PHASE STRUCTURE OF THE CARDIAC CYCLE DURING POSTNATAL DEVELOPMENT OF DOGS

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The phase structure of systole of the left ventricle was analyzed in puppies aged 1.5-3 months and dogs aged 3-5 years by recording the kinetocardiogram and polycardiogram. With age the period of expulsion and contraction increases in dogs, and there is a corresponding increase in the duration of mechanical systole and diastole. Analysis of the kinetocardiograms and polycardiograms reveals divergence of the absolute values of some parameters. The kinetocardiographic indices are less variable than the polycardiographic.

Kinetocardiography was used to investigate the structure of left ventricular systole in puppies and adult dogs and the results were compared with those of polycardiography.

EXPERIMENTAL METHOD

Altogether 28 adult (3-5 years) dogs and 40 puppies aged 1.5-3 months were investigated. The kinetocardiogram (KCG) was recorded with the aid of a detector designed by Oranskii [4] in the fourth left intercostal space. The hair at the site of attachment of the detector was shaved. The ECG was recorded in stan-

TABLE 1. Phase Structure of the Cardiac Cycle from KCG and PCG Data in Dogs of Different Ages

Index studied	Statistical index	KCG		PCG	
		1 ½–3 months	3–5 years	1 ½–3 months	3–5 years
Period of contraction	*M*	0,050	0,065	0,064	0,080
	±m	0,0027	0,0045	0,0027	0,0025
	P		<0,01		<0,001
Transformation phase	*M*	0,022	0,043	0,037	0,048
	±m	0,0017	0,0033	0,0014	0,0017
	P		<0,001		<0,001
Phase of isometric contraction	*M*	0,029	0,023	0,028	0,032
	±m	0,0016	0,0017	0,0007	0,0015
	P		<0,02		<0,05
Period of expulsion	*M*	0,119	0,146	0,119	0,136
	±m	0,0061	0,0063	0,0042	0,0048
	P		<0,001		<0,02
Phase of fast expulsion	*M*	0,020	0,031	0,025	0,027
	±m	0,0018	0,0033	0,0022	0,0025
	P		<0,002		>0,05
Phase of slow expulsion	*M*	0,101	0,114	0,095	0,109
	±m	0,0058	0,0056	0,0048	0,0055
	P		<0,05		>0,05
Mechanical systole	*M*	0,149	0,167	0,147	0,165
	±m	0,0051	0,0068	0,0045	0,0061
	P		<0,05		<0,05
Mechanical diastole	*M*	0,189	0,353	0,212	0,395
	±m	0,0187	0,0495	0,0136	0,0355
	P		<0,002		<0,01

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dard lead II synchronously with the KCG on the ELKAR electrocardiograph (paper winding speed 100 mm/sec). Polycardiograms (PCG) were recorded on the 6-NÉK-3 electrocardiograph. For analysis of the KCGs and PCGs the mean values obtained after measuring the parameters in five cycles of each record were used. The numerical data were subjected to variance analysis [3].

EXPERIMENTAL RESULTS

An increase with age was observed in the period of contraction, chiefly through lengthening of the transformation phase and also, as the PCG data showed, lengthening of the phase of isometric contraction. In adult animals the duration of the expulsion period also was longer because of lengthening of the phases of fast and slow expulsion. The duration of mechanical systole and diastole increased with age. Parameters for the phase structure of left ventricular systole obtained by analysis of the KCG and PCG in the animals of both age groups are given in Table 1.

The increase in duration of the expulsion period taking place with age in dogs is evidently connected with the slowing of the heart beat, for negative correlation between these indices has been clearly established [2, 5, 6]. Lengthening of the period of contraction mainly on account of the transformation phase is evidently due to the increase in mass of the heart with age and changes in the autonomic influences on the heart [1].

Comparison of the results of analysis of the KCGs and PCGs shows that the direction of the changes in the indices is basically the same. However, the age changes in the parameters were reflected more clearly in the KCG data.

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