Bigeminy on Exertion
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Bigeminy or coupling of beats may involve the atria alone, the ventricles, or both. There are many causes for coupling, the commonest and most important being extrasystoles. In extrasystolic bigeminy, there is a premature contraction after each normal beat. The premature beat may originate from the sinoatrial node, the atrium, the atrioventricular node, the atrioventricular bundle, or the ventricle. The last ventricular extrasystolic bigeminy, constitutes more than 80 per cent of cases. The premature contractions may arise from right or left ventricle, and very rarely may arise from the interventricular septum. They may originate from one or more foci. In ventricular extrasystolic bigeminy the atrial rhythm may be normal or abnormal. Atrial fibrillation is seen in nearly 40 per cent of cases; overdosage of digitalis is the main cause of coupling.

The aim of the present study is to report the occurrence of ventricular extrasystolic bigeminy on exertion.

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Case 1
A 40-year-old engineer reported irregular heart action on effort. Physical examination was within normal limits, and electrocardiography showed a normal tracing except for incomplete right bundle-branch block as evidenced by deep S waves in leads II and III, and an rsr pattern in V1. The Master exercise test was performed and showed ventricular extrasystolic bigeminy, every normal beat being followed by a premature contraction. After 10 minutes of bed rest, the bigeminy disappeared. One month later, the patient was seen again because of the same discomfort. Electrocardiography again revealed similar findings. One week later, bigeminy was not seen after exertion.

Case 2
A 51-year-old clerk on routine physical examination showed no abnormality except occasional premature beats. Electrocardiograms before and after the Master exercise test (fig. 1) showed coupling on exertion and returned to the previous status within 2 minutes. At a second examination a few days later the electrocardiogram was exactly the same as the previous record. The patient was instructed to omit cigarettes and coffee and tea. After a week on this regimen, exercise did not precipitate ventricular premature contractions.

Case 3
A 25-year-old woman with precordial discomfort showed only multiple irregularly spaced extrasystoles due to multiple unifocal premature beats (fig. 2A). On exertion this irregular rhythm changed to bigeminy (fig. 2B). After 10 days of rest and potassium citrate, extrasystoles were not seen at rest (fig. 2C), nor on exertion (fig. 2D).

Case 4
A 28-year-old carpenter was examined because of an irregular pulse. The thyroid gland was slightly enlarged, but there were no signs of hyperactivity. The pulse showed intermittent bigeminy. Physical examination was otherwise negative. After a few minutes of exercise bigeminy reappeared. An electrocardiogram showed ventricular extrasystolic bigeminy, which gradually disappeared.

Case 5
A 40-year-old man complained of a missing
beat at regular intervals. Physical examination and electrocardiography revealed quadrigeminy, the fourth beat was a unifocal ventricular extrasystole (fig. 3A). On exercise the rhythm changed to bigeminy, the added premature beat arising from the same focus (fig. 3B). The new premature beats disappeared on rest and reappeared when exercise was resumed.

Two similar cases are represented by two male subjects of the third decade; the tracings were recorded before and after exercise. In the first (fig. 4) a ventricular premature beat regularly occurred after two normal cardiac contractions, i.e., trigeminy. In the other electrocardiogram (fig. 5) ventricular extrasystoles appeared following a group of three normal heart beats. After rest these premature beats disappeared, to appear again on exercise.

Discussion

The occurrence of ventricular premature beats after exercise has been observed by many workers since 1927. Some authors believe that premature ventricular contractions precipitated by exercise are usually related to coronary insufficiency. Others think that these extrasystoles are of little pathologic significance. Sandberg, after his extensive study of the problem, suggests that the decisive factor is whether or not the rhythm disturbance is accompanied by ST and T depression.

The only abnormality in our subjects was bigeminy that appeared on exertion and disappeared on rest. The duration of rest required in our subjects varied. In all subjects coupling was of the extrasystolic ventricular type, and the premature beats originated from a single focus. The atria showed normal sinus rhythm in all cases. These findings do
not agree with those of Parsonnet et al., who reported that in ventricular extrasystolic bigeminy the multifocal slightly exceed those of unifocal origin.

Nothing indicates coronary artery disease as a cause of these regularly occurring premature contractions after exercise in our subjects. They may be due to increase in excitability of the ventricular musculature that occurs in the myocardium on exercise.

Summary

Regularly occurring ventricular extrasystoles taking the form of bigeminy, trigeminy, or quadrigeminy may appear on exertion in an apparently otherwise normal heart.

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References

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