). The output was displayed on a Honeywell stripchart recorder. The patients were in the semi-recumbent position and slightly tilted to the left side, with the transducer at the left sternal border.

Results

Sixteen of the 107 subjects studied had soft mid-systolic murmurs best heard at the lower left sternal edge, and one had an ejection type systolic murmur best heard in the second right intercostal space. Sixteen of the murmurs were grade 1/6, one was 2/6. All of these murmurs were heard by two of us. None of the seventeen men had any other cardiovascular abnormality, in particular their carotid artery and jugular venous pulse characters were normal and they were all normotensive. No ejection, mid- or late systolic clicks were heard, nor were any diastolic murmurs audible. It was not possible to decide with any certainty the origin of the systolic murmurs.

Resting Electrocardiograms

Three men had minor abnormalities in the resting electrocardiogram. One had first degree heart block, one had high left ventricular voltages (SV1 + RV6 = 38 mm) and one had sinus bradycardia. The other 14 had normal electrocardiograms.

Exercise Testing

All 17 subjects achieved a heart rate of greater than 160 per minute (80 per cent of maximum heart rate). None developed chest pain or discomfort or any ECG evidence

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of ischaemia. No subject had any abnormality of rhythm during the exercise test.

Echocardiographs were obtained in all 17 subjects. In 15 of them the echocardiographs were normal but in two, neither with an ejection type murmur, the aortic valve cusp echoes could not be demonstrated with clarity. In all, the posterior cusp of the mitral valve was well shown and in no subject was there any evidence of mitral valve prolapse. There was no suggestion of systolic anterior movement of the anterior cusp, and the septal thickness was normal in all the men, no asymmetrical septal hypertrophy being found.

Discussion

The presence of innocent systolic murmurs undetected until adulthood is well recognised but poorly documented. There are no reports in the literature on the incidence of innocent systolic murmurs in middle-aged men. Groom and his associates[6] were able to demonstrate that all adults have systolic murmurs detectable phonocardiographically though not usually clinically. They studied 71 normal paramedical workers aged from 20–51 years, three-quarters of whom were male, using high sensitivity capacitance pickup in a sound proof room.

They specifically excluded subjects with known heart disease or a murmur detectable on ordinary stethoscope examination, and demonstrated that all of their subjects had electronically detectable murmurs. Although these 'murmurs' were not detected at stethoscope examination, they were within the range of human audibility (and stethoscopic transmission). They pointed out that the audibility of a murmur depends not only on the frequency and intensity of the sounds but also on the auditory acuity of the listener, the capabilities of the instrument employed and the conditions under which the observation is made. They regarded the mechanism and site of origin of these murmurs as being uncertain and concluded that they represent a universal functional murmur that is usually inaudible but that may at times become clinically audible. Audible innocent systolic murmurs were found in 11 per cent of 2856 college students[1]; McCracken and Everett[2] found similar murmurs in 52 per cent of the 509 young women whom they examined in a university family planning clinic.

The number of children with innocent systolic murmurs persisting into adult life is not established. Marienfield and his colleagues[7] found only 20 per cent of subjects with an innocent murmur in childhood still had such a murmur when older, but Weaver and Walker[8] found that all of the 100 subjects they studied retained their innocent murmur of childhood into adulthood.

The presence of innocent systolic murmurs in

childhood has been well documented[9, 10, 11], although estimates of the incidence have shown considerable variation. Sampson *et al.*[12] found them to be present in less than 10 per cent of children examined in 1945, while Lessof and Brigden[9] found them in 96 per cent of the children they examined in 1957. Other estimates have fallen between these figures[10].

It is clearly important to recognise the occurrence of innocent systolic murmurs in adults in order that unnecessary concern can be avoided. This may be particularly relevant in the context of an acute myocardial infarction when soft systolic murmurs are frequently heard[13] and usually attributed to papillary muscle dysfunction[14], an inference that is not always justified, as a substantial proportion of such patients may have had the murmur all their lives.

In conclusion, our study indicates the incidence of innocent systolic murmurs in a randomly selected group of healthy 40-year-old men to be 16 per cent.

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