

THE INCIDENCE AND SIGNIFICANCE OF SYSTOLIC CARDIAC MURMURS IN INFANTS

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In the course of carrying out routine physical examinations on newborn babies, certain infants were found who presented loud systolic cardiac murmurs in the absence of other abnormal physical signs. The significance of such a finding was doubtful, but the murmur in many cases was so loud as to suggest the possibility of congenital heart disease. An investigation was therefore carried out to assess the incidence and the significance of systolic cardiac murmurs occurring in the newborn.

Published records of such murmurs are few. Taussig (1947) has stated that 'a murmur audible in the newborn period is always of doubtful significance', but 'the persistence of a murmur for a period of weeks is usually indicative of a congenital malformation of the heart'. Siemsen (1938) examined newborn infants for the presence of cardiac murmurs at least twice a week during their hospital stay and found a wide variation in the incidence of murmurs. He placed the incidence as high as 25% of 105 infants examined, but the percentage with murmurs increased with the number of examinations per patient. These murmurs were systolic, mostly soft and blowing, and usually loudest over the apex. Lyon, Rauh and Stirling (1940) place the incidence of murmurs at 1.9% in a series of 7,673 newborn infants examined during the first week of life. The incidence appeared to be uninfluenced by such factors as sex of the infant, month of birth, birth weight and the occurrence of syphilis in the mother. They were able to follow the course of 92 infants with systolic murmurs in many cases up to 1 year of age. Four infants died, and two of these who came to necropsy were found to have congenital heart disease. Seventy-one infants were entirely normal, 14 had persistent murmurs, two had inconstant murmurs, and one had extrasystoles.

Cox (1948) has assessed the frequency of systolic murmurs as 5% of 630 'ostensibly healthy infants', but these were not all restricted to the newborn period. In just under half of the cases presenting murmurs the murmur persisted.

Method

The material for this investigation consisted of all newborn babies examined in the Simpson Memorial Maternity Pavilion, Edinburgh, over a five-month period from April to August, 1950. The total number of babies examined was 1,133. All examinations at birth and subsequent follow-up were carried out by one observer.

Each baby was subjected to a general clinical examination as soon as possible after birth. In particular the precordium was palpated for thrills and the heart auscultated at the four valvular areas. A chest piece 3 cm. in diameter, with diaphragm, was used for the auscultation. When a murmur was detected it was classified according to its intensity using the classification of systolic murmurs adopted by Levine and Harvey (1949). The classification was as follows:—

Grade I is the faintest murmur that can be distinctly heard (not likely to be audible during the first few seconds of auscultation). Grade II is a soft murmur that is heard immediately on auscultation. Grade III is a murmur louder than Grade II. Grade IV is a murmur louder than Grade III. Grades V and VI are the loudest of all and were not heard in this series. When any real doubt existed as to the presence of a Grade I murmur a negative finding was recorded and the baby examined on another occasion. No diastolic murmurs were detected in the series.

Repeated auscultation of the heart was carried out as often as could be arranged during the first 10 days of life, and in over three-quarters of the cases auscultation was carried out on two or more separate days within this period.

Radiographic and electrocardiographic examinations were carried out in the majority of babies with murmurs. The variable results of such examinations were difficult to assess, and seldom proved of real value in making a diagnosis of congenital heart disease in the neonatal period.

A group of 20 infants with systolic murmurs was

selected for a follow-up of two years' duration. Each case fulfilled both of the following conditions: (1) the presence of a Grade II, III, or IV murmur, (2) the detection of such a murmur on two or more successive days in the first 10 days of life. Most of these infants were examined at intervals of three months. The survivors were all re-examined at the age of 1 year and again at the age of 2 years.

Results

In 4.8% of the 1,133 babies examined a systolic murmur was audible during the first 10 days of life (Table 1).

TABLE 1
ANALYSIS OF BABIES IN PRESENT WITH AUDIBLE MURMURS

Maximum Grade of Murmur	Number of Babies with Murmur	Percentage of All Babies Examined
Grade I	18	1.6
Grade II	24	2.1
Grades III and IV..	12	1.1
	54	4.8

In all cases the intensity of the murmur was maximum along the left border of the sternum, or at the pulmonary or mitral areas. In 12 cases the murmur persisted throughout the neonatal period. In other cases the murmur was transient, appearing within a few days of birth and lasting for one, two, or three days.

In only a few cases the systolic murmur was associated with other abnormal physical signs. Thus in two infants suffering from erythroblastosis foetalis the cardiac murmur appeared when the haemoglobin level fell below 75% and disappeared when the haemoglobin was restored above this level by therapeutic measures. In two other cases a Grade I systolic murmur, which disappeared after a few days, was associated with extrasystoles.

There was no significant difference between the group of murmurs and those without as regards sex, weight or associated diseases.

Two babies who did not present systolic murmurs during the neonatal period died, and were proved to have congenital heart disease at necropsy. One died within two days of birth from interventricular septal defect, dextroposed aorta, stenosis of the pulmonary artery, and congenital atresia of the oesophagus. The other appeared normal during the neonatal period. He developed a loud systolic murmur by the age of 6 weeks and died at the age of 8 weeks. Necropsy revealed an adult type of coarctation of the aorta.

The results of the two-year follow-up of 20 infants is given in Table 2.

TABLE 2
TWO-YEAR FOLLOW UP OF 20 INFANTS WITH SYSTOLIC MURMURS

Children apparently normal	14
Died with evidence of congenital heart disease at necropsy	2
Died with no evidence of congenital heart disease at necropsy	1
Murmurs persisting at 2 years of age	3

In 10 of the 14 children who are now apparently normal the murmur did not persist beyond the neonatal period. In two the murmur persisted to 3 months of age, and in two it persisted to 1 year before disappearing.

Of the two babies with evidence of congenital heart disease at necropsy, one died at the age of 11 days with cor triloculare and a large foramen ovale. The other died at the age of 6 weeks with a bicuspid aortic valve and aortic valvular stenosis.

A provisional diagnosis of congenital heart disease has been made in each of the three children who survive with loud systolic cardiac murmurs. One is thought to be suffering from coarctation of the aorta, another from a patent interventricular septum and the third from aortic stenosis.

Conclusions

The results of this investigation are in agreement with the experience of other observers. The differences in the recorded incidence of systolic murmurs in the newborn are probably due to the subjective nature of the examination required to detect their presence, but 2 to 5% of infants present such murmurs. The majority of these murmurs must be due to 'physiological' causes as they usually disappear by the age of 3 months but occasionally persist to the age of 1 year. Possible physiological causes are the patency of the foramen ovale and the ductus arteriosus. According to Christie (1930) the foramen ovale has closed in 95% of infants and the ductus arteriosus in 99% by the age of 1 year. In 14 of the 20 children followed up to the age of 2 years in the present series the murmur had disappeared by the age of 1 year, whereas in each of the three children with persistent murmurs a diagnosis of congenital heart disease has now been made.

The intensity of the murmur does not appear to be of any diagnostic value, as the loud Grade III or Grade IV murmurs may disappear within a few days or weeks. A consideration of the intensity of the murmur combined with its persistence may be of some value. Thus the soft transient systolic murmur

is the one least likely to be associated with congenital heart disease. The infant with a loud persistent systolic murmur is more likely to be suffering from congenital heart disease, but in the absence of other diagnostic evidence the diagnosis may remain in doubt until after the age of 1 year.

Summary

In the examination of 1,133 newborn infants systolic murmurs were detected in 54 (4·8%).

Periodic observation of a selected group of 20 infants with murmurs revealed that in 14 the murmur had disappeared by the age of 1 year. In three infants loud systolic murmurs have persisted to the

age of 2 years, and a provisional diagnosis of congenital heart disease has been made in each case. Two infants in the group died and necropsy revealed evidence of congenital heart disease. In a third infant who died there was no evidence of congenital heart disease at necropsy.

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