A-V BLOCK AND A-V DISSOCIATION IN ELECTROCARDIOGRAPHIC SURVEYS OF MIDDLE SCHOOL STUDENTS

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(1) ECG surveys were performed on 12,523 middle school students. The incidence of A-V block was 0.40% (0.37% in males and 0.43% in females). The incidence of A-V dissociation was 0.11% (0.09% in males and 0.13% in females). (2) There was no case of Mobitz type II or complete A-V block in this survey. (3) Sixty-four school students were picked at random from the students with A-V block who had been diagnosed by ECG surveys during the last three years and were given the Master's two-step test. The following four types of response were recognized; Type 1, Type 2, Type 3A, B, C, and Type 4. (4) Elevation of ASLO and antistreptkinase (ASK) were found in 6.4% and 13.5%, respectively. The serum cold agglutinin titer was elevated in four of the 12 students tested. (5) Most students with A-V block or A-V dissociation had no past history of severe disease or no major complaints.

It is not generally known that first and second degree A-V block and A-V dissociation are occasionally present in electrocardiographic (ECG) surveys of school students.¹⁻⁸

Key Words:

School students
ECG surveys
Master's two-step test
A-V block
A-V dissociation
Serological test

In the present study, we would like to describe the incidence of A-V block and A-V dissociation in ECG surveys of students and also to analyze and classify the changes in block or dissociation after Master's two-step double exercise test of students with A-V block or A-V dissociation.

MATERIALS & METHODS

First, ECG surveys were performed on 12,523 students, some aged 12 years and some 15, from April to July, 1975. There were 6,759 males and 5,764 females. The incidence of A-V block and

(Received on August 22, 1977; Accepted on January 28, 1978)

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The outline of this study was presented at the 6th Asian-Pacific Congress of Cardiology, in Hawaii, 1976.

TABLE I INCIDENCES OF A-V BLOCK AND A-V DISSOCIATION IN 12 YEAR-OLD AND 15 YEAR-OLD STUDENTS

	Screening	A-V block	A-V dissociation
Male	6,759	25 (0.37%)	9 (0.13%)
Female	5,764	25 (0.43%)	5 (0.09%)
Total	12,523	50 (0.40%)	14 (0.11%)

Fig.1. This group showed first degree A-V block or Wenckebach's type in the screening ECG, but the PQ intervals were normal before and after master's two-step test.

Fig.2. This group showed A-V block in the screening ECG and also in the ECGs before and after Master's two-step test.

A-V dissociation was studied in these students.

Next, 64 students picked at random from those with A-V block diagnosed by ECG surveys during the last three years were examined with Master's two-step test, and the changes in the PQ interval were analyzed.

In the ECG surveys, only four leads, leads I, aVF, V1 and V6, were used.^{9,10} The ECG after Master's two-step test was observed intermittently for five minutes. If the PQ interval was greater than 0.21 seconds, first degree A-V block was diagnosed.

RESULTS

The incidence of A-V block was 0.40%, and that of A-V dissociation, 0.11% among the 12,523 students examined as seen in Table I. First degree A-V block was found in 0.37% of the males and 0.43% of the females. Second degree A-V block was present in 0.07% of the males and 0.09% of the females. There was no case of Mobitz type II or complete A-V block in this survey.

The incidence of A-V dissociation was 0.13% in the males and 0.09% in the females.

The results of Master's two-step tests were of

Figs.3-5. This group showed A-V block in the first screening test and in the ECG directly before Master's two-step test, but a transient normal PQ interval for at least five minutes after exercise, it was designated Type 3A (Fig.3). If the return to A-V block occurred less than five minutes after exercise, it was designated Type 3B (Fig.4). If the shortening of the PQ interval was greater than 0.04 seconds after exercise, and yet remained abnormal, it was designated Type 3C (Fig.5).

four types:

Type 1: As can be seen in Figure 1, this group showed first degree A-V block or Wenckebach's type in the screening ECG, but the PQ intervals were normal in the ECG before and after Master's two-step test. This type was found in 26 of the 64 students (41%).

Type 2: This group showed A-V block in the screening ECG and also in the ECGs before and after Master's two-step test. A transient shorten-

Fig. 6. Three students with A-V block in the screening ECGs showed a normal PQ interval or A-V block directly before Master's two-step test, but a transient increase in the degree of A-V block after exercise.

ing of the PQ interval was observed after Master's two-step test in 14 cases (22%), but it was never longer than 0.04 seconds, as is seen in Fig. 2.

Type 3: This group showed A-V block in the first screening test and in the ECG directly before Master's two-step test, but a transient normal PQ interval persisting for at least five minutes after Master's two-step test, as is seen in Fig. 3 (Type 3A). This type, designated Type 3A, was seen in seven students (11%). If the returning to A-V block occurred less than five minutes after the exercise, it was designated Type 3B as is seen in Fig. 4 (Type 3B). This type appeared in eight students (13%). If the shortening of the PQ interval was greater than 0.04 seconds after the exercise, and yet remained abnormal, it was designated Type 3C as is seen in Fig. 5 (Type 3C). This type was found in six students (9%).

Type 4: Three students with A-V block in the screening ECGs showed normal PQ interval or A-V block directly before Master's two-step test, but a transient increase in the degree of A-V block after exercise. This type was designated Type 4, as is seen in Fig. 6. The incidence was 5%. Thus, A-V blocks could be classified into four types.

The number of ECGs showing A-V dissociation was too low to classify.

Table II shows the results of serological tests performed on the students with A-V block or dissociation during the test period. In 6.4%, there was an elevation of ASLO, and in 13.5% ASK was above normal. The serum cold agglutinin titer was high in four of the 12 students tested.

Most students with A-V block or A-V dissociation had no past history of severe disease, no major complaints and no significant clinical signs or physical disorders at the time of the study.

DISCUSSION

A number of cases of first or second degree

TABLE II INCIDENCES OF ELEVATION OF ASLO AND ASK IN A-V BLOCK AND A-V DISSOCIATION

	ASLO ≥ 250 Todd unit				ASK $\geq \times 2,560$		
	Male	Female	Total	%	Male	Female	Total
A-V Block	4.6%	5.5%	5.1%	2/43	17.9%	8.6%	10/74
				2/36			3/35
A-V Dissociation	11.1%	20 %	14.3%	1/9	0 %	0 %	0 %
				1/5			
				2/14			

A-V block and A-V dissociation were found in ECG surveys of middle school students. In the present ECG surveys, the incidence of A-V block was similar to that reported by other authors.¹⁻⁶ The incidence of A-V dissociation in the present survey, however, was twice as high as that reported by other authors.¹⁻⁶ The reason for such a high incidence of A-V dissociation in the present surveys remains unclear.

Most students with block or dissociation had been participating in such demanding sports as rugby, baseball, football, etc.^{8,11-13} Therefore, these four types of A-V block might be due to individual variations of some unknown factors.¹⁴ However, it is recommended that students with Type 4 A-V block refrain from vigorous exercise and be under a physician's observation.

Though four types of A-V block were classified, we could find no differences in other laboratory test results among these types.

Elevations in the serum levels of ASLO, ASK, and cold agglutinin titers were found in six out of 93, ten out of 74, four out of 12 students tested, respectively, but the relationships between these elevations and A-V block or A-V dissociation remain unclear.

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