ABSTRACTS ON RELATION OF VITAMIN DEFICIENCIES TO HEART DISORDERS

"In rats a Vitamin B1-free ration produces a distinct bradycardia, which disappears on addition of the Vitamin (as yeast) to the ration. In underfeeding, bradycardia develops as a result of the inanition and is not relieved by administration of the vitamin."


"CARDIOVASCULAR MANIFESTATIONS OF VITAMIN B1 DEFICIENCY: The Cardiovascular manifestations of beriberi most commonly encountered are dyspnea and palpitation on exertion, tachycardia and edema. The heart is generally enlarged both to the right and to the left. Systolic murmurs are common. Basilar pulmonary rales are frequent. The arterial blood pressure is usually normal or low, frequently with an increased pulse pressure. On palpation a bounding quality is noted in the larger arteries and 'pistol shot' sounds may be heard on auscultation. The venous pressure is generally increased but may be normal. The skin is usually warm and of normal color. Cyanosis is rare; edema may be mild and only in dependent parts, or diffuse and extreme. Electrocardiograms generally show alterations, chiefly in the T waves. Circulatory failure may be predominantly right sided or left sided. Sudden circulatory collapse (shock) has been observed, as well as syncope due to hypersensitivity of the carotid sinus."

"It is thus apparent that the cardiovascular manifestations of Vitamin B1 deficiency do not, at least in the present state of our knowledge, comprise a rigid and easily recognized clinical syndrome. Furthermore, it is infrequently rheumatic, arteriosclerotic or syphilitic heart disease may have superimposed injury due to Vitamin B1 deficiency."

"However, there are technical measurements of the circulation which may prove to be of significant value in the differentiation of beriberi from other types of cardiovascular disorders. The circulatory minute volume and circulation time are both increased in the cardiovascular complications of beriberi whereas other causes of congestive failure, except hyperthyroidism, result in conspicuous slowing of the circulation. The important points in establishing the diagnosis of cardiovascular disease dependent on deficiency of Vitamin B1 are, in addition to those points already presented, the presence of other manifestations of Vitamin B1 deficiency, such as polynu- neuritis, or of deficiency of other portions of the B complex, such as glossitis and pellagra skin changes. Indeed it is rare to observe 'beriberi heart' without at least minimal signs of polynu- neuritis; the history of dietary inadequacy or of conditioning factors which lead to Vitamin B1 deficiency in spite of an apparently normal diet; the disappearance of signs and symptoms following adequate B1 therapy."


"Nutritional disorders may affect the heart along with other tissues, sometimes seriously. Beriberi, a disease which is primarily the consequence of Vitamin B deficiency (tropical avitaminosis), has been shown to cause hydropic degeneration (intraacellular edema) of the myocardium, particularly of the right ventricle, with cardiac dilation and failure. Relief is obtained neither by digitalis nor by diuretics but by the administration of antineuritic Vitamin B1."

White, Heart Disease, Page 437, MacMillan Co., 1936.

"Evans found that Vitamin C increased the urinary output in each of 8 cases of cardiac failure and in another with considerable edema of the lower extremities of unknown etiology. In 2 cases the increase was slight; in 4 it was either moderate or considerable and in 3 cases it was great. When a quantitative estimate was made of the excess of urinary output over fluid intake in the 9 cases over a period of 173 days, it was found that Vitamin C induced greater diuresis than digitalis but less than digitalis, although never with the same degree of clinical improvement nor with reduction of the ventricular rate. These results direct attention to the need of providing an adequate supply of Vitamin C for all patients with cardiac failure. To ensure a constant state of Vitamin C saturation in heart failure it is probably enough to include in the patient's diminished fluid intake an adequate proportion of lemon and orange juice."


"... Sudden death from heart disease in relatively young or middle-aged persons is caused, in a measure, by blood vessel and heart disease resulting from a lack of sufficient foods containing Vitamin C ..."


"An analysis was made of the cardiac rate, electrocardiographic complexes and the response to drugs of rats in the non-deficient state and in repeatedly induced Vitamin B1 deficiency. The heart rate fell slowly during feeding on a deficient diet, but returned to normal within a few hours after an adequate dose of Vitamin B1. In most cases of deficiency, changes occurred in the electrocardiographic complexes. Exercise did not produce more rapid heart changes in deficiency. The cardiac responses of deficient and normal rats to adrenaline were the same. Atropine and section of the vagus nerve did not abolish the changes in normal rats. Deficient rats were more sensitive to the toxic effects of strophanthin."


"The cardiac disturbance is of great diagnostic importance in distinguishing beriberi from other, unrelated forms of neuritis and is the most serious threat to life in the patient not already endangered by infectious disease. Cardiac symptoms come and go but are always present at some stage of beriberi. They consist of shortness of breath, precordial pain, boring in nature, which may be as severe as that in angina pectoris."

The heart is enlarged and the liver swollen and tender. The veins of the neck are engorged. The pulse is weak. The cardiac symptoms, when severe, cause intense suffering and discomfort. The patients toss about in bed unable to compose themselves. They may die suddenly in such attacks. Respiration is so laborious it resembles that of respiratory obstruction."

"... The heart beat is affected in both pigeons and rats. There is bradycardia and heart block which clear up promptly when the Vitamin B1 is given."

MacLeod, Physiology in Modern Medicine, Page 615, The C. V. Mosby Company, St. Louis, 1935.

"A few years ago, Dr. Drury and I discovered that the hearts of rats suffering from lack of Vitamin B1 beat only half as fast as those of normal rats—i.e. they had what clinicians would call bradycardia.

"... The interesting point I am leading up to is this, that further investigations in my laboratory have shown that the low heart-rate has to do with the excess of lactic acid, which in the absence of Vitamin B1 cannot be got rid of. The lactic acid seems to poison the heart muscle and prevent it functioning at full rate. Give Vitamin B1, the lactic acid can be disposed of, and the heart is soon beating at its normal rate again."


"A most interesting finding recently made in England is that a deficiency of Vitamin B produces abnormal slowness of the heart beat. It was proved that it was produced by the specific effect of Vitamin B deficiency, not by insufficient food intake. Since heart failure in mankind is a common cause of death, and frequently occurs in persons apparently in excellent health, application of such experimental results to human ailments may very well be expected."


"Experimentally it has been demonstrated that Vitamin B deficiency produces an abnormal rhythm of the heart, known as 'bradycardia.' In this disease the heart rate in the rat is reduced from a normality of 500-550 beats per minute to 300-350. Since the American diet is often low in Vitamin B, is it not possible that some forms of cardiac diseases are due to cumulative effects of Vitamin B deficiency? No clinical evidence of this is available, however. A statistical investigation of the dietary history of men dying of cardiac diseases would be of medical interest."

Ibid Page 191.

Tohoku states that Vitamin B deficiency is also known to cause heart enlargement.


"... Bradycardia is common (in Vitamin B deficiency)."


"Vitamin-B1 deficiency in rats caused bradycardia, not of vagus origin, and depression of the T wave and the ST segment of the electrocardiogram. It is not clear whether or not the bradycardia is due to certain metabolites produced in excess in this condition (lactic and pyruvic acids and alpha-ketoglutaric acid). Synthetic vitamin administration in normal dogs is reported to produce, on the other hand, a marked and sustained bradycardia. The addition of Vitamin C to the perfusion solution of the isolated frog's heart increases the extent of contraction, especially when added after perfusion has been carried out for some time. Minute Vitamin C deficiency in the guinea pig is reported to be associated with proliferative lesions along the margins of the heart valves. No changes in the electocardiograms of normal children receiving therapeutic doses of D over a long period of time occur, contrary to the results of previous workers."


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