

Address.

THE CLINICAL SIGNIFICANCE OF ARTERIOSCLEROSIS.¹

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For many years the anatomical changes so frequently found in the aorta of persons beyond middle life and included under the term arteriosclerosis or endoarteritis deformans were considered by practitioners of medicine as of relatively little importance.

They so frequently were independent of any disturbance of function attributable to their presence that they were regarded rather as senile changes of comparatively little significance than as manifestations of disease. They could not be regarded even as evidence of senility, since not infrequently they were absent in the arteries of persons of extreme old age and occasionally were to be encountered in those of children.

It has long been recognized that the larger arteries of the brain, heart, kidneys, spleen and extremities might show alterations somewhat similar to those occurring in the aorta and its largest branches, and that pathological processes in the organs concerned might be associated.

It is only within comparatively recent years, however, that more searching attention has been directed by the pathologist to the lesions of the minuter arteries of the viscera and to their effects. As a result of these investigations the possibility of the existence of a disease, arteriosclerosis has received general recognition.

But the pathologist has found it difficult to identify the lesions of the larger arteries, notably of the aorta, with those occurring in the small arteries, especially of the viscera. The growth of tissue, the modifications of caliber, the presence of fat, the deposition of earthy salts, were readily found in arteries investigated with the scalpel and scissors; they also could be determined in arteries whose physical characteristics became apparent only with the aid of the microscope. Whether rightly or wrongly it has become the custom to identify these changes in the larger and smaller vessels under the general term arteriosclerosis, and to discriminate between the nodular arteriosclerosis of the larger vessels and the diffused arteriosclerosis of the smaller arteries. It is to be questioned, however, to what extent these affections of arteries of large and small caliber are identical.

A traumatic, syphilitic or tubercular endarteritis is manifested in minute arteries by sclerotic changes quite distinct from those of chronic endoarteritis deformans; and the latter process may be present in syphilitic or tubercular patients long before either syphilis or tuberculosis has been acquired.

The difficulty experienced by the pathologist in unifying the various anatomical changes found in arteries of large and small caliber makes it necessary for the practitioner to be especially cautious in generalizing with regard to the clinical manifestations of arterial disease. It is important for him to weigh carefully the evidence in the individual

case, that he may attach the proper value to it in determining questions of diagnosis and treatment.

The disturbances produced by arteriosclerosis are dependent essentially upon the resulting modifications of caliber and the alterations of surface in the arteries of the viscera and extremities. The changes of caliber are due chiefly to failing elasticity, however induced, or to obstruction from narrowing or twisting of the canal and to irregularities of surface. The ultimate result is a loss of nutrition, either slowly produced or suddenly brought about. The consequences are various disturbances of function which concern the organs especially affected, but which may be identical with disturbances of function otherwise produced.

The patient suffers from predominant affection of the brain, heart, kidneys or extremities, and it is desirable, therefore, that the organs especially concerned should be made most conspicuous in the diagnosis. It is important to recognize that he has an arteriosclerotic encephalitis, myocarditis or nephritis, since the prognosis may depend largely upon the discovery of arteriosclerotic basis for the lesions.

The treatment also of an arteriosclerotic nephritis, or of a nephritis with arteriosclerosis elsewhere, may demand the most urgent appreciation of the existence of the arteriosclerosis.

It would seem, therefore, of clinical convenience to consider arteriosclerosis as a morbid process which may affect the central, peripheral and visceral arteries of the body. Each group alone may be concerned, or two or more groups may share simultaneously in the process. Usually the effects of arteriosclerosis are more apparent in a single group, and in visceral arteriosclerosis the results are more conspicuous in one organ than another, although combined disturbances of several organs are frequent in consequence of various degrees of arteriosclerosis in each. Hence there is no typical picture of arteriosclerosis from a clinical point of view, but there are several diseases variously designated which may be attributable to arteriosclerosis. This term, therefore, to the clinician, represents rather a species than a genus, and strictly speaking should be used as an adjective, not as a substantive.

A diagnosis of the condition arteriosclerosis usually is made by the physical examination of the accessible arteries and of the heart.

The arteries are cordlike, resistant, tortuous, with a ribbed or granular surface. The tension of the pulse is high. The heart gives evidence of hypertrophy of one or both sides by an increased area of dullness, a more powerful apex beat and an accentuation of the second aortic sound, provided the aortic valve is sufficient.

Although the presence of a cordlike resistance is most significant of arteriosclerosis, it is not always found in arteriosclerosis of the internal organs, and when appreciable does not indicate that existing visceral disease is due to arteriosclerosis. Its importance as a characteristic sign is so great, however, that it always should be sought for, and the brachials, femorals and tibials as well as the radials should be palpated, since arteriosclerosis when present is not necessarily generalized but may be

¹ Extract from an address before the Hampden Medical Society at Springfield, Oct. 21, 1902.

confined to or be more conspicuous in certain vascular territories.

The significance of tortuous arteries in the diagnosis of arteriosclerosis often is overrated.

Indeed, it is by no means certain that the process which causes serpentine arteries is that which produces thickening and rigidity of the arterial wall. Although in generalized arteriosclerosis the visible arteries often are tortuous, visceral arteriosclerosis frequently is unaccompanied by tortuous temporal or brachial arteries.

Serpentine temporal arteries repeatedly are seen in youths and young men who at the time or in after life are not to be regarded as sufferers from arteriosclerosis.

The ribbed or granular condition of the surface of an artery is due to calcification, but the question still is unsettled whether or not calcification of the peripheral arteries is necessary evidence of arteriosclerosis in them. Certainly peripheral calcification, even of tortuous arteries, may be present without thickening of the walls or evidence of visceral arteriosclerosis. Although calcified arteries are oftenest found in the aged, persons under middle life are not necessarily free from this evidence of degeneration.

The pulse of high tension usually excites the suspicion of arteriosclerosis, especially in the early stage. It is by no means pathognomonic, however, for it is not always present in arteriosclerosis; indeed, there may be lowered tension when there is even extensive arteriosclerosis, and in chronic nephritis without arteriosclerosis the tension of the pulse may be abnormally and persistently high.

In like manner hypertrophy of the heart, with or without a heaving impulse and accentuated second aortic sound, may be absent in arteriosclerosis, and when present may result from other conditions than this lesion. Such is notably the case in chronic nephritis, which may or may not be connected with arteriosclerosis.

The clinical importance of the recognition of the presence of arteriosclerosis demands not only the physical examination of accessible arteries and the heart, but also the use of such means as we may have of determining the condition of other organs whose arteries are especially liable to become sclerotic.

It is, therefore, convenient in the diagnosis of the possible arteriosclerotic nature of a given disease to bear in mind the previously mentioned topographical distribution of the arteries into central, peripheral and visceral groups.

In central arteriosclerosis, in which are affected the aorta and its larger primary branches, excepting those of the heart and kidneys, the diagnosis depends partly on an inference from age, and more particularly upon the physical examination of the branches within reach of the eye, ear and finger. Although most people over fifty years of age have more or less aortic arteriosclerosis, there are numerous exceptions, and occasionally persons of advanced years show a clean aorta, and youthful individuals may have one which is diseased.

Inspection and palpation of the innominate, subclavians, carotids, femorals, and, when possible, of the iliacs, may reveal the dilatation and rigidity which usually accompany aortic sclerosis, and a con-

current dilatation of the arch of the aorta may be determined by auscultation, percussion, and perhaps palpation of the area concerned.

When aortic arteriosclerosis involves the coronary and renal arteries the resulting disturbances of function are those of visceral arteriosclerosis, and when present in addition to the above-mentioned evidence indicate the extension of the process from the aorta to the arteries leading to the affected organs.

In peripheral arteriosclerosis the physical examination of the accessible arteries is the chief reason of diagnosis, although the evidence of an enfeebled circulation is usually furnished by the sense of discomfort,—even severe pain and numbness in the extremities, and by the rapidly induced fatigue and cramps in individual muscles or muscular groups.

The diagnosis of visceral arteriosclerosis depends first upon the recognition of the various disturbances of function and then upon the discovery of evidence of central or peripheral arteriosclerosis. Such evidence confirms the diagnosis, but does not prove its correctness, since other causes exist for the ascertained disturbance of function, and the evidence of central or peripheral arteriosclerosis does not necessarily indicate that the disturbed functions of the viscera are occasioned by sclerosis of its arteries. In visceral arteriosclerosis it is customary to recognize three principal types of disease—the cerebral, cardiac and renal. The intestinal and pancreatic types have more recently been added to the series. The three principal varieties alone are those which concern most practitioners.

The cerebral type is indicated by such disturbances of function as headache, vertigo, wakefulness, loss of memory, convulsions and focal lesions due to arterial rupture, thrombosis or embolism. In cardiac arteriosclerosis the final result is fibrous nupocarditis with dilatation and insufficiency, or death may occur suddenly from rupture of the heart in consequence of coronary thrombosis or embolism. The symptoms in general are those of a weak heart; and palpitation, bradycardia or tachycardia, arrhythmia, angina, dyspnoea, cardiac asthma, Cheyne-Stokes breathing, epileptiform attacks, unconsciousness, and passive congestion of the various organs, and dropsy, are to be recognized.

In renal arteriosclerosis the signs and symptoms are those of chronic fibrous nephritis. Inasmuch as a peripheral arteriosclerosis may develop in the course of a chronic nephritis, and an arteriosclerosis of the kidney produce the manifestations of a chronic nephritis, the diagnosis of an arteriosclerosis nephritis is always a problem for the practitioner, and is more easily made after than before death.

The intestinal type of arteriosclerosis has aroused attention of late years from its significance in the causation of acute intestinal symptoms, simulating obstruction and suggestive of peritonitis. Thrombosis and embolism of the sclerotic arteries result in ulceration, perforation and necrosis, which rapidly assumes a gangrenous character.

In arteriosclerosis of the pancreas, as of the kidney, the question as to the effect of arteriosclerosis upon the pancreas or of the production of arteriosclerosis by disease of the pancreas is answered with difficulty. But the increasing importance of recognizing disease of the pancreas as an organic basis

for saccharine diabetes, and the knowledge that peripheral arteriosclerosis is of occasional occurrence in diabetes, and an important element in the causation of diabetic gangrene, suggests that arteriosclerosis may play an important part in the pathology of diabetes mellitus.

It is evident that in no instance of visceral arteriosclerosis is the diagnosis to be made from the knowledge of disturbance of function alone. The functional disturbances may be due to various causes, one of which is arteriosclerosis; and it is the association of this lesion in the central and peripheral vessels with the symptoms of such disturbed function in an organ which permits the diagnosis of a visceral arteriosclerosis.

The value in therapeutics of recognizing the existence of arteriosclerosis is chiefly in the way of caution. There are no remedies which can cause arteriosclerosis to disappear, and it is doubtful to what extent, if any, its progress can be arrested. Perhaps the chief benefit of the early discovery of arteriosclerosis comes from the opportunity it gives of warning the diseased person of the necessity of a change of habits, of avoiding mental, moral and physical strain upon blood vessels which already show signs of weakness. The dilated temporal arteries of youth are no necessary evidence of advancing arteriosclerosis; they are a sign to go slowly, to avoid excesses and unnecessary exposure.

Original Articles.

CÆSARIAN SECTION FOR PLACENTA PREVIA, WITH REPORT OF A CASE.¹

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THE advent of Cæsarian section as a logical treatment for placenta previa has invited the severest criticism and the warmest approbation of different obstetricians throughout this and other countries.

Some have recommended it as the ideal treatment in all cases of placenta previa, while other authorities have tabooed it altogether.

It is much within the confines of these extreme views that we hope to gain for the Cæsarian operation a recognition which it already merits. We cannot expect to show by this treatment the low mortality attained by Reynolds, Schauta, Everke and Leopold, in their Cæsarians for contracted pelvis, because of the difference in manifestation of these two pathological conditions. A certain proportion of the patients with placenta previa will always continue to be presented for operation in emergency. When, however, every physician doing obstetrical work is made conscious of his duty to keep under closer observation his pregnant cases, the patients with critical hemorrhage, at or near full term, will be less common, and the results by the Cæsarian treatment more favorable for comparison.

During the past three years, and especially since the report of Donoghue's case¹ in 1900, treated successfully by Cæsarian section, there has been

produced a wealth of statistics from which can easily be taken statements in support of any method of treatment.

For a review of the mortality statistics, I refer you to an article by Hugo Ehrenfest² of St. Louis, published in *American Medicine*, Jan. 11, 1902. He quotes the individual results of thirty authors, and we find that there is an average maternal mortality of about 7%. The mortality of the fetus is not noted in any instance. He strongly opposes Cæsarian section for this complication of pregnancy.

To offset any prejudice that may be acquired from a study of his investigations, I refer you to another column of mortality statistics in a paper by E. Gustave Zinke,³ read before the American Association of Obstetricians and Gynecologists, Sept. 18, 1901. From thirty authors he finds an average maternal mortality of 25% and a fetal mortality of 65.21%. In his own cases there was a maternal mortality of 17.5% and fetal of 55%. He says: "I firmly believe that Cæsarian and the Porro operations are perfectly legitimate, and elective procedures in all cases of placenta previa, central and complete, and especially so when the patient is a primipara, when the os is closed and the cervix unabridged."

In justice to Ehrenfest, it should be said that the cases in his statistics were collected since 1898.

It is hoped that in the future reports of cases an analysis of the degree of previa will be given, also the mortality in each variety.

Of 234 cases of placenta previa reported by Schauta,⁴ 50 were complete. Of this number there was a maternal mortality of 18% and a fetal mortality of 70%.

Of 75 cases reported by Higgins⁵ from the records of the Boston Lying-in Hospital, 25 were of the complete variety. Of these six died, or 24%.

Jardine⁶ reports 12 complete previa, with a maternal mortality of 16½% and fetal mortality of 66½%.

Jewett's "Obstetrics," 1899, gives 739 collected cases, with 166 deaths, 109, or 14.7%, of which were complete.

Gillette,⁷ by direct correspondence with leading obstetricians at maternity institutions of this country, received reports of 216 cases of placenta previa. Of the 216, 88 were complete, and of this number 20 were lost, or 22.7%; 66 of the babies, or 70.5%.

F. A. Dorman⁸ reports 84 cases of previa treated at the Sloan Maternity Hospital; maternal mortality in all cases was 12%, fetal 45%. In a personal communication from Dr. Dorman he informs me that of the complete type there was a maternal mortality of 17.7%.

From the above statistics, we find in complete previa an average maternal mortality of 18.9% and a fetal mortality between 65 and 70%. These results were attained in maternity hospitals by expert obstetricians, and will probably never be much lowered by any vaginal method of treatment.

It is this high, though conservative estimate of the mortality in complete placenta previa that we aim to reduce by Cæsarian section.

In partial previa the maternal mortality by version probably does not exceed 5%. But in obtaining this low figure, half of the babies are sacrificed in delivery, by obstruction of the circulation through

¹ Read before the Obstetrical Society of Boston, Jan. 20, 1903.