

# BRUCE JOHN MITCHELL

The Lettsomian Lectures on  
Diseases and Disorders of the  
Heart and Arteries in Middle and  
Advanced Life [1900-1901]

**John Bruce**  
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# **The Lettsomian Lectures on Diseases and Disorders of the Heart and Arteries in Middle and Advanced Life [1900-1901]**

## **LECTURE I**

Mr. President and Gentlemen, – My first duty this evening is to thank you, which I do most heartily and gratefully, for the honour you have done me by selecting me to deliver the Lettsomian Lectures for the present year. My second duty is to spend as little time as possible on preliminary remarks, for – as you, Sir, know, having yourself occupied this distinguished place on a former occasion – three hours are all too brief for useful presentation of material which one has collected for a purpose like the present. In selecting the subject of my Lectures I was mindful of the character and objects of this Society. In the Medical Society of London there is a fuller blending

of men engaged in family practice with men holding hospital appointments than is the case at most of the other learned societies connected with our profession in London; and there is here an opportunity for free communication of experience and interchange of opinion between these two classes of our Fellows which cannot fail to be profitable to both. Therefore, I have taken up a subject of thoroughly practical interest; and not only this, but I will attempt to present it to you, to put you in a position to look at it, from the point of view of the practitioner. The problem of the diseases and disorders of the heart and arteries in middle and advanced life may be said to come before the family practitioner every hour of his work, and to offer difficulties and create a sense of responsibility or even anxiety which are not sufficiently appreciated by the hospital physician. There comes before him the case of one of his patients, an active business man of 45, who has been seized with angina pectoris when hurrying to the station after breakfast, or that of an old friend, whose proposal for an increase of his insurance at 50 has been declined because of arterial degeneration and polyuria; or he is asked to say whether a man of 60, occupying an important and possibly distinguished position in the community, ought to retire from public life because he has occasional attacks of præcordial oppression and a systolic murmur at the base of his heart. What, again, is he to do for the stout, free-living man, just passing the meridian of life, who consults him for weakness and depression, whose heart is large and feeble, and the urine saccharine and

slightly albuminous? There is not one of my audience who has not met with such cases as these many times in his practice, and a variety of other cases of cardiac disorder and disease after 40, where the importance of the individuals, the value of their lives, and the gravity of their complaints and their prospects have exercised him very anxiously. What is the prognosis in cases of this order? What can be done for them in the way of treatment? These are the questions which we would desire to answer usefully. The answer, it seems to me, can be given only after an analysis and study of a considerable number of instances of the kind, in respect of their origin, their clinical characters and course, and the result. This is the method of inquiry which I propose to follow. It will be a study of cardio-vascular disease in older subjects from the clinical point of view, and it will be approached not only from the ordinary clinical side as it is approached in hospitals, that is, by an investigation of symptoms and signs, but also and especially in the light of that particular order of knowledge which the family practitioner has learned to appreciate and has so intimate an opportunity to acquire correctly – a knowledge of the origin or causes of the different affections, which it is always difficult, and often impossible, for the hospital physician to ascertain. For the same reason, although, to be complete, a study of the diseases of the circulation at and after middle life should include an account of the *post-mortem* characters found in fatal cases, and whilst the basis of the account I submit to you will be essentially pathological, I shall

not attempt to describe the pathological anatomy and histology of this group of lesions of the heart and arteries. This part of the subject has been remarkably advanced during the last few years; and even if I had the time and the necessary knowledge to deal with it now, I should have nothing original in it to lay before you. Indeed, if I may venture to say so, our attention lately has been too much confined to the pathological states of the heart and arteries and too little directed to the causes which produce them. "Arterial sclerosis" is now an ordinary diagnosis in every-day practice, as if it were sufficient for purposes of prognosis and treatment to have determined that the radial artery is thicker and longer and more dense than normal, without regard to the actual nature of the pathological change, whether strain, or syphilitic, or gouty, or otherwise. And in the same way the phrase "dilatation of the heart" is now in everybody's mouth, irrespective of considerations of its origin. Not only has the profession suddenly woke up to the recognition of a form of enlargement of the heart which was fully described fifty years ago by physicians in our own country, but the public have made "dilated heart" a fashionable disease which calls for the advice of a specialist and an annual visit to a Continental spa. We ought to have advanced beyond this stage of cardiac pathology long before this time. Besides, of how much greater interest is it in our every-day work to study the causes or circumstances that lead up to disease than the simple state of disease itself! And there is in a study of this kind an opportunity afforded to the family

practitioner of advancing Medicine – scientific, preventive and therapeutical – as surely as if he were a pathologist in the *post-mortem* room or laboratory.

Before, however, examining the influences and circumstances which disorder and damage the circulation in middle and advanced life, let us see what the normal or natural state of the heart and arteries is after 40. It has been ascertained that the different parts of the circulatory apparatus pass through certain definite phases of change in the different stages of that decline of existence and energy which leads to senility and ends in death. We have to thank Professor Beneke, of Marburg, for the results of a laborious investigation of this subject which are generally accepted and which I will attempt to summarise.<sup>1</sup>

We should all expect the cardio-vascular system to undergo important changes with increasing age; but few of us would be prepared to find that these changes are neither uniformly progressive nor indeed continuously progressive in the same direction. To make more easily intelligible the nature and as far as possible the origin of these anatomical alterations in the heart and arteries during the second half of life, I will first refer for a moment to the circulation from 20 to 45. During this period of life the blood-pressure is relatively high, reaching its maximum about 36; the aorta and other large arteries increase in diameter from the stress of the blood-pressure on their elastic walls, particularly between 35 and 45, and the heart increases

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<sup>1</sup> F. W. Beneke, 'Die Altersdisposition.'



in size year after year at a nearly uniform rate. We have in these facts anatomical evidence of the great functional vigour and activity of the circulation in manhood. At 45, which is practically the commencement of the period with which we are concerned, remarkable changes occur. Whilst the arteries continue to increase in circumference (somewhat more slowly than before), the blood-pressure falls and the heart begins – almost suddenly – to diminish in size; and these three features characterise the circulation for the next 20 years, that is, until the age of 65. How is this fall in the size of the heart to be accounted for? Partly by the widening of the arterial trunks and the consequent fall of pressure. But not by these only; for although the arteries had been widening even more rapidly between 20 and 45, the pressure was actually at its maximum then and the heart large, and we shall presently find other facts opposed to this view. The peripheral resistance in the systemic arteries must fall from some other cause or causes in middle age than the loss of elasticity of the arterial walls, and these causes are probably reduction of mechanical stress, due to comparative bodily relaxation, loss of vaso-motor tone in the splanchnic area, and the chronic diseases of which the subjects have died whose hearts and vessels are measured *post mortem*. During this phase of life also, the blood becomes more venous in quality and its hæmoglobin value is lowered.

At 65, other changes which occur in the heart and arteries are not less striking than those which I have just described. The

decline of circulatory energy, and the effects of time itself on the protoplasm of the cells of the body, have so lowered the metabolic and functional energy of the tissues and organs and the activity of the blood-supply, that a considerable proportion of the capillary network becomes obsolete. The peripheral resistance is thus increased, and the blood-pressure rises; therefore the heart once more increases so much in size that at the end of the 10 years (age 75) it is found as large as it was at 45, and at the same time the hæmoglobin value of the blood again proves to be higher. During this period, also, the arteries continue to grow wider and thicker and longer – another proof that the size of the heart is not determined solely by their calibre. Regarded as a whole, the process of senescence of the cardio-vascular system presents to us a beautiful instance of anatomical readjustment and compensation – the counterpart, in a way, of the growth of the circulation in energy and activity during the period of full manhood. The arterial walls, which have been stretched in their diameter and in their length by exhaustion of their elasticity under the stress of cardiac systole, are strengthened afresh by the development of stays formed of fibroid and muscular tissues in the intima and media; and the heart responds to the altered mechanical condition ahead of it in the arteries, and to the increased peripheral resistance caused by the obsolescence of many capillaries, by growing afresh.

This account relates to the size of the arteries after 40; now let us inquire what is the condition of their structural elements. The

changes described do not necessarily involve disease of the tissue elements, unless we were to call every senile change morbid. My friends Dr. Bosanquet and Dr. Mullings have given me an account of the state of the heart and aorta in the bodies of 25 men, aged 40 and upwards, examined in the *post-mortem* room of Charing Cross Hospital, who had died from accident or suicide. The average age was 53½ years, and the aorta presented some degree of atheroma in half the cases. When we consider how very slight a change in the arch of the aorta is habitually described as "atheroma," and that in a few of the cases the valves were diseased and the heart enlarged, we are justified in concluding that in the majority of persons of 53 the arteries are still sound. This result is in accord with that obtained by the late Professor Humphry, who devoted his attention so long and so successfully to the investigation of old age. He states that in the great majority of cases the arterial system appears to present a healthy condition in those who attain to great age.<sup>2</sup> Even among the majority of centenarians the evidences of arterial degeneration were not manifest.<sup>3</sup> And we know that we occasionally meet with people of 80 and upwards whose pulses are unexceptionable, beyond presenting a trace of thickening and enlargement.

For my present purpose, therefore, we may conclude that as age advances, the arteries naturally become wider, longer and thicker, and altogether larger than in early life; and that we must

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<sup>2</sup> Humphry, 'Old Age,' 1889, p. 23.

<sup>3</sup> *Op. cit.*, p. 48.

not speak of "vascular degeneration" in an evil sense as often as we find these conditions present. As for the heart, we know that it may remain structurally sound, and is more often regular than irregular, to the most advanced years of life. Conversely, these facts suggest that actual diseases of the arteries and heart, that is, other than the changes which are found in all persons after 45, are not properly senile in their nature. As Professor Humphry said, they are no part of, but are rather to be regarded as deviations from, or morbid departures from, the natural phenomena.<sup>4</sup> They must be the effects of pathological processes due to a variety of pathogenetic influences which assail the circulation. Now we are in a position to study these.

After the age of 40, many of the influences that threaten the heart and arteries with disorder and disease are peculiar to this period of life – that is, different and distinct from the causes of cardiac and vascular affections in childhood, adolescence and manhood; others of them have been encountered already, with or without permanent damage as the result. I will now examine them in detail, and at the same time refer to certain provisions with which the heart and arteries are endowed for resisting them and recovering naturally from their effects, as well as to the circumstances which render these provisions abortive or insufficient, and thus predispose to disease or indirectly determine its occurrence.

1. *Physical stress* is still a definite cause of cardiac and vascular

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<sup>4</sup> Humphry, 'Old Age,' 1889, p. 15.

damage during the second half of life, in the forms both of sudden violent exertion and of ordinary laborious occupations. I have met with instances of acute and serious strain at all ages over 40, up to and even after 70. I am aware that I must speak on this part of my subject – the evil effects of muscular exercise – with great caution in the presence of you, Sir, our President, who have long been recognised as one of the principal patrons in our profession of athletic sports, and so highly distinguished yourself in them at Oxford and in the inter-University contests. I assume that you are unwilling to admit that muscular exercise is dangerous to health. But I feel sure that you will agree with me that when the man of 65 rushes from his breakfast-table to catch his train, or the lady of 70 hurries up a hill in Wales to be in time for morning service, or the middle-aged father on holiday, who has just started a bicycle in order to reduce his weight, takes the pace from his son of 17, the effect on the heart and arteries is likely to be serious. I have notes of a good many cases of cardiac strain in middle-aged and old persons from cycling; a very few from violent efforts to drive at golf; a few from efforts at lifting or resisting heavy weights; and one notable case in which a member of our own profession, a man of 45, belonging to the Royal Army Medical Corps, broke down with acute cardiac dilatation during General French's memorable ride to relieve Kimberley. In some of my cases there was no reason to believe that the heart was other than sound before the strain; but in a majority of them (and I have analysed 40, of which I have more or less full notes)

one or more of the safeguards of the circulation against strain were already defective or wanting. What are these? In the heart, chiefly a high degree of extensibility or elasticity of its tissues, permitting over-distension of the chambers, with safety-valve action of the tricuspid in extreme cases, and a sound and vigorous musculature to effect the increased action, and if necessary the hypertrophy, which mechanical stress demands – in a word, healthy, well-nourished cardiac walls. It is an interesting fact that two-thirds of my cases of cardiac strain in the second half of life presented also a history of gout, fully developed or irregular – in other words, a history of perverted metabolism. Equally striking is another fact in this connection: that in many cases the occurrence of strain in middle or advanced age was but the latest of a series of similar events as the result of muscular effort for a period of 10, 20, 30, 40, or even 50 years – in other words, the heart had been strained originally in youth or early manhood, and had given serious trouble as often as it was taxed again. Rowing or running at college was in a good many instances given as the cause of the first strain. I need not do more than mention previous valvular disease, usually of rheumatic origin, as a condition powerfully predisposing to cardiac injury by physical exertion. Excepting in this indirect way, rheumatism has no effect in lowering the resistance of heart or vessels to mechanical stress.

The principal safeguard which the arteries possess against strain is, of course, the extensibility and elasticity of their tissues. Unfortunately the metabolic disorders, including gout, which we

have just found weakening the cardiac walls, are amongst the commonest causes of arterial degeneration also; and the two influences – gout and strain – acting together no doubt are accountable for a considerable number of cases of atheroma and chronic arteritis. It naturally might occur to us that gout and exertion could not well be associated, but this very consideration serves to explain their mutual influence in straining the heart. It is unwise, ill-timed, ill-planned muscular exercise that injures the circulation, most often on the part of the middle-aged man, who, awaking to the consciousness of growing fat and gouty, rushes inconsiderately to violent exercise for relief.

2. It is generally recognised that nervous excitement and other *nervous influences* tax the circulation; and endless phrases and expressions, articulate and inarticulate, testify to the universal belief in the close connection between the heart and the emotions. Quite recently Dr. Leonard Hill and Dr. George Oliver have demonstrated instrumentally the rise of blood-pressure that accompanies cerebral activity.<sup>5</sup> No doubt many cases of disorder and disease of the walls of the heart and arteries originate in distress, worry, anxiety and protracted suspense; and the connection is most often seen in middle and advanced life, because these depressing emotions fall most heavily upon mankind at this period. Of the instances which I have met with I will mention but one or two by way of illustration. A member

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<sup>5</sup> Leonard Hill, Allbutt's 'System of Medicine,' vol. xii; George Oliver, 'The Blood and Blood-Pressure,' p. 170, 1901.

of the Reform Committee at Johannesburg at the time of the Jameson Raid, who had been confined in Pretoria Jail, came home sometime afterwards with the ordinary symptoms and signs of fatty degeneration of the heart, and died suddenly on the street. A detective officer who had tracked suspects and criminals all over the world, facing great personal danger, and on one occasion had to convey a parcel of dynamite found near a Government office to a place of safety many miles away, came under my care later on with arterial sclerosis and cerebral thrombosis, for which no other cause but a life of adventure could be discovered. These were cases of actual disease of the heart and arterial system respectively; and I need not add that disturbances or disorders of the circulation, of every degree and variety, the result of nervous excitement or depression, come constantly under our observation, especially in women. I would particularly mention, however, a group of cardio-vascular troubles that lie between these two extremes. I have frequently observed that persons of anxious and energetic temperament, burthened with responsible work of a heavy, constant and prolonged character, when they break down, as they often do, present the clinical features of high tension: the pulse is full, the heart is large, the second aortic sound is loud and ringing; there is polyuria, and a trace of albumen may be found. This disturbance of the circulation, strongly suggestive of contracted kidney, is as common in women as in men – for instance, in matrons of schools or hospitals. Nevertheless,



however clear the direct connection between nervous strain and cardio-vascular disease may be in many instances, it is in other instances unreal, or more correctly indirect only. This is a matter of great practical importance. First, the nervous temperament often drives the subjects of it to physical overwork in the form of incessant and prolonged devotion to work, with insufficient hours of rest and sleep, and to unwise attempts to remove nervous exhaustion by violent muscular exercise, as we have just seen. In the second place, alcohol undoubtedly plays an important part in many instances regarded as overwork and worry and nervous exhaustion, both in men and in women – alcohol taken to enable more work to be accomplished, to steady the nerves, to promote sleep, to drive away care, or to relieve the faintness which it has itself induced. And thirdly, many of the complaints of nervous depression, lowness and worry are really due to gout, to influenza, and the like, which are at the same time the true causes of the cardiac symptoms.

3. What I have just said in connection with nervous causes of cardio-vascular affections brings us naturally to that important group of agents which may be summarily called *extrinsic cardiac poisons*— alcohol, tobacco, tea, coffee and lead. I will not dwell on this subject at present, for there is no need to prove the reality of the connection, and I shall have occasion to refer to some of these poisons at greater length under the head of diagnosis. Alcoholic heart occurs both in men and women; tobacco heart is extraordinarily common in our own profession, and common

in clergymen and in retired members of the public services; tea-, coffee-, and cocoa- poisoning I have met with principally in students.

4. There can be no question but that by far the most prolific causes of cardio-vascular disorder and disease after 40 are *disturbances of metabolism*, including gout – at any rate amongst the middle and upper classes in this country. This period of life brings with it in many instances comparative relaxation from work, and a disposition to substitute quiet or even passive for active exercise; and whilst the demands of growth and development on the alimentary system have greatly declined, the pleasures of the table and ease generally are too often indulged in as a privilege of advancing years and the legitimate reward of previous years of work. The results are functional disorders of the liver, gout in regular and irregular forms, gravel, and the many associated disorders of the muscular, nervous and other systems. At the same time the arterial tension rises, for the body possesses a physiological provision for eliminating the nitrogenous products of metabolism, whether normal or abnormal, namely, the kidneys, the vaso-motor mechanism and the heart. Stimulation of the vaso-motor centre by nitrogenous waste raises the arterial pressure; the heart is excited to more vigorous contraction (if necessary it hypertrophies); and the consequent polyuria washes the intrinsic poisons out of the system. Thus it happens that in metabolic disorders, from excessive or unwholesome eating and drinking, the heart, vessels

and kidneys are kept under incessant strain; and, like other organs working under strain in the gouty subject, they are the readiest to suffer – first from disorders of many kinds, and ultimately, unless reform be enforced, from cardio-vascular degeneration and chronic Bright's disease.

Of the many cases of this kind that I have seen at all ages between 40 and 80 (and others before 40), the proportion of irregular gout to acute articular gout was about 3 to 2. Under irregular gout I include goutiness in its many forms – sick headache, eczema, sciatica, lumbago, acid dyspepsia, irritable bladder, asthma, insomnia, vertigo, depression, and the familiar complexion and appearance generally of "the gouty individual," all variously combined.

In other cases the metabolic disturbances come before us not as gout or even goutiness in the ordinary acceptation of the term, but in the forms of obesity, of diabetes, of gravel, of irregular albuminuria, and of the effects of large eating and free living in general.

5. *Syphilis*– that fruitful cause of vascular disease, and both directly and indirectly of cardiac disease – has by no means ceased to attack the organs of circulation after 40. Whatever the date of the primary infection, syphilis is a standing danger to the heart and arteries in the middle-aged man and even in declining years. Thus, in 11 cases belonging to this group, the average age at which they came under my observation (most of them but not all complaining of cardiac distress) was 55. All of these were

men. I ought to add that in a considerable proportion of the cases either physical strain, alcohol, tobacco or Bright's disease was associated with syphilis in the etiology, and sometimes more than one of these.

6. For the man and woman of forty years of age and upwards, most of *the acute specific fevers* are affairs of the past. But the liability to several of them remains, and, very unfortunately, the liability to those acute specific processes which may attack the cardio-vascular system – influenza in particular, and less often typhoid fever, rheumatism, diphtheria and pneumonia, as well as septicæmia of different forms or kinds, which works havoc throughout the entire circulation. I should have had more to say under this head but for the fact that our distinguished Fellow and former President, Dr. Sansom, has thoroughly investigated it, and on more than one occasion laid the results before you.

7. I will not occupy your time this evening in tracing the origin of certain cases of cardio-vascular disease in middle and advanced life to *chronic affections* of different kinds. Besides the obvious effects upon the heart, blood and blood-vessels, of anæmia, exhaustion, &c., we meet with such grave lesions as fatty degeneration from pernicious anæmia and other blood disorders; profound circulatory derangements and occasionally valvular lesions in Graves's disease, and others.

8. I now pass on to *complex causes*. In addition to the definite and distinct influences which I have mentioned as threatening the heart in this stage of life, there are two which

are intimately associated with other causes of cardio-vascular disease, but still deserve to stand out independently. The first of these is emphysema, and along with it other chronic affections of the lungs and pleura, which strain the right ventricle; the second is chronic Bright's disease, which similarly strains the left ventricle. I shall have frequent occasion to return to these two morbid states in different parts of my subject. I mention them here to give them the position which they deserve as influences that threaten the function and still more the structure of the heart and arteries. They are often associated with each other, and each or both of them with one or more of the unfavourable influences I have just enumerated, particularly alcohol, disordered metabolism and gout. And this brings me to the many instances in which the different influences that threaten the circulatory organs in middle and advanced life act together in different combinations. Alcoholism is equally common amongst the poor, whose circulation is subjected to mechanical stress, whilst it is impoverished by want; the well-to-do, who lead luxurious, sedentary enervating lives; and, as I have already observed, the keen active business or professional man who overworks his brain on stimulants. In this country at least, gout appears to be all-pervading, and as an unfavourable influence on heart and vessels it often cannot be dissociated from alcohol, sedentary habits, worry, plumbism, Bright's disease and emphysema.

Thus, in our study of combinations of morbid influences we

come to appreciate the evil effect of certain *occupations* upon the circulation in middle life. The business man is exposed to the unhealthy actions on his heart of confinement to a close office or shop, worry, irregular hasty feeding, alcoholic indulgence in connection with his trade or profession, and unwise attempts at violent muscular exercise at the week-end or in the holiday season; or he may be guilty of entire disregard of the rules of bodily and mental hygiene, and bring on in this way premature degeneration of his cardio-vascular system. Still more numerous are the causes at work in the production of "soldier's heart." We have but to picture to ourselves, if we can, the physical strain, the mental excitement, the bodily hardships – including exposure to both extremes of temperature – and the coarse fare which have been the lot of many thousands of our brave troops in the Boer war, to understand how the fighting soldier "ages" quickly, and, in particular, ages in his heart and arteries. Add to these unfavourable influences syphilis, alcohol and tobacco (which, unfortunately, must be added in many instances), and the chance of escape from disease of the circulation in the soldier is practically *nil*. But "soldier's heart" is also met with elsewhere than in the army. The clergyman from the slums of London or other great city, who has lived and toiled and – it may be said truly – has fought with various success through alternate periods of excitement and depression, and has thus suffered much both in mind and body, comes to us with high-tension pulse, a tortuous radial artery, a large heart and a systolic murmur over the aorta,

and complains of an attack of angina. His wife, who has laboured in the parish for years (she is 76, and still active in her work of charity), has also a thickened radial artery, a large heart, and a systolic basic murmur, with no discoverable cause of these evidences of a diseased circulation but the life that she has led amongst the poor around her. Perhaps such cases of cardiovascular disease might be most correctly said to be due to the wear and tear of life. They are met with also in the traveller or explorer, who has spent most of his life in search of adventure; and they are found in a man who has never left home, but whose years have been filled with the toil and anxiety of his position as an owner of land, or with prolonged litigation.

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