The Boston Medical and Surgical Journal

TABLE OF CONTENTS

January 20, 1921

ORIGINAL ARTICLES

THE CLINICAL RECOGNITION OF THE VARIOUS TYPES OF PAROXYSMAL RAPID HEART ACTION. <i>By Samuel A. Levine, M.D., Boston.</i>	53
MEDICAL COMPLICATIONS FOLLOWING SURGICAL OPERATIONS. <i>By William E. Preble, M.D., Boston.</i>	57
THE BALNEOLOGY OF JAPAN. <i>By Horace Packard, M.D., F.A.C.S. Boston.</i>	60
REPORT OF A CASE OF CONGENITAL HEART DISEASE WITH COMPLETE AURICULOVENTRICULAR DISSOCIATION PRESENTING UNUSUAL FEATURES. <i>By F. A. Willis, M.D., Rochester, Minn.</i>	64
REPORT ON SIXTY-FOUR CONSECUTIVE EXAMINATIONS OF THE DUODENUM ON THE CADAVÉR. <i>By H. F. Aitken.</i>	67
CONDITIONS IN PALESTINE DURING THE WAR AND MEDICAL RELIEF AMONG THE CIVIL POPULATION AND THE REFUGEES. <i>By Izak Alcazar, M.D., Boston (continued).</i>	68
THE DUTY OF STATE MEDICAL SOCIETIES. <i>By R. C. Fish, M.D., Worcester, Mass.</i>	71

BOOK REVIEWS

A Study of the Epidemiology of Tuberculosis, with Especial Reference to Tuberculosis of the Tropics and of the Negro Race. <i>By George E. Bushnell, Ph.D., M.D., Col. U.S.A. (retired); Honorary Vice-President and Director, National Tuberculosis Association, New York.</i>	73
Diseases of Children. <i>By John Lovett Morse, A.M., M.D., Boston.</i>	74
Diseases of the Nose, Throat and Ear. <i>By W. S. Syme, M.D., F.R.F.P. and S.G., F.R.S.E. Edinburgh.</i>	74

EDITORIAL

ALL AMERICA CONFERENCE ON VENEREAL DISEASES.	75
MEDICAL NOTES.	77

THE MASSACHUSETTS MEDICAL SOCIETY

OFFICERS AND COMMITTEES.	78
-------------------------------	----

CORRESPONDENCE

THE WINTER CLIMATE OF LUGANO. <i>Henry W. Kilburn, M.D.</i> ..	79
--	----

Original Articles.

THE CLINICAL RECOGNITION OF THE VARIOUS TYPES OF PAROXYSMAL RAPID HEART ACTION.

BY SAMUEL A. LEVINE, M.D., BOSTON,

Assistant in Medicine, Harvard Medical School.

[From the Medical Clinic of the Peter Bent Brigham Hospital.]

PAROXYSMAL rapid heart action includes those conditions in which the heart suddenly takes on a new rhythm, beating rapidly and regularly or sometimes irregularly. The beginning and ending of such attacks almost always occurs instantaneously, that is, in one or a few heart cycles the rhythm changes. Such attacks vary in duration from several seconds to several weeks. The proper diagnosis of these conditions is best made if they are observed during the attacks although frequently one has to depend entirely on the history because of the transient nature of the upsets and the impossibility of catching the patient while the abnormal rhythm is present. It therefore becomes extremely important to question the patient concerning the nature of the attacks. They may complain of periods of palpitation, of "fluttering of the heart," of "pounding or thumping of the heart," that the heart "runs

away," or "the heart beats very fast," and so forth. If the story is that the heart gradually accelerated from the normal rate to the rapid rate, it is quite certain that the condition is not a true paroxysmal tachycardia; the same is true if the heart gradually quieted down. People frequently have periods of palpitation or vigorous heart action from conscious or unconscious emotions through the extra cardiac nervous mechanism wherein the heart rate gradually accelerates. Here the rhythm is normal but rapid, and it should be called normal tachycardia and be distinguished from the paroxysmal types.

It is the purpose of this paper to discuss how normal tachycardia can be distinguished from the paroxysmal rapid heart action and to differentiate the various types of the latter where that is possible, with such simple means as we all have at the bedside, and to touch upon the indications for the proper treatment of the various paroxysms.

Paroxysms of tachycardia may have their origin in three different parts of the heart, that is, in the auricles, in the ventricles and in the junctional tissue between the two (auriculo-ventricular node). The latter is so extremely rare and impossible to be recognized without special graphic means that it will not be considered in this discussion. Paroxysms arising in the auricles are subdivided into three types,

paroxysmal auricular tachycardia (the most common condition met clinically), *paroxysmal flutter*, and *paroxysmal fibrillation*. It is important to try to distinguish one type from the other for their behavior is different and frequently the exact diagnosis can be made at the bedside without any elaborate aid. Fortunately most paroxysms end without producing any permanent damage to the patient, but occasionally it may be a question of life and death or a matter of the loss of a limb and then the recognition of the exact condition and the institution of the proper treatment becomes urgent.

Let us assume that we have a patient whose heart is beating rapidly and regularly at the rate of 170. It is first necessary to know whether it is a normal or an abnormal tachycardia. The history of the onset of the attack or similar previous attacks as mentioned above is important. The condition may be a normal acceleration due to some infection, or nervous influence or hyperthyroidism. One should count the apex rate carefully for 60 seconds, and repeat this in five or ten minutes. The counts will either be exactly the same or not vary more than two beats if we are dealing with an abnormal tachycardia. It must be emphasized that in counting there need be no greater error than two beats; one, as the second hand of the watch crosses the starting point and the other, at the last second of the minute. If the two counts taken as above differ by three or five or more beats, it is not apt to be an abnormal tachycardia. This very simple procedure has been of great help in diagnosis. It is surprising how constant is the rate of a regular abnormal tachycardia from minute to minute, sometimes even from day to day, and from one attack to another over the course of many months. If the condition of the patient permits it, one can try to influence the heart rate by changing from a reclining to an upright position or having the patient hold a deep inspiration. None of these procedures will alter the minute count more than a few beats if it is an abnormal regular tachycardia, and will change it more markedly if it is a normal acceleration.

By the above means one decides whether the heart mechanism is normal or abnormal. If the rhythm is regular and rapid, and it appears to be abnormal, the condition may be paroxysmal auricular tachycardia or paroxysmal auric-

ular flutter. (Ventricular tachycardia will be considered below). In auricular flutter the auricular rate will be twice the rate one counts at the apex; that is, if the apex count is 170, the auricles may be contracting at a rate of 170, in which case it is auricular tachycardia; or they may be contracting at twice the rate, or 340, in which case it is auricular flutter. In fact there is practically always some degree of block associated with auricular flutter although the ventricular rate may not be regular. However, when cases of flutter are first seen, especially if they are of the paroxysmal type, they are very apt to have a 2:1 block. This results in a perfectly regular and rapid apex rate. It is generally possible to distinguish the regular rate of flutter from that of tachycardia. Although both remain perfectly fixed with change in position of the patient from a recumbent to an upright position, and the count will continue constant from minute to minute, vagal stimulation affects the two conditions quite differently. In the case of auricular tachycardia, pressure on the vagus nerve* or ocular pressure will have no influence at all or it will end the attack completely. There is practically never any slowing of the rate unless the attack ends. Very rarely the rapid rate is resumed after several seconds and leaves one in doubt whether the attack was stopped at all, or whether there was only a temporary slowing. There is sufficient graphic proof that the latter occurs with such rarity that it can be ignored in ordinary work. On the other hand, it is generally possible to slow temporarily the ventricular rate in cases of flutter by vagal pressure, but there is no known instance of ever ending an attack by this procedure. During the vagal stimulation if one auscults simultaneously one hears the ventricular rate become slow, or at any rate the rapid rhythm is disturbed or may become irregular. One may therefore conclude that if the attack is completely arrested it is one of paroxysmal auricular tachycardia and if it is temporarily disturbed it is auricular flutter; but if it is not influenced at all, as may happen in either condition, one is still in doubt.

A further simple test is of great help in distinguishing these conditions, and that is the

* Pressure is applied over the left or right carotid artery rather vigorously against the cervical vertebrae, entirely obliterating the flow of blood through the corresponding carotid artery and is generally maintained for 5 to 10 seconds.

actual rate of the heart. If the apex is counted at any regular rate from 185 to 205, the condition cannot be auricular flutter but must be one of tachycardia, for if it were flutter, the auricles would have to be beating at twice that rate, or 370 to 410. This is a much more rapid auricular rate than one finds in flutter, the general lower and upper limits of which are 250 and 350. (I have observed one case of flutter with an auricular rate as low as 208 and another as high as 358). Given a case with a regular apex rate of 190, therefore, it can be no other condition than paroxysmal tachycardia.

Finally it is necessary to recognize the attacks of paroxysmal auricular fibrillation. This condition is much more common than has been generally believed. Auricular fibrillation should no longer be called "perpetual arrhythmia," for in recent years the transient form has been observed under numerous varied circumstances; during acute infections like pneumonia and rheumatic fever, during digitalis therapy, in cases of hyperthyroidism, during convalescence from a surgical operation, in chronic cardiac patients especially in those who eventually develop the permanent form of the arrhythmia, and even in otherwise healthy people. The diagnosis is made in the same way as the permanent type of the arrhythmia. The rate is apt to be moderately rapid, about 160, and grossly irregular. At times the beats may come in such rapid sequence that they may appear to be regular; however, on more prolonged examination irregularities will appear. There will be a pulse deficit, that is, a lower radial than apex count because some of the beats will fail to reach the wrist. Too much reliance must not be put on the presence of a pulse deficit. It is thought by some to be present in no other conditions than auricular fibrillation. This is far from the truth as in all types of paroxysmal rapid heart action it may be impossible to count as many beats in the radial artery as over the precordium. In these latter conditions the pulse deficit is brought about or accentuated by the phasic variation of the strength of the pulse wave resulting from respiratory movements, and partly by an alternation of the pulse which frequently accompanies the attack. Repeated apex counts of the heart rate at short intervals during paroxysms of auricular fibrillation will show distinct differences unlike the other types of paroxysmal

rapid heart action. In one case, a minute count of the apex was 163 and five minutes later it was 157. Vagal stimulation may temporarily slow the ventricular rate but will not stop an attack of paroxysmal auricular fibrillation. It may be said that in general one will not find it difficult to recognize paroxysmal auricular fibrillation using the same criteria that enable us to diagnose the permanent type of this arrhythmia.

So far we have not considered paroxysmal tachycardia of ventricular origin. This condition is very much more rare than the auricular type and cannot be recognized except by electrocardiograms. These attacks are very apt to be short, rarely lasting more than several hours, (but are generally associated with serious myocardial disease. The prognosis is rather grave. In the few that I have seen the rhythm has been rapid and apparently regular, but on very careful attention either while listening to the heart beat or on measuring the heart cycles in the graphic tracings one can detect slight variations which do not exist in paroxysmal auricular tachycardia. Furthermore, there is no known instance of arresting an attack of ventricular tachycardia by vagal stimulation. These few points might lead one to suspect ventricular tachycardia at times and might enable one to rule it out at other times, but final proof of its occurrence cannot be made without graphic means.

In recapitulation, one can see that by using such simple means as an accurate count of the apex rate and the pulse rate repeated under different circumstances and observing the effect on the heart of pressure on the vagus nerve or over the eye ball, and of holding a deep inspiration, it will often be possible to determine whether a rapidly beating heart has a normally accelerated mechanism or whether it is one of the various abnormal paroxysmal conditions: furthermore, it will be possible in many cases to distinguish the various types of abnormal tachycardias (See table). It is important to try to distinguish the various forms of paroxysmal rapid heart action because the treatment will depend upon the correct diagnosis. Furthermore, occasionally it becomes extremely urgent to stop an attack if possible, particularly as happened in one of our cases while a surgical operation was being performed and as in another who lost his arm from dry gangrene dur-

ing a previous attack. Vagal stimulation by direct pressure over the carotid artery or by ocular pressure will end one type of paroxysmal rapid heart action and not the others, while proper digitalis therapy will control the course of paroxysmal auricular flutter and auricular fibrillation.

In treating the various types of paroxysmal rapid heart action it must be borne in mind that many of them come and go, do no harm, disturb the patients only slightly, and keep recurring over a period of many years. This is particularly true of paroxysmal auricular tachycardia which condition frequently exists in otherwise normal people. However, at times the attack precipitates the patient into a very serious state and threatens the life of the patient. One such case developed an attack while under anesthesia and it seemed to the surgeons that she might die on the operating table. Another patient lost his left arm from dry gangrene during an attack, was aphasic for several months during a second, and had a complete hemiplegia during a third before he was observed by me. In both of these two cases vagal stimulation was successful in ending the attacks. The first one was arrested by direct pressure over the carotid artery, and the second by ocular pressure. In general it may be said that repeated attempts should be made to stop the attacks of paroxysmal auricular tachycardia by one or another of the means of vagal stimulation, that is, holding a deep inspiration, pressure over the carotid arteries or ocular pressure. In more than half of such cases I have been able to restore the normal heart rhythm. Heart drugs will prove of very little assistance in such patients. They should remain in a recumbent position during the attack unless it is very mild and does not disturb them at all.

Paroxysms of auricular flutter and auricular fibrillation are more apt to occur in people who have some disease of the heart. If the clinical condition of the patient is embarrassed by these attacks digitalis should be given, because although they may only last several hours or a few days if untreated, they are apt to recur, in which case digitalis will prepare the heart for subsequent attacks and will prevent a

marked acceleration of the ventricle which would otherwise result. Furthermore, some cases will show signs of marked cardiac failure during such attacks and they are to be treated like any decompensated cardiac patient. Great improvement is to be expected, however, because digitalis has a specific action in diminishing the ventricular rate in these two forms of abnormal rhythm. The treatment of attacks of ventricular tachycardia is not so gratifying. Prolonged rest in bed is essential and digitalis in moderate doses over a long time seems to be of some value. The ultimate prognosis of this type, however, is grave.

SUMMARY.

It is possible to distinguish the various types of paroxysmal rapid heart action (paroxysmal auricular tachycardia, paroxysmal auricular fibrillation and paroxysmal auricular flutter) one from each other and from normal acceleration by simple means that all physicians have with them at the bedside in the majority of instances. The points involved in the differential diagnosis are discussed and the importance of vagal stimulation as a life saving measure in rare instances is emphasized. The proper treatment of the various types of paroxysms will depend on the correct differentiation of the abnormal mechanism.

TYPE OF PAROXYSMAL ATTACK	RHYTHM	APEX RATE	EFFECT OF VAGAL PRESSURE		TREATMENT	
			Attack ends	or no effect	Vagal stimulation	Digitalis
Auricular tachycardia	Regular	140-250 ±				Digitalis
Auricular flutter	Regular or regularly irregular	140-175 ±	Temporary slowing, attack never ends			Digitalis
Auricular fibrillation	Absolutely irregular	150-200 ±	Temporary slowing, attack never ends			Digitalis
Ventricular tachycardia	Essentially regular	175±	None			General cardiac procedures