the limb, was shown by Ranvier in another experiment. He divided the roots of the sciatic nerve in the spinal canal before they had been joined by the communicating branches from the great sympathetic. He thus cut the motor without injuring the vaso-motor nerves, and rendered the leg completely powerless, without altering the vessels. In this case, no oedema occurred, although the vena cava had been tied as in the former experiment. We see, then, that contraction of the arterioles may prevent oedema, even although venous obstruction exists; and we are warranted in supposing that it will diminish the oedema after it has already come on. But more than this: stimulation of the vaso-motor centre increases absorption. This was shown by Goltz, who injected a quantity of fluid into the dorsal lymph-sac of a frog, and found that, when he stimulated the vaso-motor centre, this fluid was rapidly absorbed into the circulation. But, when he destroyed the nervous centres, no absorption whatever took place. We do not yet know the exact way in which this increased absorption is effected; nor has it been ascertained whether drugs which contract the arterioles, either by stimulating the vaso-motor centre in the medulla oblongata or other vascular nerves, have a similar action. It seems to me highly probable that digitalis at least has such an action; for, in some experiments which I made many years ago, after the quantity of urine had been very much increased by the action of the drug, an intolerable thirst came on, which I was obliged to satisfy by drinking a quantity of water greatly in excess of the allowance to which I had restricted myself every day for the preceding six months.

By the use, then, of a drug like *casca*, which contracts the vessels, we will almost certainly lessen oedema by diminishing the flow of blood through the arterioles. At the same time, in all probability, we will increase absorption, both by a direct action upon the circulation and tissues and by the secondary effect proceeding from the augmented urinary discharge. Digitalis has hitherto been our great resort in mitral disease, but I think it probable that in *casca* we possess a drug more powerful still; at least, its effect upon the arterioles appears to be greater than that of digitalis, and it is quite possible that it may succeed in those cases of advanced mitral disease when digitalis fails.

From these examples, it will be evident that the use of experiment to the student of medical science is the same as that of a solar observation to the mariner. An unwise sailor may trust to his "dead-reckoning", and thus make shipwreck; but the wise navigator will not be content with calculating his position from his rate of sailing and the direction of his course. He knows that irregular winds and unseen currents may falsify his calculations, and he will use every opportunity of correcting them by actual observation of his latitude and longitude. Day by day, he rectifies any error into which he may have fallen, and thus he can proceed with confidence, knowing he can never be far astray. When, on the other hand, no such correction is made, each erroneous calculation forms a false starting-point for the succeeding one, and the error daily grows. Thus it was that the ancients, founding a great speculation on a small fact, and building one fancy on another, landed themselves in utter confusion. Erasistratus found the arteries empty after death; he therefore concluded that they contained air during life, and then he went on to fancy that when blood got into them it troubled the spirit they contained, and caused fever or inflammation.

Harvey found valves in the veins, and therefore thought it probable that the blood circulated, instead of oscillating backwards and forwards; and the tetanic spasms caused by upas led Magendie to believe that it acted on the spinal cord. But neither was content with mere probability; each walked as on a quaking bog, and tested each step before taking it. If the blood circulated, pressure on the veins must make them empty above and full below the point of constriction. If upas acted on the spinal cord, its action must cease when the cord was destroyed. Every step thus gained affords sure foothold for another, and thus science daily grows. Already the experimental method has done much for medicine, and in my next lecture I purpose to consider the chief gains we have obtained by its use.

MR. CROSS received a deputation on the 15th instant from the Amalgamated Tailors' Society, to lay before him the evils of what is known as the "sweating system", and to ask him to take remedial measures.

VACCINATION.—Mr. Oded Lousley, Public Vaccinator for Reading, has received from the Local Government Board £53:17. This is the second time Mr. Lousley has received an award for successful vaccination.—The Local Government Board have just awarded to Dr. P. S. Fentem £10:10, as the result of the first inspection made since his appointment as Public Vaccinator for the Bakewell District of the Bakewell Union.

THE CROONIAN LECTURES

ON

THE DIFFERENCE BETWEEN THE SEXES IN REGARD TO THE ASPECT AND TREATMENT OF DISEASE.

Delivered at the Royal College of Physicians of London.

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LECTURE I.—*Concluded.*

LET us now follow the relative liability of the sexes as they proceed towards maturity. Now, the records of the relative frequency of disease in the sexes are pretty clear in attributing to the male a much higher rate of susceptibility to *acute hydrocephalus* than the female. I need only quote the statistics of Dr. J. Risdon Bennett, where he shows that, out of equal numbers of each sex, 1,707 males and 1,349 females died of this disease.

In regard to *convulsions* taken as a prominent symptom in the broad idea of the public statistics ending in death, we find, for two years taken as a haphazard, that, in 1866, 12,438 males and 9,353 females were attacked within the first year of life; and, during the second year, 1,668 males, and 1,513 females; after which time the proportion becomes more equal, and later the excess is slightly more on the female side. In 1868, during the first year, 11,689 males and 8,905 females; during the second year, 1,480 males and 1,367 females.

Of course, we must bear in mind that, convulsions being an accompaniment of other conditions, we must take the above rather as an evidence of serious disease, and compare it with the statistics of acute *hydrocephalus*, from which it is separated in the Registrar's reports.

In regard to liability to *laryngismus stridulus*, convulsion of the larynx, we find males decidedly in excess. In Reynolds's *System of Medicine*, we find Dr. Hughlings Jackson assenting to this and quoting Vogel, Gee, and Mackenzie in confirmation. Thus, he says, "of Gee's cases, 34 were males and 14 females."

It is curious to note here that *rachitis*, which has been shown by Sir W. Jenner, Gee, and others to be very frequently found with *laryngismus stridulus*, is also more fatal in males than females. Thus, in the Registrar's report for 1866, we find there died, males 66, females 38; and in 1868, males 69, females 49.

It is also to be noticed that the death-rate in males exceeds that of the females in most of the affections of the larynx. Thus, in *croup*, the proportion of deaths was 100 males to 82.89 females, as quoted by Churchill. Trousseau gives 22 males for 8 females, and 17 males to 5 females.

In *pertussis*, we find that the death-rate is about equal.

The same may be said of the diseases classified as *paralysis* by the Registrar-General; though it is difficult to say whether the condition called infantile paralysis is thereby indicated.

Hitherto, in the diseases to which I have alluded, the male has been the most affected; but, in that which will next engage our attention, namely *chorea*, this proportion is reversed, and in a marked degree. The difference is not much up till the end of the fourth year; but after this, on the average, we find from two to four times more females than males. Thus, at the Great Ormond Street Children's Hospital, Dr. Hillier tabulated the sexes and ages of 422 cases occurring up to twelve years of age, of which 122 were males, and 300 females. I need not quote the whole table, but may mention that, between the ages of four and five, the proportion of males to females was as 4 to 16; and, between ten and twelve, as 23 to 81. Again, when *chorea* occurs after puberty, it is among women that it is principally seen; thus, in Dr. Ogle's cases, there were 16 females and but 3 males. These facts are doubtless well known to my hearers, but I am anxious to contrast this remarkable difference with other diseases of the nervous system.

Yet, like most, if not all, of the other conditions in which we find marked preponderance in one or the other sex, it must be remembered it is not confined exclusively to females; and, therefore, when we seek for the cause, we must seek in a direction where we find a factor common to both, but especially intense or prominent in the female. What is that condition? Looking at the tables, we find the increased proportion of females affected very noticeable at six years old; up to that age, there was very slight difference; but, from that period to the latest at which it has been noticed, namely forty-seven, the excess is strongly

preserved, although the general frequency is much diminished. Again, during pregnancy, we find that a considerable number of those attacked had already been subject to it in childhood.

It would be apart from the intention of these lectures, and indeed it would be presumptuous on my part to attempt to discuss the causation of chorea. I have merely endeavoured to show the line of research which, followed out, may lead up to the solution of the difficulty. It would be well to bear in mind that, about the time of the increased frequency of chorea in the female, her heart begins to exceed in frequency, and so continues through life. Possibly, other differences may be discovered by careful inquiry.

As we proceed in these lectures, we shall, I think, find that an exalted sensitiveness of the nervous system gradually supervenes; so that, at any rate, we have increased vascular action and nervous sensitiveness to assist as predisposing agents.

Employing this method of inquiry still further, and particularly with regard to the embolic theory of origin, it is interesting to find that, in rheumatism, the proportion of deaths in males is rather greater than in females. If, as is supposed by some, the embola are the result of the rheumatic diathesis, it seems but reasonable to expect that, with such a large excess of females affected by chorea, there would be a larger number of females die of rheumatism than males. This, however, is not the case.

If, then, we inquire into the statistics of deaths from pericarditis as given by the Registrar-General, the proportions are nearly the same throughout the several ages; and under the broad head of "heart-disease" within that period of life most obnoxious to chorea, and which class doubtless is, to a large extent, made up of endocarditis and its results at that period, in this class, again, we find a remarkable equality. This is well borne out by examining the cases quoted by our late lamented colleague Dr. Sibson in the fourth volume of Reynolds's *System of Medicine*, where, at the ages most exposed to chorea, we find an excess of males attacked by endocarditis.

Then again, looking at the period of life most liable to chorea, and comparing it with the frequency of rheumatism at the same ages, we find that, whereas chorea is most frequent before fifteen years, rheumatism kills most frequently from twenty to twenty-five years of age.

If, therefore, the endocardial vegetations are the outcome of the rheumatic diathesis, although silently attacking only the heart, should we not find chorea prevailing at the age most liable to rheumatism? However, I do not wish, and indeed am not competent, to deny but that minute embola may cause chorea; only, I would venture to say that, for the reasons abovementioned, one would hardly conceive them to be of a rheumatic origin.

Dentition.—Very few authors allude to any distinction between the sexes with regard to the severity of the process of teething. Yet the Registrar's reports show that males die in a much greater ratio than females; thus, in 1866, we find, under the head of "teething", 2,384 males died and only 1,909 females; again, in 1868, there died 2,221 males and 1,924 females. And this is quite in accordance with the facts already brought before you; namely, the more susceptible cerebro-spinal system and more unyielding skull in the male.

I find but little, if any, sexual susceptibility to the *zymotic diseases* in either children or adults; at least, not sufficiently constant to deserve notice.

I alluded above to the tendency there is to transmit *sexual* peculiarities. Numerous instances are recorded by Darwin, both abnormalities as well as diatheses, and notably the hæmorrhagic; yet, this rule does not obtain in syphilis, so far as I have been able to learn. No indication is found in the Registrar-General's report; and Mr. Jonathan Hutchinson tells me that, although he had taken much trouble to ascertain, he cannot find that boys are more liable to congenital syphilis than girls; although the proportion of the male parents afflicted with syphilis far exceeds that of the female.

Before considering the sexual differences of the diseases attending puberty, it will not, I think, be without advantage to devote a few minutes to the consideration of that great change in the system.

What is this change? when does it commence? upon what does it depend? Presuming we may answer the first portion of the question in the manner Dr. Fowler in his *Vocabulary* has put it, "the time of life at which the generative faculties begin to be developed", one may go on to attempt an answer to the second portion, namely, When does it commence? and, so doing, we shall gradually be led up to the solution of the third. And this inquiry will be seen not to be without practical value; for thereby we can the more easily see the direction in which we should proceed when we attempt the correction of its disturbances.

I think it will be convenient to consider the puberty of the female

first, because the changes are more marked, and are more rapid than in the male.

Now, it has generally been accepted that puberty in woman coincides with the development of the ovary and its Graafian follicles, the commencement of the menstrual function; and those changes of the form that lead the child and girl up to womanhood, which I need not detain you in enumerating.

But instances occur not infrequently in which the change of bodily form takes place thoroughly, and yet no menstruation appears; even pregnancy has happened without menstruation having occurred. And again, the full development of the body has been completed, the woman having no ovaries; what, then, is the explanation?

Suppose I place before you this proposition: *That the organs of generation in their healthful state, from the earliest intra-uterine life till the full period of puberty are in a state of progressive development*; but the growth proceeds at a more active rate about that period. Let us now consider how facts support this proposition. Formerly, it was supposed that ovulation and menstruation began together, and that the latter was a sign of the former. But recent inquiries have shown that ovules are discharged at an age long anterior to the first appearance of the menses, in fact, in early childhood. It would be difficult to say how far the irregular fluxes of blood in children are dependent on this form of ovulation, because we are generally not able to say what other causes of vascular excitement and tension may be present in these hæmorrhages; yet, it is much more rare to find a parallel condition in boys.

Again, it has been not unfrequently, I may say commonly, said that there is but little distinction between the sexes till puberty; I mean in a clinical aspect, and even in manner, disposition, etc. Yet, I venture to think that those of my hearers who have much attended to children will agree with me in saying that, almost from the cradle, a difference can be seen in manner, habits of mind, and in illness, requiring variations in their treatment. The change is certainly hastened and intensified at the time of puberty; but there is, even to an average observer, a clear difference between the sexes from early infancy, gradually becoming more marked up to puberty. That sexual feelings exist from the earliest infancy is well known, and, therefore, this function does not depend upon puberty, though intensified by it. Hence, may we not conclude that the progress towards development is not so abrupt as has been generally supposed?

And this will serve to explain, in a measure, the cases of very early pregnancy; though in many of those there is a general precocity of the development, which may be the equivalent of ordinary puberty.

We are now somewhat prepared to answer the third portion of my question. "Propter uterum", says Van Helmont, "mulier est." "Propter solum ovarium mulier est quod est", paraphrases M. Chereau. But, is either true?

How, then, are we to explain the growth and full development of those who, possessed of every characteristic of woman, "tout imprégnés de féminisme", as Professor Fonssagrives writes, are yet born without a trace of uterus and ovaries?

If the phenomena of puberty were dependent, as generally supposed, on the rapid maturation of the ovaries, then those cases would be inexplicable; but, suppose we were to say this: "That the changes of puberty were the result of a general force of development inherent in the being, extending its influence also, and principally, to the sexual system and to the nervous centres in association with it." I say, were we so say this, should we not find our facts more easily explained than they are by the other and older suggestion?

There can be no doubt that the function of menstruation is dependent on the presence of the ovaries; for when these are both absent, congenitally or by operation, the menses do not present themselves. But it is quite a different thing to say that the absence of the ovaries will cause the woman to lose her attributes as a woman. Nothing can be more clear as to the facts on this point than the evidence and arguments of Puech, in his work on *Diseases of the Ovaries*, in which he clearly disproves the opposite opinion, powerfully supported as it is even by Virchow, who goes so far as to say: "Take away these, and one has a man-woman." This, he shows by facts, is not the case: with a slight change, the women retained their attributes, otherwise it would be very difficult to reconcile the supposed effects of ablation with those cases of congenital absence alluded to just now.

It is true that, in some cases (frequently quoted), there has been a tendency to fatness, and also to a slight growth of hair on the face and masculine voice; but this certainly cannot be considered as a sign of loss of feminine qualities, because the women of some races have it in a marked degree. Indeed, this is one of the secondary sexual characters which vary in each sex and race so much that it cannot be held, when existing in a slight degree, as of such value as to

unsex the possessor. It is also a well ascertained fact that women who have no ovaries possess the sexual desire like other women, and altogether, as before stated, behave as women in their sexual relations. Hence it is clear that this instinct is neither dependent upon the ovaries nor, as shown before, on the changes of puberty, although, doubtless, intensified by it.

The case of hermaphrodites might seem to cause a difficulty in regard to their secondary sexual characters; but their case is readily understood, if we look upon the body as a whole, not dependent upon any one part, but a combination of correlated parts; though one can easily conceive that, if any error were to occur in the developmental force, so that the nervous centres as well as corresponding ovaries were deficient, there might be a tendency towards a neutral form, or man-woman.

Doubtless, although we cannot admit that the development of the body at puberty is entirely dependent on the presence of the ovaries, yet we must admit that they in their turn, full of life and activity, do powerfully react on the nervous centres, with which they stand in relation directly and sympathetically; and thus any disturbance occurring in the process of growth must reflect itself upon the economy.

Our position, therefore, is this. We may assume that we agree so far—1. That the development of woman can be completed without the function of menstruation; 2. That it can be perfected without the presence of uterus and ovaries; 3. That the sexual feeling and instinct existed before puberty.

If this be granted, then we must admit that puberty is in its essence not dependent on these conditions; rather, as I have before suggested, may we not say that "the changes of puberty are all of them dependent on the primordial force which, gradually gathering in power, culminates in the perfection both of form and of the sexual system, primary and secondary?"

The period at which this culmination arrives is not by any means fixed. We have every day evidence that the capability of procreation may occur some years before the completion of the process. By some it has been compared to the unfolding of a blossom; but that is not an accurate description. It should be compared to that position of the life of a plant when it for the first time shows signs of blooming, till it arrives at full power to form and perfect the seed.

I have dwelt somewhat long upon the puberty of woman, because, being more abrupt and marked than in man, one can view the change to more advantage, and because one can also, by comparing the normal process with its abnormal conditions, arrive more certainly at conclusions as to the causation both of the perfect and imperfect states. Now, in man, the process is slower, more gradual, making less demands on the system, and consequently is less liable to variations and perturbations. It is thus that some of the diseases of puberty have been considered peculiar to woman, yet I think we shall see that this view is not correct; that it is based on an imperfect appreciation of the phenomena first discussed.

But there is one most frequent concomitant of puberty to which I must allude before considering its errors; I mean menstruation. I have already stated that menstruation is not an integral, although it must be admitted to be a very important part. Many instances have occurred where full development and capability of procreation have existed without the appearance of the menses. It is often absent for a long time in some without any very serious condition of health. It depends on the ovaries unquestionably; for, where they have been removed, it ceases; or, where they are congenitally absent, it never appears. Hence we must regard the ovaries as an essential link in the causation of menstruation. But in what way does it act? Investigations, both clinical and *post mortem*, show at the time of menstruation a state of marked hyperæmia in uterus and ovaries which did not exist during the interval. There are other features in the process, but this is the most marked. Is the origin of the monthly hyperæmia situated in the ovaries, or in the nervous centres in relation to them? I think we cannot but conclude in the ovaries; otherwise, from what we have before seen, we ought to have menstruation when they are removed, so long as their corresponding nervous structures are perfect. Concluding therefore, that there is some stimulus generated in the ovaries, which, by reflex irritation, affects the uterus, we may further ask, Does it do so through the general system or directly upon the uterus, or is there a general condition of vascular excitement or tension which, occurring during the exfoliation of the uterine mucous membrane, finds a ready relief or exit in this direction, and thus manifests itself in the flow of menses?

At present, we are not in a position to answer the question about vascular tension, because the sphygmograph has not yet given efficient information; but, if we may judge from other clinical facts accompanying the epoch, we have every evidence of general vascular and

nervous excitement; for, when this occurs in excess, or in persons of frail vessels, we find the strain too much for their delicate walls; and thus exudations or even hæmorrhages, either vicarious, supplementary, or co-dependent, occur. That this influence is conveyed by, and is reflected on, the nervous system every passage of the epoch reveals.

If we seek an explanation why this process is so different in the male, we shall not have far to go, if we consider the difference between the testis and ovary; for, whereas the products of the testis readily escape by tubes, the ovaries are much more perturbed before the ovum can escape. Dense tissue has to be penetrated, and there is severe local distension of the vessels coupled with the tonic contraction of the Fallopian tube and dartoid tissue in connection with it.

I have already mentioned that the ovary is, according to recent researches, not the exact homologue of the testis, but that it springs later and from a different spot on the genital track; that, in the future male, an ovary commences, but soon becomes effete. That we might find some condition in the male to correspond to menstruation, would not be so very wild a thought; but, at the present time, information has not been sufficiently gathered to enable us to say whether the hæmorrhages of the male partake of any approximation to periodicity.

These remarks regarding puberty will help us, I hope, to understand more clearly the disorders which will form the subject of my lecture on Friday.

ON NERVOUS SYMPTOMS WITH EAR-DISEASE.

By J. HUGHLINGS JACKSON, M.D., F.R.C.P.,

Physician to the London Hospital, and to the Hospital for the Epileptic and Paralysed; etc.

THE author thought it desirable to consider together the very different symptoms which are dependent on or are associated with ear-disease. Excepting when considering Aural Vertigo, he would speak only of cases in which there was discharge from the ear, signifying disease of the walls of the tympanic cavity, and, as it often did, disease of the temporal bone. To limit his subject still further, it was supposed that the patient had had discharge for some time before any extra-aural complications ensued: this was a simplification of the subject, as—especially in a child—it might be very difficult or impossible to tell whether there was recent acute otitis or meningitis, or both. To the aural surgeon, the condition spoken of is a disease of an important organ of sense; to those practising in general medicine and surgery, it is very often indeed bone-disease, and that of an important part of the cranial wall. The defect of hearing which accompanies it is bad enough, but this is, in comparison, nothing to such graver evils as cerebral abscess and meningitis. Old ear-disease often kills people, and sometimes kills them rapidly. Insurance-companies know this, and act upon it. Caries of a bone is bad; caries of a cranial bone is particularly bad; but, from its numerous important anatomical relations, caries of the temporal bone is worst of all. The author handed round the following reprint of two paragraphs from Tröltzsch *On the Ear* (Roosa's translation), in which the anatomical relations of the external auditory canal and of the tympanic cavity are succinctly stated.

"I have already called your attention to the short distance of the dura mater and the cerebrum from the upper wall of the *external* auditory canal, and also to the proximity of the transverse sinus and of the mastoid cells to the posterior wall. This proximity explains why these parts are sometimes involved in the inflammation, even when the caries is confined to the auditory canal. The anatomical relations are still more important in the cavity of the tympanum, since its lower wall or floor is frequently separated from the jugular vein only by a thin translucent layer of bone. Again, the largest artery of the head—the internal carotid, with the venous sinus surrounding it—takes its course on its anterior portion. These are separated from the cavity merely by a delicate and frequently defective bony lamella. Furthermore, its roof or upper wall, which, with the superior petrosal sinus, lies between the mucous membrane and the dura mater, is not unfrequently thinned, and even perforated; and besides, even in adults, there is usually a gap in the bone, the petrosquamosal fissure.

"The inner or labyrinth wall, finally, offers only slight resistance to the transition of the inflammation to the facial nerve, and through its two fenestræ, which are only closed by membrane to the external ear, and then to the meatus auditorius internus, which is covered by the membranes of the brain. Close under the mastoid process, which is intimately connected to the cavity of the tympanum, is the transverse sinus, which makes up the whole of these important relations."