

LEFT VENTRICULAR ABERRANT BANDS IN CHILDREN WITH INNOCENT MURMURS*

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Key words: left ventricle, aberrant band, innocent murmur, Still's murmur, childhood

Left ventricular aberrant bands have been described as incidental findings at autopsy¹⁻⁴. Recently these entities have been recognized by means of M-mode and two-dimensional echocardiography⁵⁻¹⁰. In studies of this kind, the prevalence of aberrant left ventricular bands ranges from 0.5 to 50 percent⁵⁻¹⁰.

Left ventricular aberrant bands have been demonstrated primarily as anatomic variations of no significance although recently it has been noted that some of them have been associated with precordial murmurs^{2,4,8-9,11}.

The causes of innocent murmurs are still unclear. To date, diagnostic investigations have failed to demonstrate cardiac abnormality in the majority of children with innocent murmurs. McKusick⁴ suggested that musical murmurs may occur in anomalous cords located in the left ventricular outflow tract, but this has not yet been proven.

We used two-dimensional echocardiography in this study of children with innocent murmurs. Our purpose was to demonstrate the presence of aberrant bands in these subjects and to show the relationship between the location of the aberrant band and the type of innocent murmur.

Material and Methods

This study was carried out on children with innocent murmurs examined in the Department of Pediatric Cardiology at the Hacettepe University Institute of Child Health between March 1985 and January 1986. The ages of the patients, 47 girls and 53 boys, ranged between 2 to 6 years (mean age 7⁵/₁₂ years).

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The initial diagnosis of innocent murmur was made clinically, and was then substantiated by means of an electrocardiogram, X-ray and phonocardiography. Two main types of innocent murmur were specifically considered, the "Still's" or the vibratory murmur and the pulmonary systolic ejection murmur.

Two-dimensional echocardiographic studies were performed with the Honeywell Ultra Imager Model No: Ultra 80 system using 5 and 3.5 MHz transducers. Echocardiograms were recorded in the apical four chamber and long and short parasternal views to evaluate the left ventricular aberrant bands.

The echocardiographic diagnosis of the aberrant bands was made with a string-like structure which passes from free wall to wall or from free wall to septum. This structure was not related to either the atrioventricular valves or the papillary muscles. Two kinds of aberrant bands were located, the first horizontally and the second longitudinally. Some patients had both longitudinal and horizontal bands. Figs. 1-3 show the location of the bands of specific interest in this study.

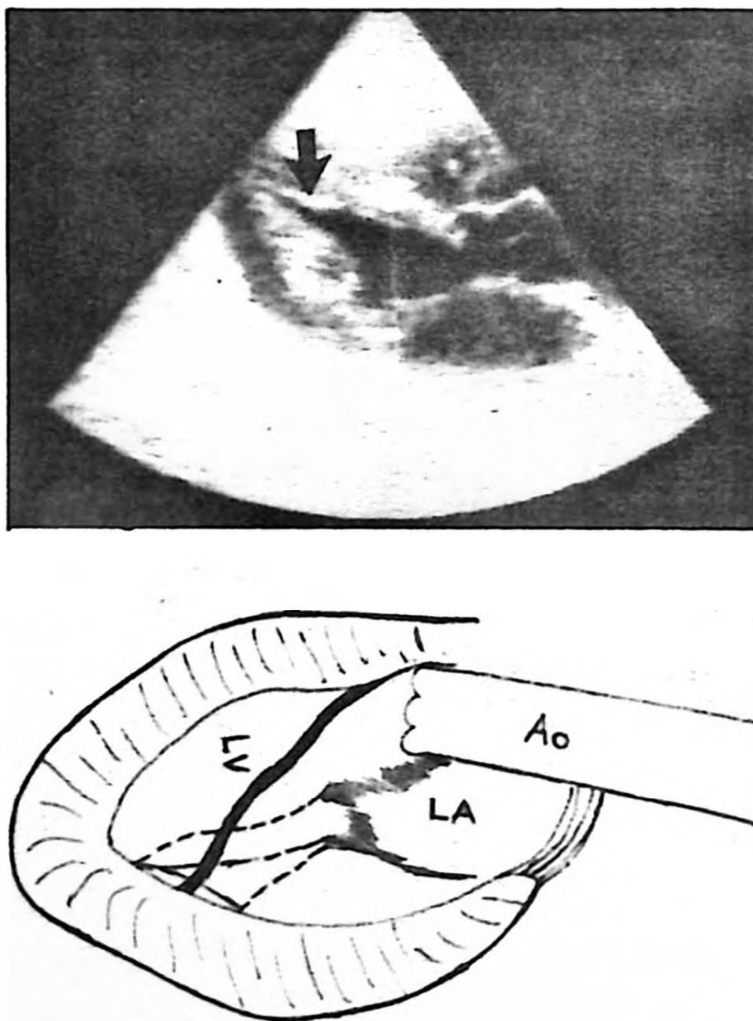


Fig. 1. (a,b): Longitudinal aberrant band: echocardiographic picture and schematic drawing of the same patient.

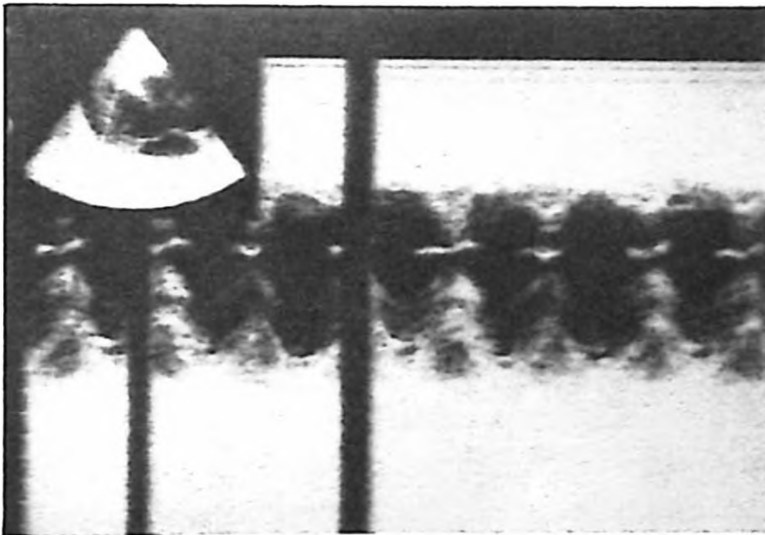
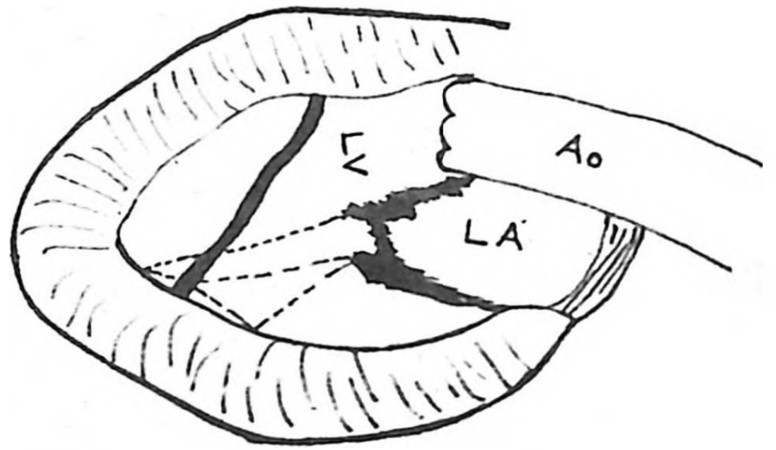
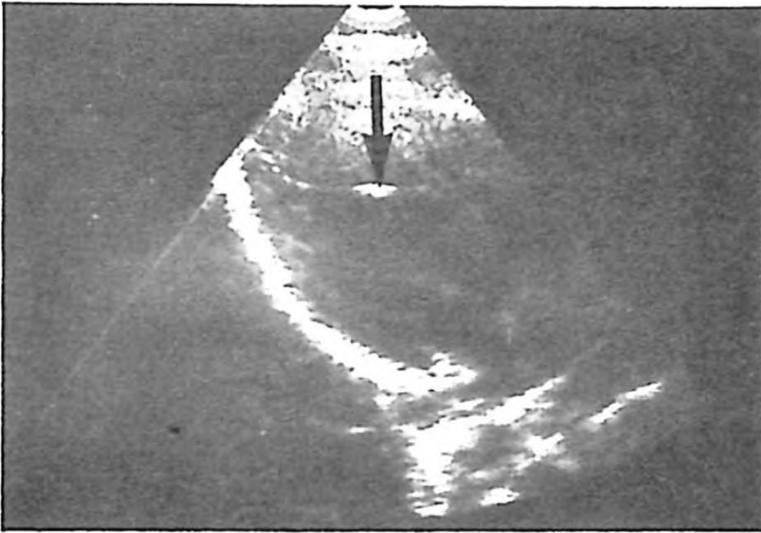


Fig. 2. (a,b): Horizontal aberrant band: echocardiographic picture and schematic drawing of the same patient.

Fig. 2. (c): M-mode echocardiogram of the same patient.

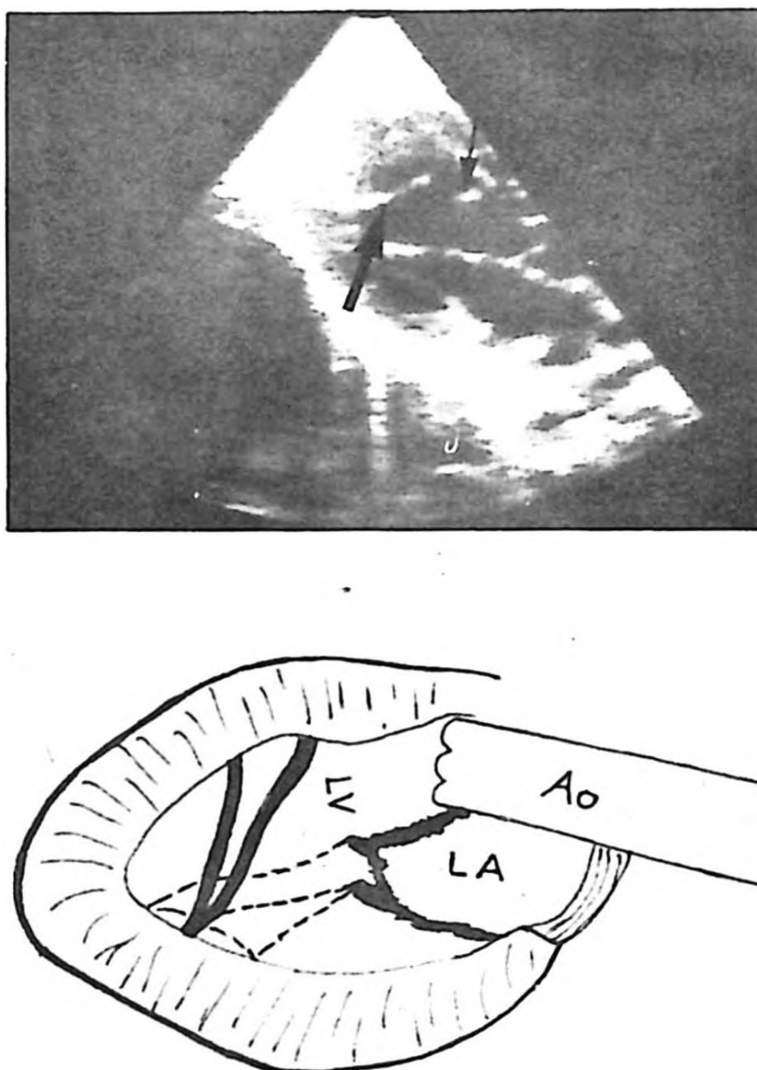


Fig. 3. (a,b): Double horizontal aberrant bands: echocardiographic picture and schematic drawing of the same patient.

In this study, the relationship of these horizontal and longitudinal aberrant bands to "Still's" and pulmonary systolic ejection murmurs was investigated. Doppler echocardiography was used as supportive evidence of innocent murmurs.

The control group included 15 children without heart murmurs.

Results

Still's murmurs were heard in 77 children, pulmonary systolic ejection murmurs in 12 and both types of murmurs in 11 children.

Two-dimensional echocardiography revealed left ventricular aberrant bands in all 100 of these children with innocent murmurs.

Aberrant bands were located horizontally in 77 cases, all of whom had Still's murmurs, and longitudinally in 12 cases all of whom had pulmonary systolic ejection murmurs. Both kinds of linear echoes due to aberrant bands were demonstrated in the 11 children with both types of murmurs. Single aberrant bands were present in 67 children, and two or more bands in 33 children. Aberrant bands were not seen in the 15 children without heart murmurs.

Discussion

Aberrant bands were first described by Turner^{12,13} as an incidental finding in the left ventricle at autopsy. They were generally considered to be of no clinical significance, although recently some authors have suggested that aberrant bands may be associated with precordial murmurs, but detailed studies regarding this have not been carried out. However, with the use of two-dimensional echocardiography, it has become possible to study cardiac structure more precisely. As a result of these studies, we now know that the prevalence of aberrant bands is greater than previously believed.

Two-dimensional echocardiography is a useful means of differentiating aberrant bands from other conditions causing abnormal linear echoes. String-like echoes are seen clearly in the four-chamber view and in the long and short parasternal view.

Murmurs occurring in individuals without apparent heart disease are called "functional", "inorganic" or "innocent" murmurs. The reasons for these "innocent" murmurs are still unclear. Two main types of innocent murmurs are to be heard in children. One is known as the innocent vibratory murmur or "Still's" murmur and is usually located between the lower left sternal border and the apex. It has a peculiar musical sound and is sometimes thought to originate in the vibration of the pulmonary valve itself. But it has also been suggested by De Monchy¹⁴ that it has a left-sided origin. Recently some authors have suggested that since the Still's type innocent murmur does not originate on the right side of the heart, it must have a left-sided origin¹⁵⁻¹⁶. The other innocent murmur is the pulmonary systolic ejection murmur which is located at the second or third left intercostal space. Pulmonary systolic ejection murmurs occur in children, adolescents and young adults. It has been suggested that this murmur is an exaggeration of normal ejection vibrations in the pulmonary trunk.

We propose in this paper that innocent murmurs may occur as a result of the presence of aberrant bands in the left ventricle. We investigated this relationship in 100 children with innocent murmurs.

We demonstrated that in 77 cases of innocent murmurs, there were abnormal linear echoes in the left ventricle toward the apex (horizontal bands).

In 12 cases, two-dimensional echocardiograms revealed long string-like echoes stretching from the upper part of the interventricular cavity to the lateral wall of the left ventricle (longitudinal bands). The children with "Still's" or vibratory murmurs had horizontal bands, however, the children with pulmonary ejection murmurs had longitudinal bands. If both Still's and pulmonary ejection murmurs were heard in the same child, we found either longitudinal bands or both longitudinal and horizontal bands.

We suggest here that the presence of aberrant bands is not uncommon. If proper attention were given to the subject and reliable techniques were used, the prevalence in the population would be found to exceed the fifty percent that has been reported in previous studies. However, in cases with innocent murmurs, the prevalence appears to be very high indeed.

It would seem that in the past, researchers were either not aware of aberrant bands or they were not interested in their structure; certainly little attention was drawn to them.

In our study, we found aberrant bands in 100 percent of all the cases with innocent murmurs. As a result, we suggest that the cause of the innocent murmurs may be aberrant bands. Furthermore, we think that the intensity of the innocent murmur may be related to the thickness of the band, and also to the stretching of the band caused either by an increase in the speed of the blood flow against the band or the dilatation of the left ventricle.

Our study provides strong evidence of a relationship between aberrant bands and innocent murmurs, and also confirms previous reports of an association between left ventricle aberrant bands and Still's murmur.

The data we have collected also suggests that there might be a relationship between the location of the aberrant band and the type of innocent murmur, the horizontal band being associated with Still's murmur, and the longitudinal ones with pulmonary ejection murmurs. As far as we know, such an association has not been previously reported.

Summary

One hundred children with innocent murmurs are presented in this study. Two-dimensional echocardiography revealed left ventricular aberrant bands in all of these children. Longitudinal bands were found to be associated with pulmonary systolic ejection murmurs, while horizontal bands with Still's murmur. Strong evidence in this study regarding the relationship between innocent murmurs and left ventricular aberrant bands had not previously been clearly demonstrated.

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