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THROMBO ANGIITIS OBLITERANS

by

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UNIVERSITY OF NEBRASKA COLLEGE OF MEDICINE

Senior Thesis

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INTRODUCTION

In 1908, Buerger gave to the medical profession the first exhaustive work in an attempt to discuss and describe a certain peripheral arterial disease characterized pathologically by a progressive obliteration of the peripheral and of the deeper vessels. Various authors such as Von Winiwarter and Bachard had written about this condition as much as thirty years earlier, but had not carried out any exhaustive efforts to classify this condition pathologically or clinically. Various names had been suggested previously, such as Endarteritis Obliterans, Juvenile gangrene, et cetera, but Buerger's nomenclature of Thromb Angiitis Obliterans suited the condition from the pathological standpoint, and the name was accepted by the medical profession.

For many years there has been difficulty in the diagnosis of peripheral vascular diseases. There was not much understood as to the Etiology and Pathology. Very little was to be found in the textbooks, and relatively few articles were found in the literature. A fatalistic attitude was taken toward these conditions, and the physician or surgeon was content to treat symptomatically and to amputate when it became as they thought necessary either because of the onset of gangrene or due to the very severe pain. At the present time neither of the above conditions is an indication for amputation.

During the past ten years there has been an increasing amount of work carried out in an attempt to determine the pathology and etiology for without a good understanding of these we cannot expect to intelligently treat this condition. As yet the etiology is not understood but several

features which were once thought to be necessary are now shown to play no part or to be of doubtful cause in the production of this condition. For example, it has been definitely shown that syphilis plays no part in the etiology, nor is it necessary for the person to originate from the Jewish race.

As the pathology became clearer and the ideas concerning the etiology changed, so also did the forms of therapy change. This was also greatly influenced by some marked improvements in the methods of diagnosis of this condition.

In this paper I will attempt to give a concise summary of the condition known as Thrombo Angiitis Obliterans and also a review of the literature of the last five years giving the advances in methods of diagnosis and in the advisability of treating the various stages of this disease by the various methods of treatment.

Historical:-

In 1879 von Winiwarter and Friedlander reported a case in which the arteries of the lower extremities were occluded and which appeared to them to be due to a chronic proliferative process having its origin in the intima and being associated with an inflammatory reaction of the wall of the blood vessels. As a result of this study von Winiwarter proposed the name Endarteritis Obliterans.

Wilonski, a few years later, believed that the essential change in the vessel wall is due to a multiplication of elastic fibers and termed the condition as Arteritis elastica.

Weiss and von Manteuffel suggested that the extensive occlusion of the vessels was due to a primary arteriosclerosis causing the formation of a white parietal thrombus with a gradual extension downward followed by organization. They also believed that the veins were not involved in the process.

Von Winiwarter had a supporter in Sternberg, and von Manteuffel was supported by Bunge.

In 1897 Bachard established the thrombotic nature of the disease and concluded that it was a primary thrombosis of the arteries and veins, and that its identity was distinct from Arteriosclerosis.

However, it was not until 1908 until Buerger rescued this condition from the heap of confusion and placed it on a sound clinical and pathological foundation. He believed that we are dealing with a thrombotic process in the arteries and veins which is followed by organization and canalization and which is not associated with an obliterating endarteritis. He gave it the name Thromboangiitis Obliterans, by which it is known today

Definition:-

Thrombo Angiitis Obliterans is a disease of the blood vessels, arterial and venous, probably of a chronic inflammatory etiology, characterized pathologically by an occlusive thrombosis that subsequently gives way to a stage of healing or organization, the final result being the complete closure of arteries and veins over a large extent of their course by vascularized and cannalized connective tissue. The disease is characterized clinically by pain in the extremities, intermittent claudication, coldness and numbness of the extremities, pallor on elevation and rubor on lowering of the extremity, and an absence of pulse in the lower arteries. The condition may limit itself or go on to a progressive gangrene which may require amputation.

Etiology:-

For many years it was stated that almost without exception, this disease occurred in young adult Jewish males. Also, it was closely related to the smoking of cigarettes. It is now thought that the reason that Jews were involved more was because the early work was reported by a Jewish physician doing his work at the Mount Sinai Hospital of New York City where the majority of patients are Jewish. In recent years, with an increased amount of study of this condition and the diagnosis of more cases, due to the fact that we are on the lookout for them, it is now believed that Jews are only slightly, if at all, any more susceptible to this condition than are any other race or nationality. It is still believed that the disease is one peculiar to middle aged or young adult males. Smoking is still thought to play a part although many cases occur in non-smokers, and the vast majority of smokers never have the disease. However,

it is believed to be an allergic reaction to tobacco. It is thought that chronic infection plays a role in this condition. Other etiological theories are that the condition simulates chronic ergotism and is due to the rye bread eaten by these people. H. J. Gray is convinced that the disease is of a Histamine or like product origin entering the blood stream from the intestinal tract. It is at the present time believed that syphilis and climate play absolutely no role in this condition.

The important thing in determining the etiology is to be able to tell how much of the pathology is due to occlusive lesions and how much is due to a spasticity of the vessels. This will be discussed under the paragraph on diagnosis.

Gross Pathology:-

The chief work on the pathology was first done by Buerger and as yet there have not been any advances to his work. He noticed an extensive obliteration of the larger arteries and veins when these vessels were dissected out. He also records a Periarteritis and arteriosclerosis. The process differed greatly in its intensity and the characteristic appearance depended upon the age of the occluding process.

Usually the vessel is seen to be filled with a grayish or yellowish mass that can be distinctly differentiated from the annular wall of the vessel and that appears to be pierced at one point, or several points, by an extremely fine opening through which a minute drop of blood can be squeezed. The tissue is firm in consistency and does not at all resemble the crescentic or semilunar occluding masses typical of arteriosclerosis. The vessel itself is somewhat contracted so that its wall appears somewhat thickened. This picture is both characteristic of arteries and veins, and

is to be found most frequently in the peripheral portions of the vessels. As we trace the obliterated vessels upward we are apt to find a change in the character of the obturating tissue. It may become softer, brownish in color, and terminate abruptly in the lumen of an apparently normal vessel. At other tissues the brownish tissue gives way to soft reddish masses which are evidently the results of recent thromboses. In some cases this thrombotic process occupies large portions of the vessel's course; in others it is of short extent and terminates in a long cone of recent thrombus.

The veins share equally with the arteries in the occlusions. The arteries chiefly involved are the Dorsalis Pedis, Anterior Tibial, and Dorsalis Hallicus. It does not, as a rule, attain the level of the Popliteal Artery. We usually meet with obliteration of large territories with closure of the distal parts of the vessels, rather than the proximal. There is often an involvement of some of the smaller branches, such as metatarsal and tarsal, but the smallest arteries are free. The beginnings of the obliteration are not to be sought in the capillaries, nor in the finest branches. If the vessel is followed upward it is frequently seen that there is a sudden cessation of the process, and in many cases, two to four inches of the vessel is closed with apparently normal portions above and below.

There may be an abrupt and sudden change from occluded to normal vessel or there may be a transition into red thrombotic masses.

The peculiar appearances presented by these terminations, the apparently normal condition of the vessel below and above the occluding masses, and the transition into thrombosed areas all speak in favor of the view that we are dealing with a thrombo arteritis or thrombo phlebitis,

rather than with a proliferating or obliterating process derived from the intima of the arteries and veins. Microscopic studies back this up.

Besides the lesion of occlusion, there are two other striking changes, namely, a certain amount of arteriosclerotic thickening and periarteritis. Arteriosclerosis is rarely pronounced. The periarteritis refers to a fibrotic thickening of the tissues just around the vessels. The artery, vein, and nerve are bound together and are difficult to separate, even by dissection. This adhesive condition is due to fibrous tissue growth and varies considerably in its amount. It varies from a very small amount of fibrosis to a very dense amount which forms one dense rigid cord. Samuels is of the belief that the pathology is self limiting. Of late years it has been found that not only does this condition affect the extremities, but more and more reports are coming into the literature of involvement in other localities. Among other vessels reported involved are the spermatic, renal, coronary, mesenteric, cerebral, carotid, celiac axis, iliacs, and mesenteric.

It is to be emphasized that patients affected with this disease do not usually suffer directly from the disease itself, but from the disastrous occlusive thrombosis which signalizes nature's method of healing a vascular lesion which has long since disappeared.

Histology:-

A good discussion of the histology is obtained from a description by Gerdwood in Aberdeen, "There appears to be a general intimal thickening, and the lumen was completely occluded by a well organized thrombus in which there were numerous granules of Hemosiderin. Recanalization of the thrombus had occurred, the new channels being of various sizes and for the most part

packed with red corpuscles. The internal elastic layer was thrown into folds by contraction, and there was reduplication of the elastic fibers. In the media there was fairly dense cellular infiltration round about the vasorum and patchy fibrosis of the muscular coat itself. There was very dense fibrosis of the adventitia and surrounding tissue, and the tiny vessels in the neighborhood showed signs of Endarteritis Obliterans.

The Saphenous veins on section showed some irregular intimal thickening, the lumen being occluded by a fairly recent thrombus. Throughout the limb generally the veins were thickened but not to such a marked degree as the arteries. In the larger superficial veins there was in many instances marked intimal thickening at times practically obliterating the lumen. The media showed some fibrosis while a recent thrombus filled the lumen.

Much difficulty was experienced in dissecting out the main vessels owing to the very dense fibrosis which matted the arteries, vena comites, and nerves together and to the surrounding tissues. This is a prominent feature of the disease.

In general then, the chief changes found are a varying degree of fibrosis of the media, with dense fibrosis of the adventitia and surrounding tissues in which the tiny vessels showed Endarteritis obliterans with some accompanying perineural fibrosis, the intima showing local or generalized thickening which may or may not merge into an organized, often recanalized thrombus, more or less obliterating the lumen of the vessel and containing numerous yellow granules of hemosiderin. The veins in most cases show intimal thickening, this, in the vena comites, being most pronounced in that part of the vessel in closest relation to the affected artery."

Diagnosis:-

The diagnosis of this condition is made by clinical observation and by the use of certain special tests which determine the arterial function of the extremity.

The clinical diagnosis usually presents the following picture. A young adult male between the ages of twenty and forty years usually begins to have pain in the calf of the leg or in the arch or toes of the foot. This pain is worse when he walks quite a distance and is often relieved by resting. As a rule he gives a history of having been previously treated for fallen arches. He notices that one foot gets colder than the other and becomes somewhat numb especially when the weather is a bit cold. At times the pain becomes very severe. He soon finds out what will relieve this pain - rest in bed, immersing the extremity in hot or sometimes cold water - keeping the extremity in the horizontal position or somewhat dependent. He usually gives a history of being a heavy cigarette smoker.

Physical examination of the affected extremity shows the following findings. Not much is seen on inspection at first. Later, the foot becomes blanched when it is elevated and very red when it is lowered. Occasionally the nails are brittle and appear somewhat atrophied. The extremity is colder to the touch than its brother, and there is difficulty in palpating the posterior tibial or the dorsalis pedis artery. As a rule the history goes back over several months or even years duration. The patient may also tell of a chill, fever and severe pain along the course of a vein. This indicates a superficial migrating phlebitis.

A simple test brought out by Samuels of New York City is to elevate both extremities to 90°. At the same time to rapidly flex and extend the foot using the ankle as a pivot joint. If there is arterial obstruction there is very shortly noticed a plantar pallor of the affected extremity while the opposite one maintains its pink color. There will also occur at the same time some pain in the affected extremity. This test acts on the same principle as does intermittent claudication and denotes an impairment in the arterial supply to the extremity.

Among the special tests for determining the circulatory ability are the Oscillometric Index. This gives the amount of pulsation of the vessels and gives one an idea as to the amount of occlusion present within the vessels. The temperature of the extremity can also be very accurately determined. This is helpful in determining the extent of circulatory damage and is also much used to watch the progress of the disease and the beneficial effect of therapy.

Another special test which promises to be of great value in this condition is one brought out by Scott and Morton of Rochester, New York. By their method they are able to determine the relative amount of obstruction due to spasticity and to occlusion within the vessel. The temperature of the extremity is taken. The Sympathetic nerve is blocked off by a posterior tibial injection. This causes a loss of vasoconstrictor power. The temperature of the extremity is then taken at 15 minute intervals for two hours. If the obstruction is due to spasticity the temperature will begin to rise towards the normal temperature - which can be obtained by recording the temperature of the opposite extremity. This rise is due to the vasoconstrictor loss brought about by the nerve injection. If the obstruction is due to occlusion, the temperature will not rise. If it rises only a

small amount you can figure out how much of the pathology is due to Spasticity and how much is due to Occlusion. This test is very important in determining the type of therapy for it is evident that a Lumbar Ganglionectomy will have no effect if the pathology is occlusive in nature, while it may be very helpful in a spastic condition.

Treatment:-

Clinical interest in a given field is usually proportional to its therapeutic possibilities. Consequently, it is not surprising that until recently the common arterial diseases of the extremities have attracted comparatively little attention. Dr. Finney's comment that anyone can amputate an extremity, but that it takes a good physician to save one, has long been true. In the past, the investigation of peripheral arterial disease has been concerned chiefly with the end stages. Interest was drawn to the extremity showing actual or threatened gangrene. Before gangrene occurs the profession shows a certain fatalism towards these conditions. Buerger first suggested that Thrombo Angiitis Obliterans was due to an inflammatory condition as distinguished from senile or diabetic arteriosclerosis. However, specific treatment of the peripheral arterial diseases based on an anatomico-pathological classification has been disappointing, although many various types of treatment have been suggested. As yet, there is no treatment for Thrombo Angiitis Obliterans as such. The outcome of the disease and the effect of the various forms of therapy depend on a physiologic function, namely, the state of the local circulation, and not on the anatomic condition of the main arteries. The predominant importance of function rather than structural change in the peripheral vascular diseases has received recognition in their study only in the last few years.

It is well known that continuous vasoconstriction over a period of time can lead to gangrene, a condition which is well known to occur in Raynaud's disease. During the past few years it has been shown that spasm is an important element in many instances in the common arterial diseases in the extremities. Since the recognition of this significant fact and the development of satisfactory methods for determining the vaso constriction in the clinical syndromes, much progress has been made in treatment. The attitude of hopelessness should be abandoned for as time goes on there are emerging certain definite principles of treatment in these conditions.

Whatever the type of common arterial disease, when symptoms are produced they are dependent on an impairment in the local circulation. Such circulatory deficiency is recognized by its symptoms and the signs elicited through ordinary methods of physical examination. When this deficiency is present it is dependent on one or both of two factors affecting the arteries:- viz. first mechanical obstruction and second vascular spasm. The differentiation of these two elements as the cause of circulatory deficiency can be carried out by the blocking of the sympathetic nerve as has already been mentioned in the paragraph on diagnosis by special methods.

Treatment should always be directed first toward preventing the ischemia from doing more harm than is necessary. This is a general principle and applies to all cases irrespective of their cause. Under this heading come such simple but important measures as rest, postural treatment and exercise, relief from pain, and particularly, scrupulous prophylaxis against infection. The choice of other measures depends on the presence or absence of spasm. When occlusion is shown by a functional test to be a causative factor, then at present there is no way to augment greatly the diminished flow of blood to the extremity. In such cases the principle of

treatment is to aid the more peripheral distribution of the small amount of arterial blood available. Pearse of Rochester, New York has found venous ligation to be a very valuable procedure in this case, and Samuels of New York City recommends large amounts of Hypertonic saline solution intravenously. The above methods are not curative in every case, but have helped many in which the circulation was not hopelessly inadequate. All in all, the obstructive group offers a much poorer prognosis than does the spastic group of which I shall now discuss. In this group the important thing to do is to overcome, either temporarily or permanently the arterial spasm. Various methods have been used to accomplish this. Among them are Lumbar Ganglionectomy, (Sympathectomy), fever producing injections (typhoid, sterile milk), local or general hyperemia, and the use of vaso-dilating drugs. The conservative measures as a rule do very little good. It has been found that the cessation of smoking aids greatly in overcoming arterial spasm.

Lumbar Sympathectomy produces a continuous improvement in the local circulation to the same degree that was caused temporarily in blocking the nerve with anesthesia to find out the percentage of spasticity. This is the procedure of choice in young or middle aged individuals when the clinical evidence of a local circulatory deficiency and the functional importance of vaso-constrictor spasm are clearly established. The one important objection to this type of treatment is that it requires a major operation. The peripheral vasodilatation accompanying the systemic reaction to the injection of protein or inorganic chemicals has been advocated as a method of treatment in the milder cases in place of surgical intervention. The effect lasts from a few hours to several days. This method was thought to be useful as a substitute for operation in the older group of patients concerning the condition of whose myocardium there may be some doubt. However, it is exactly in these

cases with an impaired myocardial action that the dangers of such fever reactions become greater, consequently it cannot be used in place of operation if the decision becomes necessary due to an impaired myocardium. For these patients there are those who recommend paravertebral injections of alcohol. This procedure probably does not give permanent relief; it is usually followed by rather severe neuritic pains, and would make a later operation, if necessary, much more difficult. Periarterial sympathectomy does not have enough merit to warrant its use in such cases. Injection of alcohol into the peripheral nerves, as suggested by Smithwick and White in 1930, below the main muscular branches, not only relieves pain but may result in improvement in the local circulation when the latter is impaired by vasomotor spasm. The two objections in accomplishing the latter objections are first, anesthesia in the peripheral area accompanies the vaso motor paralysis. Second, vasomotor constrictor innervation to the vessels is reestablished in a few months. This method, however, is helpful in some difficult cases when operation and fever producing injections are absolutely contraindicated by the patient's general condition. The one procedure that permanently overcomes the detrimental effects of sympathetic vasoconstriction in arterial disease is sympathetic ganglionectomy. It is hoped that in some future day we may find a simpler means, such as a drug, that will produce the same effect without undergoing the risk of a major operation.

Samuels of New York is a great advocate of using the conservative treatment. He is of the opinion that this is a self limiting disease, and if the patient will follow his treatment this condition will quiet down without a necessity of amputation or any other type of major operation. His treatment in brief is as follows:- absolute rest in bed; absolute cessation

of smoking; postural exercises; alternating hot and cold foot baths; chloramine foot baths to prevent any foot infection; anesthetic ointments to relieve pain; injection of large amounts of hypertonic saline into the veins which process he believes to lower the viscosity of the blood, and thereby increasing the peripheral circulation. He has had a large series of cases and the results of his work are very convincing.

Of late it has been suggested by Langeron and Desplats in France that irradiation of the Lumbar regions with x-ray has a marked vasodilating influence. It has relieved the pain and the threatening gangrene.

Further, the Schwartzman's of Odessa and London have reported good results in these conditions by using the angioidilating drugs acetylcholine and muscle extracts.

Allen of Boston says that all forms of therapy have shown some success in the hands of various men. He states, however, that since as yet the etiology is unknown, the treatment cannot be carried out along scientific lines. He also believes that much of the success in treatment is due to the hygienic measures carried out by the patient, along with rest of the extremity in placement in a position where the interchange of blood is the best, at a level with the heart, along with the very pains taking care of the patient to follow the instructions of his doctor. He also believes that a great amount of the success is due to the fact that this is a self limiting disease. He does not recommend venous ligation but is enthusiastic of alcoholic injections of the peripheral nerves. He has also been using the x-ray to produce a vasodilating effect, but uses it on the extremity and not over the Lumbar area. His reasoning is, "Why use it on the Lumbar region when the pathology is in the extremity." The important thing to

remember is that regardless of which special or specific therapy is used, it will be a failure unless the general measures of rest in bed, postural exercises, cessation of smoking, and surgical cleanliness of the extremities are used in conjunction with the chosen therapy.

Adson of Rochester, Minnesota is of the opinion that if there is a lesion in one extremity manifested by an ulcer, it is very likely that the other extremity is also involved and recommends a bilateral lumbar ganglionectomy to check the progress in the other extremity. He shows by a series of cases that good medical management along with lumbar ganglionectomy, greatly improves the circulation and markedly lowers the incidence of amputation.

An interesting point brought out by Dr. Scott of Rochester, New York is that we cannot go by the textbook classification and description of a disease. He points out that after Buerger's disease was recognized and described in the texts as having certain characteristics, it has since been found that not only Jews are affected, that the same process may occur in any of the blood vessels of the body, that it may occur in non-smokers and that there may be an accompanying calcification of the vessels.

As time goes on the methods of therapy in this condition are being used on a rational basis, and those principles are really now beginning to emerge as something to guide us, and the feeling of hopelessness, of not knowing what to do in the face of these problems, is being abandoned.

It is also evident that early diagnosis is of most importance in the institution of treatment, and also in determining if the lesion is spastic or occlusive, for the treatment and the prognosis differs in the two cases. One should keep in mind that a condition which starts out as spastic, may, if not recognized soon, change to occlusive as time goes on, giving a

poorer prognosis.

Samuels cautions us not to expect a temporary vaso dilator such as typhoid vaccine or Periarterial Sympathectomy to correct a condition which takes a long time to heal. Typhoid vaccine is dangerous in the presence of gangrene because of the risk of sudden occlusion of large arteries during the period of hyperpyrexia. There is also much discomfort due to the chills, fever, nausea, and vomiting. The complexity of splitting the lumbar sympathetic fibers and the dangers of this major operation are far too great in proportion to the temporary benefits obtained in the cases which are characteristically chronic in nature. Samuels believes that there is no indication for amputation unless there is a total destruction of the foot so that a weight bearing stump is unattainable.

As far as the periarterial sympathectomy is concerned, Leriche who designed it says in Nelson's Loose Leaf Surgery, "Periarterial Sympathectomy has no place in Buerger's disease. This operation can produce no good effect here, for in order to produce its effect it requires at least a partially intact peripheral circulatory system." He says that nearly all of those who have tried sympathectomy have failed. He now is of the opinion that there is not any type of sympathetic operation which has any place in Thrombo Angiitis Obliterans.

Adson says that the real problem in therapy is to select those cases which are surgical and those cases which are medical. The work by Morton and Scott will greatly simplify this. If the condition is a spastic one it is generally believed that sympathectomy is of value, while those due to occlusive lesions are not aided by this procedure.

Case Histories:-

I. Samuels - J.A.M.A. vol.102 No.6

E.M. male, age 43, Jewish, born in America, was originally observed by Dr. Samuels in 1928, at which time he complained of intermittent claudication and coldness of the right lower extremity. Diagnosed Thrombo Angiitis Obliterans and conservative treatment of rest in bed, cessation of smoking, hypertonic saline intravenously and surgical cleanliness of extremities advised. This was not carried out by the patient. Two years later the patient appeared with massive gangrene of the right foot. The Oscillometric Index at the right ankle was zero. Amputation was advised at one hospital as the only means of relief. This was refused and Dr. Samuels took charge of the case. Conservative treatment was followed and within a short time, five months, the gangrenous portion had separated spontaneously, leaving a clean granulating ulcer. After a few weeks the ulcer healed and the patient resumed his work as fireman in a boiler room. At present he can walk miles without discomfort, has gained weight, and requires no orthopedic appliance in the shoe of the amputated foot.

II. Samuels - J.A.M.A. vol.102 No. 6 p.438

B.S., male, 33, Jewish, born in America, had had symptoms of Thrombo Angiitis Obliterans for four years prior to the formation of an ulcer on the left big toe. He had always been a heavy smoker, having consumed as many as fifty cigarettes a day since his early boyhood. When seen in April 1931, he was in extreme pain caused by a foul, necrotic ulcer on the left big toe. Previous surgeons had performed periarterial sympathectomy on the leg and had prescribed morphine in large quantities but all to no avail. The oscillometric index at the ankle of the left leg was .3 which offered hope

of a good outcome. The usual conservative treatment was instituted with strong accent on the immediate cessation of smoking. Spontaneous amputation of the necrotic toe soon occurred, and after 13 months the foot was completely healed. At present, the patient is working at his usual occupation, has no complaints, and has gained considerable weight. Surreptitious smoking probably accounted for the unusual duration of healing time in this case.

III. Samuels - J.A.M.A. vol.102 No.6 p.439

M. MacM., male, 49, American, of Scotch descent, non Jewish, first noticed migrating phlebitis in the right leg in 1929 at the age of 44. He had been treated for syphilis 26 years previously but repeated wasserman tests since then were negative. About a year prior to his first examination by Dr. Samuels, a gangrenous ulcer of the distal part of the right big toe had developed. The oscillometric index at the right ankle was zero. The ulcer was painful, interfering with sleep, and the patient had lost considerable weight because of his rigid adherence to a "salt free" diet. This diet had been prescribed by a local physician because of the possible presence of arteriosclerosis. Considerable improvement and gain in weight were noted when the diet was discontinued. Three months after the institution of routine conservative treatment, the ulcer was completely healed. The patient can walk long distances without discomfort. The presence of syphilis in this case probably exerted no influence on the course of the disease.

IV. Brown - Surg. Gyn. and Ob. - 1934 page 299

A man, Gentile, age 37, came to the Mayo Clinic because of pain in the foot on walking. He had smoked two packages of cigarettes a day for 15 years. Three years previously he had noticed that the right foot became colder than the left. In addition, during cold weather, the affected foot

numb, and blanching of the toes was observed on several occasions. A year later he had found that after walking for three blocks, a painful sensation of fatigue developed in the arch of the right foot. Six months later a similar sensation had been noted in the calf of the same leg. He had found that by resting two or three minutes, relief supervended, and the same exercise could be repeated. In the year before his visit to the clinic the amount of walking he was able to do had been diminished to one block, and in the recent past, similar symptoms had been noted in the left foot. He had noted repeatedly red spots along the veins of the right leg; these cleared in two weeks. Six weeks before his admission to the clinic, a small ulcer, associated with constant pain had developed on the nail margin of the right first toe and had not healed. He also stated that in the preceding winter he had noticed that several fingers of the left hand were extremely sensitive to cold, and that blanching had occurred. On examination, the right foot when dependent was much redder than the left. When elevated, the foot blanched sharply and when lowered slowly to the dependent position at least one minute lapsed before normal color returned and the veins filled. Palpation disclosed perceptible difference in temperature of the two feet. The arteries of the right leg below the femoral artery, and of the right leg below the popliteal artery, had become closed. In addition, the left ulnar arter was occluded, and the fourth and fifth fingers were colder than the other fingers. Allen's test was positive in the left hand.

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