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Angina pectoris with especial reference to the treatment

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ANGINA PECTORIS

With Especial Reference to the Treatment

Presented to the Faculty of the
University of Nebraska, College of Medicine
As Partial Fulfilment Of Requirements
For The Degree of Doctor of Medicine

by

George E. Loupee

Omaha

1934

PREFACE

This paper is not long. However, it deals with a subject which is one of the major medical problems of the time, and one which is deserving of much more thought and study than is commonly given it. Many of the great names of medicine are found to be linked with the development of our present knowledge of angina pectoris. Heberden, who is credited with presenting the first complete description of the condition, Charcot, and others to the time of Osler and nearly all the leaders in modern internal medicine and pathology have, at one time or another, been drawn to the study of this most fascinating problem.

For the reason of its interest and its station as such a distinct problem in the study of medicine in our time it was chosen as a logical subject for this paper. To select some particular phase of it for more thorough investigation became another question which was settled only after quite extensive reading, which brought to light the importance of the treatment and the management of the cases. In the past, it has been too frequently assumed that nothing could be done for a person who suffered with angina pectoris except to offer him relief from the attacks as they came. This is not true. Many instances of this dread affliction may be largely mitigated, and what may be regarded as a cure, to all intents and purposes, has been effected in some favorable cases.

Surgery as an aid in the management in some carefully

selected cases is a comparatively recent development and at present its value is such a debatable question that it was thought best to confine the subject matter of the treatment to the medical side, only.

Information on which to build this paper was gathered from innumerable sources but an effort was made to employ as few as possible and to choose only those which were apparently most valuable. The works of modern writers were used as far as possible, but the publications of such men as Osler and MacKenzie could not be overlooked, for no other reason than of their influence on more recent authorities. Their conclusions and decisions are not to be considered as old in any event, but in regard to the specific phases of treatment the more modern sources appeared to be most applicable.

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ANGINA PECTORIS

With Especial Reference to the Treatment

"There is a disorder of the breast marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it, and not extremely rare, which deserves to be mentioned here at length. The seat of it and sense of strangling and anxiety with which it is attended, may make it to not improperly be called Angina Pectoris."

- Heberden, 1768 ^{3 and 1}

* * *

HISTORICAL SKETCH

Angina pectoris was undoubtedly mentioned in the writings of men before the time of Heberden, as judged by the reference to conditions in the old medical literature which were apparently instances of this grave disease.³ But, up to the time when he presented his original work, no one had been able to classify and identify the various aspects of the syndrome with such clarity and to group these various aspects under a single head.

His original paper was delivered before the Royal College of Physicians in London on July 21, 1768.² It is one of the outstanding landmarks of medical literature and medical history. No other single work excels it in detail of keen observation, in clarity of conclusions, and in the practical accuracy of application. Today it stands, requiring but little modification or elaboration as far as it is intended to go. At the time when it was published, the observation of cases was at its highest point of development. At that

time, however, very little attention was given to the subject of pathological anatomy except by the Hunters and this article does not vary from others of its period in that respect. It may be noted, also, that very little has been added in that regard since that time. Heberden's article probably stands today as the most highly satisfactory description of the clinical picture which has yet been written. It was intended as a purely clinical recognition of the condition and from it the most clear cut impression can be obtained. There is no modern article which stands out more noticeably, except in the light of our present knowledge regarding etiology, pathology and treatment, than this remarkable paper. Almost nothing relative to the symptomatology can be mentioned which Heberden had not recognized and stressed.

Attempts have been made by some French² writers to accord Rougnon, who was professor of medicine in the University of Besançon, with the first description of the condition. Indeed, in a letter to a friend dated a few months prior to Heberden's momentuous work, he had given the circumstances of the course of disease and the death of a patient whom he had seen. And this instance probably was one of what was later called angina pectoris, but he was uncertain of the condition and no attempt was made to classify or label the clinical picture.³ He admits in his communication that the condition was very puzzling and the autopsy was entirely unsatisfactory to the friends of the patient.

Osler² gives credit to Morgagni for the first actual

description of a single case. In the section on aneurysm of the aorta, he gives a splendid review of a case, referring to the paroxysms, the pain, the difficulty in breathing, the numbness of the left arm and the affect of exertion.

There are others, also, to whom credit must be given for the development of our present knowledge concerning this clinical syndrome.² It remained for Edward Jenner to point out, in 1799, the frequent association of disease of the coronary arteries with the rest of the picture. In our present concept of the condition, his work on the pathology of angina pectoris remains largely unshaken and entirely modern in its applications, though naturally our knowledge of the pathology has greatly increased and broadened since the report of this great master of research. His original deductions on this subject have stood along with his conclusions of the elemental principles of immunity, and his monumental work on vaccination.

In 1794, John Hunter described the condition as he was afflicted with it, from the standpoint of the keen observer.³ The attacks from which he suffered were brought on particularly by exercise and by worry and anger. He was accustomed to say "that his life was in the hands of any rascal who chose to annoy and tease him". He suffered for twenty years from this affliction and died at a meeting of a hospital board. Following this, Parry, a contemporary of Hunter, in 1799, recognized coronary sclerosis clinically. Parry was associated with Hunter's physician, Jenner.⁵

Since these early reports of the observations of Vari-

ous workers, many articles have been written on the subject of angina pectoris. Many of these were relative to the causes of the symptoms. Huchard collected sixty-four different opinions from many well known physicians concerning the etiology of the condition.¹ The early writers associated it with disease of the coronary arteries. Albutt took a stand of distinct contradiction to this conception and concluded that the disease was due entirely to pathology in the aorta. Still another concept which was later brought out was that the cause was confined to the myocardium. Of these, the theory founded on the basis of coronary disease has best withstood the test of time although there are many yet who believe that are other sources of origin for the clinical picture.¹⁰

Another epoch making contribution to our knowledge of the condition was furnished by Lauder Brunton in his discovery of the value of the nitrites in the treatment of the acute attack of the anginal pain.⁹

The subject persists as one of the most interesting and most fascinating of medical problems. And many of the great names of medicine have been in one way or another linked with this study. But the three names which are connected with what are probably the greatest contributions to the subject are Heberden, Jenner, and Lauder Brunton.

INTRODUCTION

Angina pectoris must be regarded as one of the most important and interesting conditions met in the practice of medicine today. It has become more important during the present generation and now it presents a great challenge to all physicians. Our civilization suffered many a rude shock in the past few years and with these it might be added that it is responsible for much of the increase in angina pectoris in our times, as an apparently justifiable accusation. Better diagnosis cannot be given as a reason for this increase because the condition has been well known in the past. Today it might well be said that angina pectoris is a cause of a great deal of the disability and no small number of the deaths in our large communities. The medical profession is riddled with it. The Journal of the American Medical Association for 1931 shows statistics that more than one-third of the deaths of physicians were due to heart disease in the year, and more than one-hundred of these were ascribed as due to angina pectoris, when the type of heart disease was definitely specified in less than one-half the cases.

It is evident that something should be done in an effort toward prevention of this affliction, and to that gravely important phase of the subject more space will be given later in this paper. The diagnosis and treatment of the condition are my present concern and the prophylactic measures which may be accomplished are certainly important factors in any consideration of treatment.

GENERAL DESCRIPTION

Not many years ago, there was considerable criticism of the use of the term angina pectoris, on the grounds that angina is not a disease but a symptom occurring in several diseases; that there is no uniform pathology present; that angina may occur without coronary sclerosis; and that coronary sclerosis often occurs without angina. While there is some foundation for this criticism, clinical evidence, as well as pathological and electrocardiographic studies, have supported us in regarding angina, if not a distinct disease, as much a clinical entity as is asthma.⁶

"It is a disorder of middle life and old age, characterized by a peculiar pain, generally substernal, induced in its victims by anything which increases the work of the heart, such as exercise, emotional strain or hyperthyroidism, showing a tendency to increase in severity and frequency as time goes on, and to reach a climax in coronary occlusion or sudden death."⁶ The mechanism that produces this pain is still somewhat obscure, but clinical evidence points to its being due to a relative ischemia of the heart muscle as a result of a lack of elasticity of the blood supply, so that a flow that is adequate at rest becomes inadequate when the heart load is increased.⁹ This insufficiency is generally caused by coronary sclerosis but may be due to syphilitic lesions of the aorta or coronaries, to occluding vegetations, to obliterative endarter-

itis, or still less frequently, to severe aortic regurgitation of rheumatic origin.* The last three causes account for most of the cases seen in young people. Clinically, classical angina pectoris is due to coronary sclerosis in the vast majority of cases, and when we think of this disease we, as a rule, think of this form.

The predisposing causes of angina are still somewhat debatable, but heredity undoubtedly plays a part, and certain families, such as the Arnold family of England, are prone to develop it.²² It is more common in the male than the female, in the ratio of three to one; and is much more common in men who do intensive mental work and who are under nervous strain than among manual laborers. It is largely a professional and business man's disease and is particularly frequent in the over ambitious who have vasomotor instability and a very sensitive nervous system.

The influence of tobacco and other poisons in the production of this disorder, and of arteriosclerosis in general is still undetermined. The more and more common entrance of women into business and the professions, as well as their increasing use of tobacco, is making this more difficult to determine. The increase of the incidence of this disease is one of the major medical problems of today; the number of men who are taken at the height of their usefulness to the world by this dread malady should awaken our intense consideration of possible methods of prevention.

The chief symptom of angina pectoris is pain, some-

times slight and often severe, generally substernal, and commonly described as squeezing, pressing, choking, or, more rarely, burning. It frequently radiates down the inner side of the left arm, causing a sensation as if the arm were pressed or bursting, or as if the clothing were too tight on the wrist. The pain may go down the right arm instead of the left, or it may be felt in both arms. It is sometimes felt in the throat as a clutching sensation, or in the jaws, under the left shoulder blade, or even as an earache. In the earlier stages it is brought on only by strenuous exercise, such as hurrying up hill, and is more apt to occur if its victim is excited or angry at the time. It comes on more easily after eating, especially about twenty minutes after, and is caused by less exercise on a cold than on a warm day. As time goes on, it requires less and less effort to bring on the pain and the stage may be reached when even mental effort or sustained interest precipitates an attack.² It is rare to have pain at night except in the late stages of the disorder and in the more severe cases.¹³

As a rule the pain is so severe that the patient in an attack will present a most striking picture. Suffering with the paroxysm, he becomes inarticulate and he stands fixed in his agony; he rarely moans and he seldom seeks to express his distress in words or gestures. Whatever may be his position at the onset of the attack, he will commonly maintain it. Even the effort of lying down is rarely attempted during a severe seizure.³

Sometimes the pain is accompanied by a choking sensation or one of apprehension. Frequently there is a sense of anguish and this becomes a distinct feature of the whole picture. There are instances in which the degree of pain is not great but in which these others are present as symptoms. This anxiety has been described as a fear of death.¹ Accurate description is difficult, but is spoken of as a sense of impending disaster, of apprehension, of breathlessness, of melancholy and such emotional agony that the suffering is approximately as great as from the pain itself. No matter how accustomed the patient may be to these attacks, no matter how understanding he may be of them or how indifferent he may be toward death, he is inevitably terrorized by them.³

These two manifestations, pain and anxiety, are the two outstanding and altogether characteristic symptoms of angina pectoris.

Frequently, the attacks may be said to be characterized by a lack of definite cardiac disturbances. Arrhythmia may or may not be present during the course of the paroxysm, unless the heart be arrhythmic also when no attack is present. The pulse may be full and regular and the heart sounds may be apparently normal, but usually the pulse is small and the sounds distant and of poor quality. Even electrocardiographic records of normal constituents may be taken, not only between attacks, but actually in the midst of major paroxysms¹³ Other evidences of cardiac pathology such as murmurs and striking changes

in blood pressure, when not present during the quiescent periods, are rarely developed during the course of an attack." In the height of the paroxysm the blood pressure may be slightly depressed, at least, relatively. With such profound evidences of sympathetic disturbance and involvement, it might be expected that marked variations in blood pressure from the normal would be found:

Probably the most frequent immediate excitor of the attack in susceptible cases of angina pectoris is physical exercise. The patient soon learns that exertion beyond the usual may bring on an attack, by walking uphill or against the wind, by flights of stairs or by anything which demands physical exercise. He must always be warned never to undertake any physical effort beyond that necessary for the requirements of his obligatory responsibilities.

Otherwise, the most frequent cause of attacks are emotional stresses or excesses. Anger, grief, even pleasurable experiences are among the commonly given exciters of distress. Prolonged mental or emotional efforts are to be controlled wherever possible by the person who is subject to seizures of anginal pain.

DIAGNOSIS

The diagnosis of angina pectoris depends almost entirely on the history given by the patient unless one has an opportunity to observe a typical attack and note its relief by rest or nitrites. The sensation of the patient is the entire clue; all else is merely suggestive of the diagnosis. Since this is true the history taking and the entire study of the case should be handled personally by the physician. Failure to observe and study carefully has been the cause of most of the errors in diagnosis of this condition. The use of epinephrine as a diagnostic test is probably unwise and unsound, although it has been suggested as a means of producing a typical attack of pain by some writers.¹⁴

Complications may or may not be present with angina pectoris. For that reason physical findings as an aid in making and arriving at a diagnosis cannot be considered reliable. The commonest complicating features when present are hypertension, cardiac enlargement, coronary thrombosis, and certain disorders of the nervous system.¹⁵ Nearly twenty percent. of the cases show no circulatory disturbance, either by physical examination, x-ray or by electrocardiography. A few show no abnormalities except in minor changes in the T-wave in the electrocardiogram.¹⁵ Some few instances of electrocardiographic changes of transient nature have been recorded during actual attacks but this finding is not a constant one and the opportunity for such

study does not present itself frequently.

The differential diagnosis of angina pectoris ordinarily is not a difficult matter. The symptom of pain, as it is usually described, should not be confused with the dull prolonged heartache or the sharp, stabbing, knife-like pains of neuro-circulatory disease, or of big pounding hearts in nervous persons;¹² even though such pain may be referred occasionally to the shoulder or down the left arm as a numbness or burning sensation. It is this type of pain which is spoken of by some writers as pseudo- or false angina. These are not the pains of true angina pectoris as Heberden first described it. In fact, true angina is often described as not being pain at all, while the stabbing sensations are always described as pain or dolor.⁵ There are essentially four clues which may be used in the differentiation of these pains, which are largely of nervous origin, from angina pectoris of the true type. They are: (1) their site (usually the left breast), (2) the character of the pain, (3) sensitiveness of the breast to touch or pressure, and (4) other accompanying symptoms of neuro-circulatory asthenea such as sighing, fainting, and exhaustion.¹² It is helpful to remember, however, that angina pectoris may exist with some other such condition as described in the same patient.

In the past a common confusion has been brought into the differential diagnosis of angina pectoris by coronary thrombosis.¹⁵ The clear separation of the two clinically has been made only in the last decade, and it is now compara-

tively easy except in a few borderline cases which deserve further study. The pain of coronary thrombosis is often more severe, though this is by no means always true, lasts hours or days instead of minutes and is otherwise exactly like that of angina pectoris.

In seeing a patient in an attack it is most important to determine whether or not coronary occlusion has occurred, because it is absolutely necessary if thrombosis has occurred that the patient be given a long rest period in bed.⁹ If the possibilities are considered the diagnosis should be relatively easy. In simple angina, the pain usually comes on with exertion or excitement and usually passes off rapidly with rest, at least in the early stages of the disease, whereas the pain of thrombosis may come on while the patient is at rest and last for hours. It is not relieved by nitrites and even morphine in large doses may fail to give complete relief.

Aortic pain, as it is so often called, may prove to be a point of difficulty in the differential diagnosis.¹⁰ It occurs, however, only when the aorta is seriously involved in a pathologic process and then it may be due as much to local pressure as to the lesions in the aorta itself. True aortic pain is quite different from the pain of angina pectoris in clear cut cases. It may be described as a prolonged heavy ache, sometimes throbbing in character, and often lasting hours or days. It is unrelieved by nitrites and may require heavy doses of morphine repeatedly. This type of pain is commonly located in the region of the upper

sternum and the base of the neck, often to the right of the midline and frequently referred to the right shoulder or arm. This has been thought to be due to the common location of extensive involvement of the aorta which is usually in the ascending portion. Dissecting aneurysm of the aorta may be a point of confusion in some cases but sudden death, as a result of rupture of the aneurysm into the pericardium or pleura, usually occurs following prolonged pain.¹⁵

Pericardial or pleural pains are not difficult to differentiate from true anginal pains. Usually their prolonged character, the common aggravation by respiration, the association with an acute infection, and the presence in most cases of a friction rub may be used to arrive at the final conclusion.¹⁷ These physical signs may all be useful but it should be remembered that several observations have been recorded of the existence of true angina pectoris in early stages of pericarditis. Such combined states are rare, indeed, but they arise frequently enough that the possibilities of their being present always have to be respected.¹²

There are several other causes of pain in the region of the heart and chest which are to be taken into account as possibilities in making the diagnosis. The pain accompanying some pathological process of the skeletal system of the thorax sometimes presents a problem. However, it is usually prolonged and may be considered as having an aching character, and it is likely to be aggravated by movements of the chest or the arms.¹⁷ Also, its location

is not substernal, as a rule. Chest pain may be, and often is, subdiaphragmatic in origin. Peptic ulcer, gallbladder disease, and distention of the gastrointestinal tract may cause pain of a type which may be questionable. However, the local tenderness and the point of origin of the ulcer pain, together with its relief by food, will ordinarily furnish sufficient evidence to rule it out. Gallbladder pain when referred to the chest goes to the right shoulder or back in most of the cases. It may be colicky in nature and may be associated with vomiting, usually lasting more than a few minutes. When it may resemble a heart pain, it is coronary occlusion and not angina pectoris which must be differentiated. Gaseous distention of the intestinal tract has for a long time been a matter of considerable confusion and it is altogether possible that it may be a cause of the precipitation of an anginal attack, and the relief from the attack may follow the belching of gas, but the pain thus caused is not in itself characteristic in any way of angina pectoris."

Perhaps the most important object or objects in the differential diagnosis is the determination of whether or not this is an attack of true angina pectoris or is a symptom complex of nervous origin producing a false angina or some allied condition. Ordinarily the decision is not difficult although thorough study and observation of the case is required. The confusing cases are those in which there may be true angina pectoris with a developing neurosis.'

TREATMENT

Recalling the work of Lauder Brunton who first used the nitrites for the relief of pain in attacks of angina pectoris and to whom goes the credit for one of the great steps forward in the development of modern knowledge of the condition, the treatment, in general, has become of great concern to all physicians and it has been a subject of particular interest at one time or another with nearly all students and practitioners of internal medicine. A great amount of uncertainty still exists in the general management of these cases and in the handling of the patient between attacks. Just how much freedom to allow him is a point at which various writers take different stands. In any case, however, the patient soon learns his limitations and finds out whether or not he can take physical exercise to any extent or withstand excessive mental or emotional strain.

Any physician knows that the treatment of angina pectoris has been a continual source of experiment since the condition was first recognized by Heberden. As a result, the number of supposed remedies is large.¹ Some of these remedies are recommended not only for relief of the symptoms but also as actually having the power to cure the disease. Nearly every writer, when he presents his point of view, meets with opposition and this usually may be traced to the fact that his measures have gone untried by others. Most of these writer have given their own methods

thorough trial and have found them beneficial in the management of their cases before they have handed them on to other members of the profession. However, one must recognize the fact that the symptoms are the result of certain organic changes, and it is manifestly impossible to remove those organic changes by any method of treatment.

The general management and treatment of angina pectoris presents several quite separate phases, and, therefore, it will be taken up under the following subdivisions: (1) The prophylactic treatment, dealing with those persons who, by their inheritance and by their make-up, are subject to angina pectoris; (2) The specific treatment, relative to the treatment of complicating conditions and etiological factors which may be present in a patient who has anginal attacks; (3) The treatment between attacks, directed toward lessening the frequency and severity of the attacks; and (4) The treatment of the attacks.

Prophylactic Treatment

Angina pectoris is definitely a familial disease and it becomes important that it be recognized as such. It is possible that its familial tendency may be delayed or even eradicated by careful supervision of the early life of the members of a family in which this trait is present. In those groups in which obesity is the rule, careful regulation of the diet becomes imperative. Some control of the use of such foods as starches, fats and sweets,

which tend toward an abnormal deposit of fat, should be undertaken in early life. By such means, though they are difficult, much can be done to hold the tendency to obesity in check.

In those in whom there may be tendencies toward endocrine imbalance, early management will help to lessen the probability that angina pectoris may develop as a result. Thyroid extract may be used as needed or iodine can be given for its beneficial effects. Iodine in the form of iodized salt or in occasional courses of Lugol's solution may be of some value.

Physical exercise, sufficient in amount but not in excess, is another important consideration. Limited activity should be permitted but the children of such families should not be allowed to enter into vigorous competitive sports, but such enterprises as golf, baseball, horseback riding, and swimming should be encouraged. Vacations and diverting pleasures will materially decrease the tendencies of the ambitious and aggressive young business or professional man toward angina.¹⁹

Such individuals are also to be closely guarded against infections. Any likely focus should be removed or otherwise properly treated at the earliest possible time. Adenoid tissue should obviously receive prompt attention when it begins to show pathologic change and the nasal condition should be kept in as near a normal state as possible. Following any of the infectious conditions and especially after measles, scarlet fever and the like, a

period of convalescence should be vigorously enforced with rest as the important factor. Immunization against diphtheria and typhoid fever are recommended. Temperance in all things should be stressed from an early period in the life of the person who comes from a family in which angina pectoris is a possibility.³ The child should receive well intended instruction on the subject of emotional control.

The selection of a vocation or a life's occupation might properly and profitably be considered carefully. Many young men are apt to prepare themselves for some line of work for which they are inadequately equipped physically. In matters of this sort the family doctor should certainly take a position of adviser and counselor more than he has in the past.

Specific Treatment

In any consideration of the conditions which accompany angina pectoris or which may be traced as causes of the symptom complex, syphilis probably offers the most formidable problem. Many early cases of angina pectoris caused by syphilis may be absolutely and completely cured, to all intents and purposes, by prompt and adequate treatment. Brooks³ feels that arsphenamine and similar arsenicals are dangerous agents to employ in active cardiovascular lues until the condition has been brought under control by the iodides, mercury, or bismuth. This point has been emphasized by various authorities writing on the

subject.

When a patient has once developed angina pectoris, only the most cautious study should be made concerning the past history, the habits, and the ancestry of the patient by his physician.² By this means the condition of the sufferer and the presence of some accountable cause for the difficulty may be located. Then treatment directed toward the best end can be instituted. In a good number of cases, very little more than temporary relief or relief from symptoms can be accomplished, but in the few cases in which some exciting cause can be isolated and handled accordingly early and appropriate management will repay every effort.

In some cases anginal attacks have developed following in the course of acute rheumatic fever. Salicylates have been found to be beneficial in occasional instances of this type, but the doses required are usually large if much relief is to be afforded. Frequently such amounts are not tolerated by mouth and the only means of administration left available is by way of the rectum. This method ordinarily serves well and dosages varying from 120 to 300 grains per twenty-four hours may be given. It is questionable whether or not this line of treatment will prove of value in cases of rheumatic heart, which have developed angina, as it has in the more acute forms of probable rheumatic origin, but these are instances in which the drug should be given a thorough trial.³

There have been a number of cases of angina pectoris

which have developed in persons who were found to have gout. In these cases immediate or even early relief from the attacks is not common, but if strict anti-gout measures are carried out, most individuals usually respond well. Good results have been reported with the use of such drugs as colchicine and atophan but startling benefit is not the rule, especially in long standing cases where permanent lesions have presumably appeared.³

Under proper care and handling persons who are handicapped with angina pectoris, which can be traced to some definite condition such as those mentioned, may live out happy and useful lives. But it must be remembered that treatment can be expected to bring good results only where it has been started early, before any permanent damage has been done.

Treatment Between Attacks

The patient who suffers from frequent paroxysms of angina pectoris is usually a man of the business, political, or professional world, but he is not uncommonly a physical laborer. In this country angina is particularly prevalent among the classes on whom rest the worry and the care of progress, and it is this type of person who is aggressive and high-strung. If the victim of this type can be brought to give up all or a large part of his professional or business affairs, great benefit can be expected. Whenever possible, he is to be convinced that he should eat slowly of light foods in smaller amounts than

those to which he is accustomed and live the leisurely life of one of carefree habit and independent means. This, of course, becomes, difficult in most instances, but the prolongation of the life of the patient frequently depends on such drastic measures.²³

Rest is the most important general measure, by all odds, which is to be employed in the quiescent periods. Its most logical justification is perhaps on a physical basis.²⁴ Many fatalities can probably be traced directly to over exertion. It is particularly important that the patient should be instructed to refrain from such activities as most commonly precipitate his distress. In some cases, exxentially those of an acute nature, strict confinement to be is a logical proceedure, and it should be continued until the patient can sit up without the development of a seizure. In any event the return to the stresses of life must be accomplished slowly and dilegently. It must be kept in mind during such a course of management, however, that the patient should report frequently to his physician of his improvement and take particular note of any return of symptoms, and, finally, he may return to his responsibilities.

Diet for the victim of angina pectoris is a major problem. A study of the food requirement of the the patient may well be made. Those foods which the patient has found to be most easily tolerated are to be recommended. Preferably, however, light foods taken in leatively small amounts are to be given, remembering that in some cases

the attacks may be precipitated by distention of the stomach. The heaviest meal of the three should be taken at noon, and the patient should not be allowed to lie down following the meal in most cases. Some patients may be subject to seizures when they lie down after eating. Large feedings at night or near bedtime are to be discouraged. Tea and coffee are usually well tolerated by these patients and limitations in their use may be required only in those who experience discomfort which may be directly or indirectly connected with their consumption.⁸

Tobacco should be forbidden in certain cases of angina pectoris where the attacks may be precipitated by over indulgence, but as a general rule it may not be harmful. This is an argumentative point, but White and Sharber²⁵ in recent studies have demonstrated that it is of relatively no importance in the majority of instances.

Similarly the use of alcohol has been a subject of discussion. Heberden recognized the value of alcoholic beverages and they undoubtedly are beneficial in a large number of cases. In properly selected form and in carefully controlled amounts, alcohol may be given for the relief of the paroxysm, as well as a matter of routine. In sufficient amounts it is beyond doubt of distinct value in severe attacks of the condition. In some cases it may prove to be valuable for its sedative action, and in others for its ready assimilation and its quick absorption.³ It has a vasodilator action which may have some favorable effects.

In relatively rare cases there may be evidences of definite cardiac disease. The likelihood of sudden death becomes a more formidable problem in these instances. Treatment directed toward compensation along with the control of the anginal attacks should be started as soon as possible. The vasodilators can be used with the common benefits to be expected except in those cases in which a marked hypotension exists. Sedatives given to promote rest and comfort should be given as needed. And in those subjects who show tendencies toward or actual evidences of decompensation, the digitalis group of drugs is to be used as in other cases of decompensation.²²

Iodine in the form of its sodium or potassium salts is frequently employed in the treatment between attacks. The theory underlying its use is maintained for its favorable effects on arteriosclerotic changes which are found to be present in a high percentage of the cases. Their continued use, in spite of no definite proof of beneficial results, shows that they must have some value.

Other drugs which have been found to be useful between the attacks are certain members of the xanthine group of diuretics. The salts of caffeine and theobromine were not generally used as diuretics until after 1885. And it was not until ten years later that their therapeutic use was applied to symptoms of cardiac origin. In 1895, Askanazy applied them for the relief of cardiac asthma and angina pectoris, and he noted that in some cases the effects were striking. Gilbert and Kerr²⁶ reported their results based

on a recent study of the use of this series of drugs in selected cases and were enthusiastic in their statements. These drugs have been slow in becoming popular with the profession but this may be due to the fact that in most cases unpleasant symptoms generally develop if they have been used over a period of time in effective doses. Of this series, theobromine, theobromine sodium acetate, theobromine sodio-salicylate, theobromine calcium salicylate, theophylline and others were given quite and exhaustive test and favorable results were reported in most cases. They used them alternately giving the drugs in periods of three or four days each week. In this way a good many of the unpleasant symptoms were avoided. They found that theobromine calcium salicylate and theophylline-ethylenediamine were the only ones which could be taken daily for more than a few days by most patients without having some ill effects.

Bain¹¹ says that, as the anginal attacks become more frequently prevalent and more severe in uncontrolled cases, it appears as though the patient becomes hypersensitive to the stimulus which brings on the pain. He suggests the use of light soothing massage and effervescing carbonated baths for the patient. However, the essential factor is mental and physical rest and he feels that the patient is better off away from home. Hay maintains that diathermy occasionally diminishes the number and the severity of the attacks.

Contrary to most writers who have dealt with this

subject, Evans and Hoyle,²⁰ after studying a series of cases which were under regular management in an effort to determine the relative value of drugs, concluded that none of the drugs used by them in the routine treatment can diminish the frequency or the severity of the paroxysms.

In following out any line of treatment, even when the most desirable results are obtained, to the extent that the patient is completely relieved from attacks, it must be recognized that, irrespective of the apparent result, the heart can rarely return to its original condition approaching the normal, though such may seem to be the case. It is impossible to remove the pathologic changes which have occurred. It becomes essential to remodel the manner of life, eliminate all unnecessary expenditure of energy, and to live within the limits of the damaged heart.

Treatment of the Attack

Perhaps the most important of all is the treatment of the acute attack, at least insofar as the patient himself is concerned. He stands fixed in his agony or he assumes the position which he has found in the past to be the most comfortable for him. The muscles are usually rigid and he is held speechless.

In 1867, Lauder Brunton introduced the nitrites for the treatment of this condition after he had found that a lowered blood pressure frequently lessened the severity of the pain. This was one of the great steps forward in

the progress of the treatment of this condition. Later, in 1876, William murrel introduced the use of nitroglycerine for the same purpose and this drug facilitated better relief in some instances and was found to be more convenient and easier to handle.²⁴ These two drugs are more often used now than any others to promote rapid coronary dilatation and relief from the anginal spasm.

Sir Thomas Lewis²⁵ maintains that the drop in blood pressure caused by the nitrites often is not sufficient to give a desired effect. For that reason he believes that there might be a relationship between a decrease in the expenditure of energy by the heart muscle, by increase in the blood supply to it, or by the joint effects of both to bring about freedom from the pain. It has been showed experimentally that the nitrites dilate the coronary arteries and he uses this evidence to support his contention.

Amyl nitrite by inhalation often brings relief in one-half to one minute, and it is quite conveniently carried by the patient in the form of "pearls" which usually contain 5 minims of the drug. These are easily crushed by the person in the hankerchief and the fumes inhaled. Certain objections to this method, however, are the unpleasant odor, both to the patient and to those about him, the uncertainty of the results, and the short period of action of the drug which may be only fifteen minutes, seldom more than thirty minutes. The use of nitroglycerin will allow freedom from these objections and is generally preferred because it can be conveniently carried in the form of hypodermic tablets

of 1/100 grain which are not volatile and which do not deteriorate readily. These tablets are less expensive than the nitrite pearls and the effect, though being somewhat slower in action than the amyl nitrite, lasts longer, usually for a half hour to an hour.^a Two or three minutes may be required for the full effect of the nitroglycerin, however. The average dose required by most patients is one tablet, 1/100 grain, placed upon or under the tongue and allowed to dissolve there. Several tablets may be taken at once or throughout a seizure to produce a more thorough and lasting effect, and patients are not infrequently found who require several tablets at a time.

In the use of these drugs it is perhaps well to try out their action on the patient when he is first seen so that the characteristics of the action can be observed. At the same time the patient is to be instructed concerning this action so that he will be prepared for the effect produced on him. He might well be told that he should sit down or lean against some firm object lest he should fall as a result of the vertigo which is frequently produced. He should be fully prepared for the characteristic nitrite effect by a full explanation. Otherwise he may become frightened when he first uses the drug and get more harm than good from it.³

It must be remembered that the nitrites should be given early in the attack. Their benefit can be derived at any time, it is true, but they are most effective when given as soon as possible after the onset of pain. This fact must be impressed upon the patient. Another factor to keep in

mind is the contention that there is great diminution in the danger of the attack following the relief from the distress.

Some patients do not react as desired to the nitrites and occasionally one is seen who experiences considerable discomfort by the action of the drug, especially if over doses are taken. The best dosage should be determined by the physician in every case where possible.

Morphine is the most effectual drug and the most certain in its action for the relief of the attack. It is less prompt in producing results than the nitrites, and there may be more danger of death with the developing relief of the pain than with nitrites, but it should be used in cases in which the agony is severe and in those which do not react favorably to nitrites. Usually one-fourth grain given orally, or better hypodermically, will abort an attack and it is surprising how infrequently the morphine habit will be established from this therapeutic use of the drug.

In his original article, Heberden advised the use of opium given at night to prevent attacks during sleep in severe cases. Dover's powder has been widely employed for this purpose, and, when other drugs fail to give the desired results, it may be and should be used. Opium may be used over considerable periods of time in this way without impairing the health of the patient or producing the drug habit.

Alcohol in the form of brandy, whisky, rum, and the like very often gives great relief from the pain.³ It may be ta-

ken in combination with other materials and is especially beneficial in those cases which apparently develop as a result of gastrointestinal distress.

Other measures which give good results frequently are warm baths, applications to the precordium, and the Danzer method of hemostasis in the extremities.³ These may be of great benefit in occasional cases which do not respond well to the ordinary methods of treatment.

As soon as the acute attack has subsided, the patient should be urged to quiet himself and to fall asleep if possible. The use of a hypnotic may prevent the development of secondary attacks which are very likely to appear. Some such drug as chloral hydrate, allonal, or luminal is preferred for this purpose. A period of rest which may be promoted in this way will usually prove to be of great benefit.

CONCLUSIONS

The treatment of angina pectoris has been a matter of extensive experiment and continual effort since Heberden first described the condition. Today, with this dread affliction taking so many men at the height of their usefulness to the world, the prevention of the development of the disorder presents a distinct challenge to us all. The relief of the immediate attacks can be comparatively easily attained in most instances; it is the avoidance of these attacks which becomes a most formidable problem to the medical profession. A confused state of controversy exists today concerning this particular aspect of the management of cases, but we can hope that some definite and distinct plans or measures can be worked out for the benefit of these patients.

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