The Relation OF HEART DISEASE AND PREGNANCY.

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IN FOUR SECTIONS—SECTION I.

INTRODUCTION.

THERE are few subjects in medicine of which an accurate knowledge is more urgently required than that of a woman's fitness for child-bearing. That a great strain is thrown upon the maternal heart during pregnancy and labour is well known. It is a matter of experience, too, that the pregnant state may throw more work on the heart than it can bear, with the result that the mother's life is lost, or her health irreparably impaired. The child, too, often dies. These disastrous happenings surround a natural process with dread and mystery, for the dread is aggravated by the fact that the source of danger is not clearly realised. As a result, all sorts of signs are looked upon with suspicion—signs innocent as well as signs grave. Needless to say, this obscurity does a great deal of harm. Many women are subjected to unnecessary alarms and restrictions when pregnant; others have to suppress the natural desire of motherhood; while connubial relations are often disturbed by warnings and hints of dangers which may never arise.

Defect in Medical Knowledge.

This unsatisfactory state of affairs is entirely dependent on a defect in medical knowledge which it is quite possible to remedy. That the matter is not worse is in a measure due to the fact that the vast majority of women, especially women of the working-classes, never have their hearts examined. Were they systematically examined, abnormal signs would be discovered in many instances; the significance of these signs would not be understood; grave doubts would be aroused. Thus, many who have passed unscathed through the pregnant state would have been unnecessarily frightened and alarmed.

When we seek for an explanation of our ignorance on this subject we find that it is due to the fact that medical knowledge has not advanced far enough to enable us to understand the meaning and significance of certain physical signs. Moreover, we find a new difficulty when we come to ask ourselves in what way our lack of knowledge can be made good. Gradually it is forced on our minds that if we would understand clearly defects and their origins we must go back to the beginning and consider the way in which, at present, the subject-matter of these chapters is investigated and taught.

The teaching of disease of the heart comes within the province of the physician. When, however, one comes to estimate the opportunities the physician has for dealing with the relation of heart disease to pregnancy, one soon discovers that his practice never brings him into contact with pregnant women except when one of these latter is referred to him for an opinion. On these occasions it frequently happens that, instead of frankly recognising that his experience does not justify him in claiming a knowledge of the subject, he gives a prognosis of the "guarded" type. He says in effect: "The patient may undergo pregnancy safely; on the other hand, there is a possibility that she may not." The effect of this is that the patient is left with a vague notion that some dread fate hangs over her head. In other instances the physician "plays for safety," and forbids the pregnancy, yet these patients may be perfectly capable, in many cases, of undestaking it.

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The obstetric physician, if we may judge from modern text-books, has never taken the trouble to understand the elements of cardiology; in consequence he continues to pursue his enigmatical methods. While the advances in cardiology are barely mentioned in books on general medicine, they are not dealt with in books on obstetrics. In the recent text-books on this latter subject which I have read there is not the slightest indication that any advance has been made in the study of the heart during the last forty or fifty years—the writers apparently being unconscious of the revolutionary changes which have taken place in our knowledge of this organ in this period of time.

I am emphasising this point for reasons which have only an indirect bearing on the matter in hand. I wish my reader to visualise clearly the methods peculiar to medical investigation. Pregnancy is not the only condition which is shrouded in darkness. There are a great many other questions of a similar kind which are an integral part of the practice of medicine and which await inquiry. No progress, I believe, can be made in regard to them till it is understood how medical investigations should be conducted. The matter of heart disease and pregnancy serves thus as an illustration of a wider difficulty. It shows, if we will but learn the lesson, how completely our present-day method of medical research fails of its purpose. It is my aim to indicate the nature of this failure, and to explain in what manner I conceive that success may be attained.

Personal Experiences.

My attention was early directed to the subject of Heart Disease and Pregnancy by a tragic experience which occurred soon after my entrance into general practice, about forty years ago. I attended a young woman, 35 years of age, for a miscarriage at the third month of her first pregnancy. I discovered then that she had a presystolic murmur; so far as my investigation of the condition went, there was nothing more the matter with the heart. I had a vague notion that mitral stenosis was a serious embarrassment to the heart in pregnancy, but of the source of danger and its nature I had no knowledge. The woman left my neighbourhood for a year, at the end of which time she returned to her father's house, seven months pregnant, and with a considerable cedema of the legs. This cedema increased until, when labour set in at full time, she was much swollen not only in the legs, but in the abdomen. The external genitals were so cedematous that an examination per vaginam could be carried out only with difficulty. As the labour proceeded little progress was made; the suffering was very great, and there was marked distress in breathing. The patient had to lie propped up in bed, a position which rendered the use of instruments impossible. Moreover, so profound was the sense of suffocation that attempts to give chloroform were resisted. Two practitioners of much experience saw her, but after many hours of suffering she died undelivered, from extreme exhaustion.

I had, at that time, a fairly large midwifery practice, and, on several occasions during the next few years, I had some rather trying experiences in attendance on women with heart trouble, though no other case proceeded to such a disastrous ending. I noticed, however, that in a number of patients with damaged hearts the pregnancy further impaired the functional efficiency of that organ. The importance of this being thus forced upon me, I read carefully all the available literature. This, indeed, confirmed the view I had formed as to the danger in mitral stenosis, but gave me no enlightenment about the risks in other forms of heart affection. There were many vague hints of the evils arising from valve lesions, but of sufficiently definite information to enable me to recognise which types of these lesions were to be feared there was none. Even the changes occurring in the normal heart during pregnancy were very imperfectly described.

State of Knowledge of Cardiac Phenomena.

I made a note of the results of my reading, and propose to give the gist of it here as a kind of review of the state of knowledge of cardiac abnormalities prevalent forty years ago. That this may be found strangely apposite to-day by certain of my readers will only show, I fear, that the attitude of the profession of those early times is still the attitude of the bulk of teachers and authors. Indeed it seems to me, as I turn back to these old pages, that the trend of modern medicine, both in teaching and investigation, is to render the solution of such problems as the relation of pregnancy and heart disease impossible. Before the discovery of auscultation and the use of the stethoscope, about 100 years ago, experienced physicians estimated the state of the heart by its manifest functional efficiency; and in reading the authors before that date, I find that many of the views which I have arrived at were anticipated by them. There is no doubt in my mind that the line pursued by those physicians was sounder than that which has been followed since the introduction of mechanical devices. The coming of the stethoscope was the beginning of a method in clinical research which has greatly hampered the practice of medicine, in that the introduction of mechanical methods has led to a confusion as to the kind of knowledge which these methods are capable of affording. This criticism applies not only to the stethoscope and its various modifications, but to all the other instruments which have since been employed in the examination of the patient. I need mention only the sphygmograph, polygraph, electro-cardiograph, and blood-pressure instruments.

The discovery of the sounds of the heart and the various modifications of these sounds was followed by a period in which a great deal of time was spent on auscultation and on the discussion of the phenomena revealed by it. At first the cause of the cardiac sounds was not clear; a long series of observations, experimental and clinical, was therefore undertaken, to find out the manner in which the sounds were produced. I do not dispute that a great deal of valuable knowledge was thus accumulated.

One unfortunate consequence of this concentration upon the new method, however, was to give it a preponderating importance in the examination of the heart, and to minimise the value of the study of other phenomena, with the result that unjustified conclusions were drawn from mere modifications of the sounds. This, as has been indicated, was an error inherent in the view taken, at that time, of the possibilities of the new instrument. The physician who detected an abnormal sign supposed that in detecting it he had obtained information of a sort hitherto only obtainable by a test of functional capacity. He believed that he had gained knowledge entitling him to make a prognosis without the labour of determining how far the patient's activities were already curtailed. What he failed to see was that so long as he did not know the mechanism of production of the abnormal sound, nor the after-histories of people who might have this abnormality, he could not properly base conclusions on its presence. Thus, in reading the early literature of heart affections, since the introduction of the stethoscope, we find a grave significance attached to the presence of a bruit, at a time when the cause of the bruit was unknown and the kind of information which it conveyed was not understood. I have sought for an explanation of this rather astonishing state of affairs. I find it, I think, in the probability that a physician, examining dying patients in whom a bruit was present, would attribute the failure of the heart to the cause of the bruit. That this is the correct explanation is rendered more likely because we find similar reasoning following the discovery of a sign by any new method. Thus, to-day, physicians and "heart specialists" may be observed attributing serious significance to peculiarities detected in graphic

or electro-cardiographic records or in blood-pressure readings before they understand the nature of the signs on which their gloomy forebodings are based.

I dwell on this to draw attention to the fact that medical knowledge has not even yet advanced so far as to enable investigators to understand the principles which should guide them in recognising the significance of an abnormal sign. They do not know how to apply their observations in practice, nor what steps to take to obtain an estimate of their significance. This statement may seem to be an exaggeration; if, however, the reader will consider the methods, to be described later, which I was compelled to employ in order to find out the significance of a symptom, he will, I think, realise not only that a defect in knowledge existed, but also how it came to exist; and why it is still with us.

The hasty conclusions formed by the early observers in regard to the significance of murmurs have hung like a mill-stone round the necks of the profession; to-day these conclusions mislead the vast majority of doctors, and cause much unnecessary trouble and injury to people in many walks of life.

THE NORMAL CHANGES IN THE MATERNAL
CIRCULATION DURING PREGNANCY, CONFINEMENT,
AND THE PUERPERIUM.

Methods of Investigation.

In my endeavour to find out wherein lies the danger of pregnancy to women with heart disease, I experienced most difficulty in determining how to set about such an inquiry. The study of patients with damaged hearts proved fruitless and misleading, for I was not able to tell the significance of some of the symptoms. I had already supposed certain of these latter to be abnormal and of grave significance, on grounds which I was coming to recognise were insufficient. At last I realised that it was necessary for me to understand the phenomena which occur in healthy women if I was to form a clear idea of the changes taking place in consequence of the accommodation of the circulatory system to increased work.

I began, therefore, to observe women during their confinements, noting all the signs which I took to be departures from the normal, and also those which occurred as a consequence of the straining during the labour. I soon found quite a number of changes; for example, modification of the sounds, murmurs, irregularities, displacement of the apex beat outwards to the left, some dusiness of the countenance, and so on. Some of these signs were modified or disappeared during the puerperium. I was at a loss to explain their presence or their significance, and I saw that the subject required far more thorough investigation. I recognised that it would be necessary to watch the onset of these signs, and the conditions or factors which caused them; then, it would be necessary to watch patients for a long time after their confinements to see if the signs disappeared or remained to give rise to trouble in the future. This latter part of the problem was one of extreme difficulty. For it was not only necessary to note the progress of the patient, but also to find an intelligent method of estimating the significance of the changes which might be observed.

In the routine of my work as a general practitioner, I had opportunities of seeing women before they became pregnant. I made careful notes of the state of the heart and circulation in such of these as I expected would become pregnant. When they consulted me afterwards for early troubles, such as sickness and vomiting, I examined their hearts at intervals. Further, I examined those who bespoke my service for their confinements, and kept them under observation till labour began. As time went on, I found that one sign after another required particular observation, and so I had to adopt special methods to obtain the information I desired. Thus I found oedema of the lungs to be a very important matter in heart failure, and its relation to the pregnant

state had to be specially considered. I found, too, that the embarrassment of the circulation increased during the last months of pregnancy, and that a number of new symptoms appeared then; for example, murmurs, irregularities, and pulsation of the veins of the neck. It was necessary to know exactly when such changes began; so I used to ask the patients to stay in bed on certain days till I had visited them. The different points were carefully noted. Finally, the significance of these signs, as they were related to the heart's efficiency, had to be considered. This led to an inquiry, extending over many years, which is not yet complete.

I will deal specifically with the more important symptoms in later chapters; here I propose to summarise the results of the alterations which occur in healthy people.

CHANGES DURING THE EARLY MONTHS OF PREGNANCY.

Practically no changes in the circulation could be detected in the early months of pregnancy. Sometimes sickness confused the picture, bringing in its train exhaustion, and variations of the pulse rate, but as time went on these disappeared.

Limitation of Response to Effort.

Towards the sixth month the response to effort began to be restricted, i.e. breathlessness appeared after an amount of exertion which had hitherto been accomplished in comfort. As a rule this never became extreme, and the woman was able to attend to her household duties; she felt the breathlessness chiefly on going upstairs.

Effect of Increase in Size of Uterus.

About the seventh month the uterine tumour altered the shape of the chest—widening it out so that the circumference gradually increased. The chest was measured immediately under the breasts and, as full time approached, the circumference increased considerably in some cases. Immediately after delivery the circumference diminished, and day by day it decreased till some weeks after confinement it had returned to normal.

The following are a few examples:

	CASE 1.	Inches.
At full time		28
Immediately after birth of child		25½
Four days after birth of child		24½
	CASE 2.	
At full time		26½
Immediately after birth of child		26
Seven days after birth of child		26
	CASE 3.	
At full time		29
Immediately after birth of child		26½
One day after birth of child		25½
Three weeks after birth of child		23½

Displacement of the Heart.

Coincident with the change in the chest circumference the heart was frequently displaced until the apex beat was pushed out one inch beyond the left nipple line, and upwards to the fourth interspace. After labour the heart gradually swung back into its normal position.

Hypertrophy of the Left Ventricle.

It is well to bear this normal displacement in mind. For a long time it has been held that the left ventricle hypertrophies during pregnancy and undergoes some sort of involution after confinement. The evidence for this view has been based chiefly on theoretic grounds, on some very imperfect post-mortem observations, and on the displacement of the apex. Further, the safety of chloroform anaesthesia during pregnancy has been attributed to the same circumstance. No evidence of hypertrophy could be perceived.

Stasis of the Lung.

Accompanying this widening of the chest, there is a tendency for stasis to occur at the bases of the lungs. This will be dealt with in speaking of the failure of the right heart. In order to estimate the factors which embarrass the right heart, the lessened effect of the movements of respiration had to be considered. I found that normally there was a tendency to stasis even in healthy women when pregnant. In the periodic examination of pregnant women I found that a few of these, after lying in bed all night, had crepitations at one or both bases. These crepitations disappeared after one or two deep breaths, and were never present during labour. They returned for a few days after the confinement. The meaning and significance of this sign will be discussed later.

Venous Stasis.

A variety of phenomena appeared on the venous side of the circulation. In a number of patients the veins of the legs became swollen and varicose—in some there was considerable swelling and varicosity of the veins of the thigh, and of the vulva. Hæmorrhoids were frequent. The cause of these changes is not clear to me. I lean to the view that they are the result of actual pressure on the veins in the pelvic or abdominal cavities. Some writers, however, say that these signs may appear at a stage so early that pressure is out of the question. I had not myself observed them at such an early stage. There is, no doubt, a marked change in the peripheral vascular system in the smaller arteries and veins, which is made evident particularly in the breasts. The mammary artery, usually imperceptible, becomes dilated, and probably the arteries generally dilate to a slight extent, though this is not capable of measurement. One can infer so much from the fact that many women become fatter during pregnancy. There is perhaps also an increase in the quantity of blood.

I find that some writers attribute the hæmorrhoids and varicosities of the vulva to back-pressure from the heart. That is an error, of little importance so far as this matter is concerned, but one which must be pointed out, as it misleads when we are dealing with heart failure. The idea that the heart fails by an engorgement affecting one chamber after another has long held the field. We are invited to picture regurgitation from one orifice after another until the right auricle and ventricle throw blood back into the venous system, causing the appearance of venous stasis, varicosities, and dropsy. While no doubt there is a little truth in the idea, it can be laid down that such an effect of heart failure has only a very slight influence and is not the cause of the phenomena attributed to it. I have seen many people die slowly of heart failure in whom none of these signs appeared. I have seen the right auricle and ventricle throw such quantities of blood back that the liver was distended and pulsated at each systole; yet there was neither venous stasis nor dropsy in the legs. Experience shows that varicose veins are frequently present in people with perfectly healthy and efficient hearts.

Pulsation in the Jugular Veins.

Another symptom usually, but erroneously, considered to be the result of this back-pressure is pulsation in the veins of the neck. During a systematic inquiry into the signs exhibited by the circulatory system my attention was arrested by the movements in the veins of the neck. At the time when I began the inquiry very little attention had been devoted to this subject. The pulsations indeed had been recognised, and graphic records of them had been obtained, but the nature of the movements taking place and their significance were not understood.

Among healthy women during pregnancy I found that these pulsations vary in an extraordinary way. They are present at one time, and absent at other times; sometimes they are small and barely

perceptible (Fig. 1), then again they become of great size (Fig. 2). The records of many patients showed that pulsations were often quite distinct before pregnancy. They might remain unaltered during the whole period till labour set in. During labour they practically always disappeared, but returned in a day or two after delivery, sometimes attaining a great size. Thus in the case from whom Figs. 1 and 2 were taken there

I found that neither the presence nor the absence of pulsation was of any use in estimating the efficiency of the heart. In those rare cases to which I have referred there were present other signs which gave a surer indication.

Where, on the other hand, the study of the jugular pulse became of the greatest value was in unravelling the mechanism of cardiac irregularities. By observing the changes in the jugular pulse, I discovered a method of differentiating between the waves produced and of relating them to their causes in the heart itself. This matter will be referred to in dealing with Heart Irregularities.

FIG. 1.—Tracings of the jugular and radial pulses the day after the confinement, showing only a faint movement in the jugular tracing.

FIG. 2.—Tracings of the jugular and radial pulses the second day after confinement, showing a large movement in the jugular tracing.

was no jugular pulse during the labour, a faint pulse next day (Fig. 1), and a large pulse on the second day (Fig. 2). I attempted to correlate these variations with coincident changes in the heart—seeking for evidences in the size of the organ, in its sounds, or in its functional efficiency, but I failed to find any relation. I thought that the increased size of the venous pulse might indicate a dilatation of the right heart, but I found the increase taking place and the heart remaining normal in size, with no alteration of the cardiac sounds.

The disappearance of the venous pulse during labour seemed capable of a reasonable explanation. A false view of the effect of effort upon the heart has long been held—the view that the healthy heart dilates with effort. More careful observation reveals the fact that, instead of dilating, the healthy heart actually becomes smaller on effort. It will be realised, if thought is given to the subject, that this is to be expected. When effort is made dilatation takes place in the peripheral vessels. The result is that during effort there is, in the peripheral vessels, a relatively greater amount of blood than is present in them when the body is at rest. As the size of the heart depends partly on the quantity of its blood-content, with a diminution of the blood during effort, the size naturally becomes smaller.

The right auricle and the veins leading to it act as a reservoir to the ventricle. The pressure in the veins and auricle is never of itself able to distend the ventricle and cause dilatation; so that, when there is a free return of blood from the periphery, the jugular vein is never quite empty. The emptying and filling of the auricle and ventricle cause a variation in the quantity of blood in the jugular vein, and it is this which we recognise as the pulsations referred to, and which we can graphically record (Fig. 2). When, therefore, a larger quantity of blood is contained in the peripheral vessels, the jugular vein does not receive a sufficient amount for the movements occurring in it to be perceived. After the effort has ceased, however, the returning blood increases to such an extent that the reservoir becomes filled. The movements are then again visible.

In order to comprehend the relation of these pulsations to heart failure I watched patients with a jugular pulse for many years, noting the effects of effort and illness—particularly febrile illness. In rare cases I discovered great pulsation in the veins with certain forms of heart failure—but, on the whole,

Dropsy.

The mechanism by which dropsy is produced is still one of the most obscure matters in medicine. My notes of cases of pregnancy show that in healthy women, at this time, swelling of the legs was far from infrequent. It was usually slight, but sometimes became very considerable. As it tended to get worse towards the end of the pregnancy, and as there were no accompanying changes in the heart, I attributed it to the pressure of the uterus on the veins. At all events, the women went through their confinements quite well, lived for years afterwards, and bore other children. Even those women who also had albumin in the urine did well. (I am not referring to cases of albuminuria which ended in uræmia. I had, like every other general practitioner, experience of these. My opportunities, however, were too restricted to enable me to get a full knowledge of the significance of this sign, which, be it said, still awaits elucidation.)

Cyanosis.

During labour, in many patients, the face becomes tinged and dusky, while the lips become of a dark red. I made a great many observations on the capillary circulation in this connexion, but nothing definite was elicited.

In many women systolic murmurs and irregularities appeared and disappeared. These will be dealt with subsequently.

CHANGES IN THE DISEASED HEART IN PREGNANCY.

Abnormal Signs appearing during Pregnancy.

I had many patients who showed abnormal circulatory signs. Let me say at once that the great majority of these passed through the pregnant state, confinement, and puerperium with no trouble. Thus, some cases of mitral stenosis did not seem to suffer in the least, while others suffered severely. Cases of irregularity showed the same variation—the great majority passing safely through, a few revealing signs of heart failure. Cases, again, in which the heart was weakened from other causes, but where there were no abnormal physical signs such as murmurs or irregularity, bore the pregnancy well and seemed little the worse afterwards. These latter were usually breathless and the victims of præcordial pain.

The Interpretation of Abnormal Signs.

At the time when I was making these observations, the results seemed terribly bewildering; they did not enable me to recognise where the danger lay—which was the object of my research—and their variations seemed without principle. I had forced upon me the urgent necessity of a more thorough knowledge of the fundamental nature of abnormal signs, the mechanism of their production, and the bearing of their causes on the heart's efficiency, especially under stress. To obtain this knowledge I began a new, long investigation into the meaning of all manner of cardiac symptoms. This investigation has occupied me for many years; it took me away from the study of heart disease and pregnancy.

I missed, therefore, the opportunity of studying directly heart failure in pregnancy in large numbers of women. On the other hand, I obtained some knowledge of the fundamental principles underlying the production of heart failure. The application of these principles to the cases of heart disease complicating pregnancy which I have since encountered has, I believe, demonstrated their usefulness. It has demonstrated also the value of the type of observation of which I am speaking. I had, as a consultant in London, a great many women referred to me by doctors who were anxious to know whether they were fit for child-bearing or whether, pregnancy having been incurred, there was danger. In these instances I made use of the principles I am about to describe. They guided me to an opinion. The results fully justified the faith I had learned to repose in them.

The Differentiation of Abnormal Signs.

In order to acquire a knowledge of the source of danger in heart disease complicated by pregnancy, I had to get a clear view of the heart's work, how this organ accomplished its work, and what were the signs when it failed to perform its duties in an efficient manner. I conceived that the key to this problem was heart failure. I searched the literature of the subject, but except when heart failure had reached an extreme degree, giving rise to dropsy, dyspnoea, and enlarged liver (sometimes spoken of as the "cardinal signs of heart failure"), little attention seemed to have been devoted to it. Indeed, so confused were the descriptions that no certain differentiation appeared to have been attempted between the phenomena of heart failure and those of other accompanying, but merely incidental, states. Nor was there any clearer distinction to be found between signs which indicated disease and signs in their nature physiological, or so little pathological as to be of no prognostic significance. Thus, it was recognised that murmurs or irregularities might in many cases be indicative of nothing serious. It was stated that there were other murmurs and irregularities which were of grave significance. What was not stated was how one might differentiate the serious from the trivial, the important from the merely incidental.

In the case of irregularities matters were in worse plight. Here there was no differentiation at all. I had not gone far into this subject before I found that progress was impossible unless and until I should be able to distinguish one form of irregularity from another.

The Significance of Abnormal Signs.

Even when, at last, I had succeeded in recognising clearly the different forms of irregularity there remained the important question: "What bearing does their presence have on the patient's future?" This question applied, as I saw, with equal force to the subject of murmurs. Attempts to answer it had in this latter instance been made, but they had not succeeded, for the matter was left in a very vague and indefinite state.

The question is one of such urgent moment to the rational practice of medicine that only the slightest consideration is required to convince anyone that a solution of it must be obtained. Nevertheless, I repeat, no really systematic endeavour to find a solution had been made. The prognostic significance of such common signs as murmurs and irregularities was by no means understood. The somewhat rule-of-thumb procedure which led to the vague notions then prevalent hindered as often as it helped.

The Misunderstanding of Prognosis.

When I reflect now upon the steps I took to obtain this knowledge I can understand to some extent why it had been neglected. Prognosis, at first sight, seems an easy business as compared with

diagnosis. Moreover doctors, as students, have their prognosis given to them ready-made in terms of diagnosis. They are told, for example, that a murmur means a damaged heart. As soon as they are out of school they are placed in positions which impose the necessity of making prognoses. If they enter the army or navy they are at once put to the duty of examining recruits, a matter requiring a knowledge of prognosis. If they become examiners for life insurance the same knowledge is essential to the performance of their duties. In every field of medicine indeed where an opinion as to the future of an individual is concerned, the necessity of assessing the prognostic value of signs and symptoms is necessary. Thus the young doctor begins at once to act upon what he was taught. He accepts the ready-made prognosis and gets into the habit of using it. He says that "a murmur means a damaged heart," and does not doubt that he is right. Thus prognosis seems to be a matter of the greatest simplicity once a diagnosis of signs has been arrived at. The vast and vital difference between the sign itself and the nature and significance of it is overlooked or forgotten.

It is scarcely necessary to dwell upon the importance of a true knowledge of prognosis to a doctor who has to determine whether a woman is or is not fit for child-bearing.

Method of Arriving at Prognosis.

In my own inquiry into prognosis in heart affections I made many false starts before I recognised the principles which should guide me. One day, however, and quite suddenly, I put to myself the question: "What are you afraid of?" The reply was, of course, "Heart failure." At once there came the next question: "Do these signs indicate heart failure, or do they foreshadow its occurrence?" This brought home to me my lack of knowledge.

I realised at least, clearly, the difference between the mere recognition of a sign—diagnosis—and its interpretation. I saw that prognosis hitherto had been accomplished by a process akin to jumping over an obstacle. One found a sign and called it a disease, instead of attempting to elucidate the mechanism of its appearance, or labouring to watch the responses to the calls of life of the man or woman showing it. That kind of "prognosis" was a double guess. One guessed that a murmur meant heart disease, and then one guessed again that heart disease meant an early death. Thus there was forced on me the need to watch and to follow individuals with all forms of cardiac abnormality, year in and year out. To study them in health and in periods of acute illness. To be with them during prolonged bodily exertion. To note, if possible, the very earliest signs of heart failure, and to observe every variation of these signs during the years of their development. To make myself familiar with periods of improvement and with periods of regression. Finally, to be present if patients died and to undertake post-mortem examinations. These labours I made some attempt to carry out. Their results will be detailed later.

GIFT FOR X RAY RESEARCH.—The board of management of the Royal Infirmary, Manchester, have accepted a gift of £4000 from an anonymous donor in aid of research work in connexion with "Intensive X Ray Therapy." The donor expresses the desire that a portion of this money should be expended in paying the expenses of a research scholar who is to study the methods adopted in various clinical centres—e.g., Erlangen, for the utilisation of intensive X ray therapy in relation to the treatment of cancer. The intention of the donor is to stimulate inquiry into a recently suggested means of dealing with malignant disease. Dr. Anderson, who was trained at the Liverpool Royal Infirmary under Dr. Thurstan Holland, has been appointed research scholar, and he will shortly proceed to Erlangen. The board of management have also made arrangements to have the necessary apparatus fitted up in their X ray department.