(9.)

CASES, WITH REMARKS

ILLUSTRATING THE

ASSOCIATION OF CHOREA WITH RHEUMATISM

AND

DISEASE OF THE HEART.

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For some years past attention has been frequently directed to the occurrence of various nervous phenomena, especially of chorea, in the course of acute rheumatism. The subject has engaged the notice of those best qualified for its investigation, and several ingenious hypotheses have been advanced in explanation of this singular association in disease. To the complete exposition of the views of those who have especially studied this point in pathology, given by Dr. Burrows in his Treatise on Disorders of the Cerebral Circulation, it will be needless, even were it possible, to attempt making any addition: indeed, the subject is so thoroughly discussed there, and in the works therein mentioned, that, but for the obscurity in which the association between the rheumatism and the nervous phenomena is still confessedly involved, I should not feel justified in again drawing attention to it. The very variety of the explanations which have originated from equally competent sources, bears ample testimony to this obscurity on the subject; and on this account it may be hoped that any additional facts which seem calculated to throw light on any part of it can scarcely be deemed superfluous.

The cases and remarks which I now offer have reference to only one form of the nervous disorders that may arise in the progress of acute rheumatism, and this because it is the form most apt to ensue, and because I am more familiar with it than with any of the other affections of the nervous system associated with this disease.

Case I.—Mary Anne Burke, aged 20, admitted into Hope Ward, under Dr. Hue, Dec. 3, 1849. Dark-haired, pale, anæmic-looking; manner strange, with an anxious alarmed expression. There were frequent spasmodic movements of the muscles of the face, especially about the nose, the movements being usually accompanied by a short inspiratory moan. These, with an occasional jerk of her head, were the only choreic movements observed. Although involuntary, yet the movements seemed to be under some degree of control; for, by an effort, she could restrain them for several seconds, though after such pause they returned with increased force. She was very taciturn, owing apparently to difficulty in uttering words rather than to disinclination to speak: her answers, when obtained, were rational and correct. She said that she was in pain all over, especially in the ankles, knees, and hips. The left ankle and foot were slightly swollen and tender, but not red.

I may remark here that this slight swelling and tenderness, which shortly

disappeared, was the only positive sign, in addition to the general complaint of pains in the joints, that acute rheumatism existed: it was, however, quite sufficient to denote the fact. There was a dry black secretion about the lips; the tongue was pale, thickly furred white, with a dry brown streak down the centre, spreading out at the apex. The pulse was 84, but singularly irregular,—usually three beats would occur in ordinary succession, then there would be a complete intermission, then three more ordinary beats, followed by another intermission. She passed her evacuations in bed, but was conscious of doing so.

She was a dressmaker, always delicate, and subject to severe headaches, especially since a violent blow on the head six years before. She never had rheumatism or chorea; but her mother was rheumatic, and a sister had been in the hospital with rheumatic fever. Nine days before her admission she began to be ill, chiefly with palpitation and a feeling as if "something was amiss with her heart." Three days subsequently she came to the hospital to have a tooth extracted; it was then noticed that her throat was inflamed. At this time her catamenia, which had hitherto been regular, were due, but they did not appear. The next day her throat was worse, with increase of palpitation and pain in the chest. The twitchings of the head and face commenced two days before admission. For several nights she had had no sleep, and latterly had been delirious, and with difficulty kept in bed.

On auscultation there was found to be increase of the heart's impulse, which was perceived over a greater space than natural. The first sound was loud and ringing, with a short blowing murmur at the apex; the second sound indistinct. There was increased and extended cardiac dulness on percussion. This auscultation was made a few hours after her admission into the hospital; but, when first admitted, certain sounds were heard which led my friend Mr. Wood, who then examined her, to suspect the existence of pericarditis. These sounds, however, had quite disappeared on the subsequent auscultation.

There was something in the general appearance of the patient which suggested the possibility of many of her symptoms being the result of hysteria, and she was accordingly treated at first with the Haust. Ammoniaci Fœtidus. The day following, however, the irregular movements had extended to the shoulders, and the next day both arms were affected, the general and auscultatory signs being otherwise unchanged, except that the pulse had become regular. During the night of December 5th, which was her third night in the hospital, she was noisy and delirious, but when visited the following morning was found calm and rational, though with a haggard anxious aspect. The spasmodic movements of the arms were increased in violence, and the right lower extremity was now affected. The lips were dry; tongue red, glazed, and clean, but inclining to dry; skin cool; pulse 120, small, soft, regular: the bowels, which had been relaxed, were quiet: she complained of thirst, headache, and a feeling of weariness and exhaustion; the heart's impulse and action were much increased, and the first sound was prolonged, muffled, and accompanied with a murmur.

Her hair was ordered to be cut short behind, and a blister applied to the nape of the neck, on the supposition that there was some mischief in the head.

The two following nights she had a little rest, and the involuntary movements of the limbs did not increase in violence, but her peculiar anxious haggard look remained. On the night of the 8th (five days after admission) she was again restless and delirious, and on the following day the chorea had greatly increased, the arms and head being continually tossed about, and the shoulders and chest writhing and twisting incessantly. She got a little sleep in the morning, but was no better on awaking. The jactitation increased towards night. Chloroform was then administered, and quieted her for a time; but, as the effects of the reagent passed by, the movements returned with the same violence as before. On the 10th I made the following note:—With exception of an occasional doze, she was restless and tossing about all night, frequently uttering short spasmodic screams: is now in a state of constant restlessness and jactitation, throwing her arms about, and tossing her head from side to side, the legs being nearly still. She tries to speak, but cannot, only uttering unintelligible sounds: she also frequently attempts to cough, but fails in the effort, appa-

rently from inability to combine the requisite muscular movements. Face pale and haggard; lips covered with sordes; tongue brown and dry; skin cool, moist: pulse small, feeble, about 120 in the minute, her restlessness preventing its being accurately counted. The like cause also interfered with a proper auscultation of the heart. Her head was again shaved, and a blister applied to the vertex. She also took chloroform again with temporary cessation of the movements, followed by a little sleep. She appeared to like the remedy, and occasionally asked for it, as well as she could. In the evening and early part of the night she had a little sleep, but after two o'clock the following morning the choreic movements became more violent, involving the lower limbs, and increased to such a degree that it became necessary to tie her in bed to prevent her being thrown out. Between nine and ten o'clock she was lifted out of bed to have her bed made and her blister dressed. On being returned to her bed, she took eagerly about half a pint of beef-tea, then lay quiet, and in a quarter of an hour was dead.

Five hours after death the brain and heart were examined. In the former, nothing unusual was noticed beyond a peculiarly soft condition of the cerebellum. In the latter was found the probable source of all the mischief. The two surfaces of the pericardium were universally and rather firmly adherent to one another through the medium of a thin layer of soft, reddish, rather dry granular lymph. The heart was rather large: its muscular tissue presented extensive fatty degeneration, large buff-coloured blotches being abundantly scattered through the walls of both ventricles, while the interior of these cavities exhibited in an extreme degree the peculiar streaky, freckled aspect, so characteristic of fatty disease of the heart. Moreover, there was abundant evidence of recent endocarditis, the tricuspid, mitral, and aortic valves being more or less thickly set near their free borders with clusters of minute, soft, reddish, loosely adherent granules.

The objections of friends prevented the spinal cord and other organs from being examined. The liver, however, was noticed to be extremely fatty.

Here we have a case in which a delicate girl, inheriting a tendency to rheumatism, and having a sister formerly affected with that disease, becomes out of health just at a period when the catamenia are expected, but do not appear, suffers a slight attack of articular rheumatism, with a severe inflammation of the investing and lining membranes of the heart, and then has violent chorea, which terminates in death, dissection disclosing, moreover, extreme fatty degeneration of the muscular tissue of the heart. Abundant matter for general comment is here offered, but into this we must not now enter.

Case II.—Ann Holt, aged 13, a thin, light-haired child, admitted under Dr. Roupell, October 18, 1849, with rheumatic inflammation of various joints, of five days' standing, and pain in the chest of one day's duration. The heart's action was accelerated, and there was a prolonged soft systolic murmur at the apex, faintly heard also at the base, where the second sound was clear. So far the mischief seemed to be only endocardial. She was treated by leeches to the region of the heart, and small doses of calomel and opium every four hours. The next day (the 19th) the first sound at the apex was confused, while at the base a peculiar creaking sound was audible with the systole, the second sound still remaining clear. On the 20th, the joints being still very bad, the first sound continued rough and crackling at the base, while a somewhat similar sound was occasionally audible with the diastole. Little doubt now remained of pericarditis being superadded to the endocarditis, and this little was removed by the pericardial friction becoming more distinctly marked during the next three days, and then it disappeared, leaving an endocardial systolic murmur both at apex and base. The rheumatism now rapidly subsided, and the child got so much better, that I took no further note of her until the 29th, five days after the disappearance of the pericardial sounds. On this day I learnt that the preceding evening she was observed to be very strange and foolish in manner, and that subsequently twitchings ensued in the face and arm: she passed a restless night, and in the morning she had frequent spasmodic movements of the muscles of the face, with involuntary knitting of the brows, while the left hand and arm were constantly in movement. Her thin, wan, feeble as-

pect, was even more striking than on any previous occasion, and was now combined with an expression of alarm at her strange condition. On auscultation the systolic murmur remained loud, both at the apex and base, while over the aortic valves was heard, for the first time, a remarkably harsh and prolonged diastolic murmur. Her feeble condition, with a small pulse of 130, precluded any active measures, and she was treated simply with Dover's powder to tranquillize her nervous system.

Without going into the daily particulars of this case, I will just remark that the chorea did not materially increase, and scarcely lasted three weeks. During this period there was no return of the pericardial rubbing sound, but the endocardial murmurs underwent strange varieties, which, however instructive in themselves, may be at present passed over, as not bearing materially on the question before us. The child left the hospital shortly after the subsidence of the chorea, but carried with her all the signs of seriously damaged mitral and aortic valves, with an enlarging heart, and probably some remaining mischief in the pericardium. In less than three months she was re-admitted in a dying state, with symptoms all pointing to the damaged heart and secondarily damaged lungs. At first she rallied, and for some days gave promise of amendment, but then she worsened and died, a copious pleuritic effusion appearing to be the immediate agent in her death. The examination of the body after death revealed recent inflammation of the right pleura, with pneumonia passing on to suppuration. The heart was considerably enlarged, while the effects of the former inflammation were manifest on the mitral and aortic valves, and on the interior of the left auricle. The condition of the pericardium was examined with peculiar interest, on account of the pericardial friction-sound which was noticed about four months before her death. The only evidence of the previous inflammation was in the existence of numerous vascular tufts of new tissue about the base, and of several rough vascular patches of false membrane on the anterior surface of the heart. I have alluded to this case before, in support of the opinion I entertain, that inflammation of the pericardium attended by effusion of lymph does not necessarily terminate, as is commonly supposed, in the formation of permanent adhesions.*

Case III.—The next case I wish to mention is that of a girl named Eliza Blenning, aged 13, who was admitted January 31, 1850, under Dr. Hue, with acute rheumatism and serious cardiac complication. This girl had been in the hospital two years previously with a somewhat similar attack, and then fell under the notice of my friend Dr. Ormerod, from whom I learn that she was admitted simply for chorea, that subsequently pericarditis ensued, and then, last of all, a distinct attack of articular rheumatism came on. The ordinary sequence of events was therefore, in this case, completely reversed; and the fact is one of importance in relation to the probable cause of the association of chorea, and other nervous diseases, with rheumatism. Another fact bearing on the same subject is, that this girl had suffered at least two, if not three previous attacks of chorea, unassociated with rheumatism, or other obvious cause—the first when she was nine years old, the second shortly afterwards. I need not dwell on any further particulars of the case during her present visit to the hospital: suffice it that, after being placed in extreme jeopardy by the cardiac affection, she was discharged convalescent, though with a seriously and permanently damaged heart. During this attack there was no return of the chorea.

In each of the three cases I have just narrated the rheumatism and chorea were distinctly associated with pericarditis; but I will now mention other cases in which there was reason to believe that the pericardium was quite unaffected, while in at least one case it was probable that there was no affection of any part of the heart.

Case IV.—In November, 1849, William Harvey, aged 20, a tall, dark-haired, nervous man, was admitted, under Dr. Hue, with a second attack of articular rheumatism, unaccompanied by cardiac affection. Ten years previously, when he was therefore 14 years of age, he had his first—a very severe attack. In the course of it chorea ensued, and lasted several months, at the end of which time he left the hospital well: he had no reason to suspect that his

* London Medical Gazette, 1850, p. 581.

heart was affected during this attack, having no symptoms referable to that organ at the time, and not having been subsequently troubled with palpitation. On his second admission to the hospital the attack of rheumatism was severe, though less so than the former attack. I carefully examined his heart from time to time during the progress of the disease, but never could satisfy myself that there was anything morbid in its sounds or action beyond increased impulse, which might be explained by the general vascular excitement attendant on an acute febrile disorder. It is certainly possible that, in the first attack of rheumatism, there might have been inflammation of the pericardium, resulting in partial adhesion of the pericardial surfaces, and that, in this second attack, pericarditis may have again ensued, and its existence been undetected, owing to absence of the pathognomonic friction-sound in consequence of such adhesion. Yet this can only be supposition; and, in the absence of stronger evidence of pericardial inflammation, it is, I think, fair to infer that the pericardium was unaffected in this second attack. After being in the hospital for about five weeks, and when the rheumatism had almost subsided, chorea again came on, and gradually increased until it had attained such a degree of violence that the man had to be kept strapped down for a week, to prevent his being tossed out of bed. During the chorea his heart was again several times closely examined, but nothing morbid was detected; and, when he was so far recovered as to be discharged from the hospital, the sounds were quite those of health. The nervous affection in this case seemed therefore to be unassociated with any affection of the heart.*

The following case may be mentioned as somewhat parallel to the last, though it is open to the objection that there was no auscultatory proof of the pericardium or the heart being formerly unaffected.

Case V.—Elizabeth Lark, aged 17, a healthy-looking girl, was admitted February 1st, 1849, under Dr. Burrows, for a rather slight attack of chorea, of a fortnight's duration. The catamenia were regular, the heart's sounds perfectly healthy. She had had four or five similar attacks; the last occurred when she was 14 years of age, and after continuing for two or three weeks it was followed by a severe attack of articular rheumatism, which confined her to bed for fourteen weeks, the chorea continuing nearly the whole time, and greatly aggravating her sufferings, by the constant movements of the inflamed joints. She had at that time no pain about the chest, and was not subsequently troubled with palpitation.

As before stated, however, these negative circumstances cannot be held as certain evidence that there was at that time no affection of the heart: such affection might have existed, and subsequently quite disappeared, supposing the pericardium to have been inflamed in that attack. We must, however, in such case, conclude, either that no pericardial adhesion had resulted, or, what is not probable, that an adherent pericardium existed, without manifesting any general or physical sign of such a condition.

It may be observed, that in this case, as in Case III. the chorea *preceded* the rheumatism; also that there had been several previous attacks of chorea, unassociated with rheumatism: the import of these facts will subsequently appear.

Case VI.—Maria Potter, a healthy-looking girl, 16 years of age, was admitted under Dr. Burrows with rather a severe attack of chorea, from which complaint she stated she had scarcely been free since she was six years old. When fifteen she was in St. Bartholomew's Hospital with acute rheumatism; she then had a slight attack of chorea; the catamenia first appeared at that time. She had been troubled with palpitation since the rheumatism. When in the hospital the second time, the chorea was not associated with rheumatism: there was, however, a soft systolic murmur at the apex, which seemed to indicate that in the previous rheumatism she had suffered from endocarditis. There was, however, no evidence of previous pericarditis; and the remarks on this point applied to the last case will apply here also.

Case VII.—Eliza Fanchild, aged 17, a small, puny, undeveloped girl, who had never menstruated, was admitted under Dr. Roupell, with a severe and first

* In two months afterwards, however, this man was re-admitted with another attack of rheumatism, followed again by chorea, and accompanied this time with a rough systolic murmur at the apex.

at ack of chorea, which could not be traced to any exciting cause. There was no rheumatic history; and I could not clearly ascertain that she had been particularly exposed to fright, which is so often the alleged, and probably the real, exciting cause of chorea. After about six weeks of incessant choreic movements, terminating at last in complete jactitation, requiring her to be restrained in bed, the poor girl died, quite worn out.

After a careful post mortem examination of the body, including the brain and spinal cord, I could find nothing at all bearing on the case, except that the free edge of the mitral valve was roughened by minute granulations.

Apart from the general interest which this case possesses as an example of fatal chorea, in which examination after death failed in disclosing any serious organic lesion, the case is of pathological value, from the presence of the deposits of fibrine on the mitral valve: the bearing of this point on the subject under consideration will appear in a subsequent part of this communication.

For the reasons stated at the commencement of this paper, I shall refrain from entering into any discussion of the several theories advanced in explanation of the occurrence of nervous phenomena in the course of acute rheumatism. The details, however, of some of the cases I have narrated suggest a few remarks on the principal alleged cause of the development of these nervous symptoms during rheumatism—viz. the existence of some inflammatory affection of the heart, but especially of the pericardium. Now, admitting, as I do most fully, the influence which acute inflammation of the heart or its membranes no doubt frequently exercises in inducing the most varied disorders of the nervous system, and believing that the cardiac complication in articular rheumatism has a large share in the production of chorea, or other nervous disorders which may arise in the course of the attack, yet there appear to be some circumstances favouring an opinion that such inflammatory affection of the heart, or at any rate of the pericardium, is not essential to the development of any of the nervous symptoms in question. The two principal circumstances in favour of such an opinion afforded by the cases I have narrated, and by others presently to be noticed, are first, that chorea occasionally arises in the course of articular rheumatism without the existence of any positive evidence that the heart or pericardium is inflamed; and second, that, as in Cases III. and V., chorea is sometimes developed first, the rheumatism, with or without cardiac complication being only subsequently superadded.

The two facts just mentioned,—namely, the occasional occurrence of chorea in articular rheumatism uncomplicated by any decided cardiac affection, and the occasional occurrence of chorea *previous* to the onset of rheumatism or of any affection of the heart, naturally suggests an inquiry whether there is not some more general cause for the association between the chorea and the rheumatism than that ascribed to an affection of the heart or pericardium. Apparently impressed with these, and other similar facts, irreconcileable on any previous explanations, Dr. Begbie has recently advanced a very ingenious theory on the subject.

He suggests that the same diathesis or morbid condition of the blood which gives rise to rheumatism, may give rise also to chorea; and he founds his opinion on a fact which I have myself also several times noticed, that out of the same family one member may be affected with chorea, another with rheumatism, while a third may be the subject of both these affections. In instances of this kind the tendency usually seems to be hereditary, one or other of the parents having generally manifested a liability to rheumatism. This view, that the same diathesis may lead to the occurrence either of chorea, of rheumatism, or of both, as the case may be, has many circumstances in its favour, while it explains difficulties which on other hypotheses are inexplicable, and reconciles many facts otherwise opposed to each other, especially the occurrence of chorea previous to the onset of the rheumatic attack. Moreover, it receives the support of Dr. Watson,* and also seems to accord with the observation of Dr. Todd, that "many of the patients who suffer from chorea are of a rheumatic diathesis."†

However inclined one may feel to

* Practice of Physic, 3rd edit. Vol 1, p. 663.
† London Medical Gazette, 1849, p. 664.

agree in the general probability of such an explanation of the occurrence of chorea in rheumatism, it seems to me, nevertheless, that there are still several interesting facts to which too little attention has hitherto been paid in the investigation of this subject, especially as these facts appear to help to a better understanding of the associa tion in question. While examining this subject it occurred to me that much information might be gained by collecting a number of cases from various authentic sources, and arranging them in a tabular form, constructed so as to show at a glance all the important points in each case. I have therefore brought together 36 cases in which symptoms of chorea were observed in connection either with articular rheumatism alone, or with acute disease of the heart alone, or with rheumatism and cardiac affec tion combined. (See p. 62).

On analysis of these 36 cases it will be seen that the chorea was more or less closely associated with rheumatism in 33, while in the remaining 3 there was recent disease of the heart without any affection of the joints. The latter number might have been considerably increased had I included in the table all cases of simple chorea in which an endocardial murmur was heard; but these were purposely omitted, as not seeming to bear on the subject in hand; for it is a question how far in such cases the murmur is dependent on actual organic disease of the heart. In each of the three cases I have given, however, there was distinct evidence of cardiac disease, recent pericarditis in two (1 and 18), and affection of the mitral valve in the third (25).

The next point of interest in the analysis which may here be noted refers to the total number of cases in which there was disease of the heart. Unfortunately this point cannot be determined with certainty; for in 5 of the cases (10, 30, 31, 32, 34) the condition of the heart is not stated, while in three others (4, 21, 24) there was no positive evidence either for or against any cardiac affection. Excluding these doubtful cases, however, we have still twenty-eight in which the state of the heart was noted; and of these we have strong evidence for believing that the heart or its membranes were affected in all but two (13, 23). This very large proportion shows the important share which the cardiac affection doubtless takes in the development of the nervous phenomena: yet the existence of even but two cases of chorea and rheumatism, unaccompanied with disease of the heart, prevents the conclusion that the cardiac complication is invariably an essential element in the production of the nervous symptoms. Besides, it must be remembered that at least in three of the cases (21, 22, 35), the symptoms of chorea ensued before either the rheumatism or affection of the heart appeared. Hence, I think, we may conclude from this part of the analysis, that chorea may be associated with articular rheumatism alone, or with disease of the heart alone, that neither are essential to its occurrence, while it is from the combined influence of the two together that it is most likely to be developed.

On examining into the nature of the cardiac affection in the twenty-six cases in which the heart was said to be diseased, we find in

10 cases, effects of both endocarditis and pericarditis (2, 8, 9, 16, 17, 19, 20, 22, 27, 36).
11 cases, effects of endocarditis alone (5, 6?, 7, 12, 14, 15, 25, 26, 28, 29, 35).
5 cases, effects of pericarditis alone (1, 3, 11, 18, 33).

The endocardium, therefore, presented evidences of disease in no less than twenty-one out of these twenty-six cases, the pericardium only in fifteen. Therefore, if the mere weight of numbers might determine whether affections of the endocardium or of the pericardium were the most likely to be associated with symptoms of chorea, the verdict would be in favour of the former. And such verdict may, I think, be substantiated by several other not unimportant particulars; for, having found the endocardium affected in so large a proportion of these cases, we may be led to inquire whether there is any reason for believing that it might have been affected in the remaining five cases also. In one of these cases (18) the mitral valve was said to be "somewhat thickened;" in the remaining four the condition of the endocardium is not named, and therefore, perhaps, it ought to be inferred that it was sound; but when it is remembered how slight the effects of endocarditis frequently are, consisting only of a few minute beads of lymph along the

No.	Sex.	Age.	Severity of Rheumatism, if present.	Nature of the Nervous Affection.	Date of commencement of Nervous Symptoms.	Previous Nervous Affection.	Affection of Heart.	Relation in point of time between commencement of Nervous and Cardiac Symptoms.	Resuts.	Remarks.	Authority and Reference.
1	F.	16	No rheumatism.	Delirium; chorea.	Chorea about 3d week; delirium earlier.	None noted.	Pericarditis (idiopathic).	Cardiac symptoms preceded the chorea.	Temporary recovery; subsequent death.	After death were found effects of pericarditis; lungs indurated; other viscera healthy; condition of endocardium not named.	Abererombie, (Trans. of the Med. Chir. Soc. of Edinburgh, vol. i.1821), quoted by Dr. Burrows.
2	.	17	Slight.	Chorea (very violent); delirium.	6th day after commencement of rheumatism, which had subsided.	Do.	Pericarditis; Endocarditis.	Unknown.	Death in 3 weeks.	Lymph in pericardium; vegetation on valves of left side of heart: brain healthy.	Dr. Bright, (Med.-Chir. Trans. vol. xxii.), quoted by Dr. Burrows.
3	F.	27	Severity not stated.	Delirium, with jactitation.	3d week of rheumatism.	Do.	Pericarditis.	Almost coincident.	Recovery.	Endocardium not named, but probably not affected.	Dr. Macleod, (on Rheumatism, &c.), quoted by Dr. Burrows.
4	F.	16	Moderate.	Chorea; delirium.	Not clear.	Do.	None detected.	—	Do.	Not clear that the heart was unaffected.	Dr. Burrows, (loc. cit. p. 196).
5	F.	14	Do.	Chorea.	3d week.	Chorea when 7 yrs old.	Systolic murmur at apex (endocarditis).	Both present on admission.	Do.	No previous rheumatism.	Dr. Ormerod, (MS. notes)*
6	F.	14	Do.	Chorea (slight).	3d week. (?)	None noted.	Double cardiac murmur.	Cardiac murmurs on admission; chorea 10 days afterwards.	Do.	Not clear whether pericarditis existed with the endocarditis. Sister to No. 19.	Do.

7	F.	14	Do.	Chorea (severe).	Do. (?)	Chorea. 18 months before.	Endocardial murmur.	No note of auscultation till 11 days after chorea.	Death (3 weeks after chorea).	Pericardium healthy; beads on aortic and mitral valves; brain and spinal cord congested. Never menstruated; anteversion of uterus.	Dr. Ormerod.
8	M.	10	Do.	Chorea.	See Remarks.	Chorea, unassociated with rheumatism, 4 years previously.	Recent endocarditis; recent and old pericarditis.	Both present on admission; (see "Remarks")	Do. (3 weeks after chorea.	A year before had rheumatism, with pain in heart and "inflammation of lungs." 4 weeks ago, pain in chest, followed in one week by chorea. Old pericardial adhesion; also soft lymph. Recent granules on tricuspid, mitral, and aortic valves; brain and spinal cord quite healthy.	Do.
9	M.	16	Severe.	Chorea (severe); delirium; convulsions.	10th day of rheumatism.	None noted.	Pericarditis; endocarditis.	Pericarditis on admission, 3 days before chorea began.	Death (7th day of chorea; 17th of rheumatism).	Recent lymph in pericardium; fibrinous deposit on mitral and aortic valves.	Do.
10	M.	14	Severity not stated.	Chorea.	On convalescence from rheumatism.	Chorea twice before.	Not noted.	——	Recovery.	At 8 years old had rheumatism; 4 months afterwards had chorea; in another year chorea again.	Dr. Todd, (Med. Gaz. N.S. vol. viii. p. 664).
11	F.	19	Moderate.	Do.	6th day of rheumatism.	Chorea 18 months previously.	Pericarditis.	Not noted.	Death.	Died after 4 days of chorea and 10 from commencement of attack; adherent pericardium.	Dr. Pritchard, (London Medical Repository, vol. xxi. p. 2).

* I have to thank my friend Dr. Ormerod for permission to analyse his valuable notes of this and the four following cases.

No.	Sex.	Age.	Severity of Rheumatism, if present.	Nature of the Nervous Affection.	Date of commencement of Nervous Symptoms.	Previous Nervous Affection.	Affection of Heart.	Relation in point of time between commencement of Nervous and Cardiac Symptoms.	Results.	Remarks.	Authority and Reference.
12	F.	15	Ordinary.	Chorea.	On decline of rheumatism.	Chorea when 12½ years old.	Endocarditis.	Endocardial murmur at 3d week of rheumatism; chorea later.	Recovery.	Sister had chorea; brother had rheumatism and pericarditis, without chorea.	Dr. Begbie, (Monthly Jour. of Med. 1847).
13	M.	13	Do.	Chorea (slight).	During or after rheumatism.	None noted.	None.	——	Do.	Brother to next case; had rheumatism before.	Do. (loc. cit. p. 746).
14	M.	14?	Do.	Chorea.	Do.	Do.	Endocarditis.	About coincident.	Death.	Died after chorea of several months' duration. Several previous attacks of rheumatism; heart healthy till last attack; diseased aortic valves after death.	Do.
15	M.	18	Severe.	Do.	On decline of rheumatism.	Do.	Do.	Not clear.	Recovery.	Slight but protracted chorea on convalescence from rheumatism.	Dr. Babington, (Guy's Hosp. Rep. vol. vi. 1841, p. 419).
16	F.	15	Ordinary.	Chorea (slight).	24th day of rheumatism.	Do.	Endocarditis; pericarditis.	Chorea subsequent to cardiac affections.	Do.	Chorea in left arm only, of short duration.	Do.
17	F.	16	Severe.	Chorea (moderate).	On decline of rheumatism. (?)	Hysterical.	Do.	Do.	Do.	Catamenia regular; began to menstruate at 12; the chorea began to subside on appearance of catamenia. Had rheumatism before.	Do.

18	F.	15	None.	Chorea.	See Remarks.	None noted.	Pericarditis.	Uncertain.	Death.	Chorea for 6 weeks. Seemed to be getting well, when suddenly ensued convulsions, dyspnœa, and death in a few hours. Abundant old and recent lymph found in pericardium. Mitral valve somewhat thickened.	Do.
19	F.	20	Very slight.	Chorea (severe).	7th day of illness.	Do.	Pericarditis; endocarditis; fatty disease.	Both present when first seen.	Do.	Sister to No. 6. Catamenia ceased at commencement of attack.	Dr. Kirkes, (Case 1, narrated) M. A. Burke.
20	F.	13	Ordinary.	Chorea (slight).	16th day of rheumatism, which had almost subsided.	Do.	Pericarditis; endocarditis.	Chorea subsequent to cardiac affections.	Temporary recovery; subsequent death.	See particulars of case.	Do. Case 2—Ann Holt.
21	F.	14	Severe.	Chorea.	Before the rheumatism.	Several attacks of chorea.	None. (?)	See "Remarks."	Recovery.	Three years later had chorea again, independent of rheumatism; at that time catamenia regular, and heart-sounds healthy.	Do. Case 5—Elizabeth Lark.
22	F.	11	Ordinary.	Do.	Do.	Do.	Pericarditis; endocarditis.	Nervous affection preceded cardiac.	Do.	Two years afterwards had rheumatism and pericarditis without chorea.	Do. Case 3—Eliza Blenning.

No.	Sex.	Age.	Severity of Rheumatism, if present.	Nature of the Nervous Affection.	Date of commencement of Nervous Symptoms.	Previous Nervous Affection.	Affection of Heart.	Relation in point of time between commencement of Nervous and Cardiac symptoms.	Results.	Remarks.	Authority and Reference.
23	M.	14	Severe.	Chorea.	During the rheumatism.	None noted.	None. (?)	See notes of case.	Recovery.	Ten years afterwards had another attack of rheumatism; on subsidence of which, severe chorea ensued, unaccompanied with signs of cardiac disease; a few months afterwards another attack, with endocarditis.	Dr. Kirkes. Case 4—William Harvey.
24	F.	15	Ordinary.	Do.	Do.	Repeated attacks of chorea.	Do.	——	Do.	First menstruated during this attack; subject to chorea afterwards.	Do. Case 6—Maria Potter.
25	F.	17	None.	Do.	——	None.	Endocarditis.	——	Death.	Nothing detected after death but granules on mitral valve.	Do. Case 7—Eliza Fanchild.
26	M.	16	Ordinary.	Chorea (very severe).	On subsidence (3d week) of rheumatism.	None noted.	Do.	Uncertain.	Recovery.	His father, mother, and sister had shown evidences of insanity. It was so impossible to auscult him during the long continuance of the violent chorea, that pericarditis might easily have existed and been overlooked.	Do. William Hobbs.
27	M.	16	Do.	Chorea.	On subsidence (5th week) of rheumatism.	Do.	Endocarditis; pericarditis.	Both existed when first seen, but appeared to have commenced almost coincidently.	Do.	——	Do. John Gilbert.

28	F.	17	Severity not stated.	Do.	In course of rheumatism.	Do.	Endocarditis.	——	Do.	"Bruit, at first audible below the mamma, disappeared under treatment."	Dr. Hughes, (Guy's Hosp. Rep. vol. iv.) Case 10.
29	F.	14	Do.	Do.	Not stated.	Do.	Do.	——	Relief.	"Bellows-murmur over aortic valves and below mamma."	Do. Case 17.
30	F.	13	Do.	Do.	In course of rheumatism.	Do.	——	——	Recovery.	Condition of heart not named.	Do. Case 33.
31	F.	19	Do.	Do.	2 (?) months after rheumatism.	Do.	——	——	Do.	Do.	Do. Case 45.
32	M.	18	Do.	Do.	Not stated.	Do.	——	——	Do.	Do.	Do. Case 77.
33	F.	15	Do.	Do.	In course of rheumatism.	Do.	Pericarditis.	——	Do.	Endocardium not named. "Heart permanently diseased."	Do. Case 98.
34	M.	18	Do.	Do.	Do.	Do.	——	——	Do.	Heart not named.	Do. Case 99.
35	F.	15	Ordinary.	Do.	Before rheumatic or cardiac affection.	——	Endocarditis.	Chorea for 4 months; then rheumatism; then endocarditis.	Do.	Rheumatism subsided first, then chorea, then the endocardial murmr. Only menstruated once, 5 months previously.	Do. Page 376.
36	F.	16	Do.	Do.	See "Remarks."		Pericarditis; endocarditis.	Almost coincident.	Death.	A month before had left the hospital well from an attack of rheumatism, pericarditis, and chorea; returned with dyspnœa, cardiac pain, and general distress. In 17 days after readmission, pericardial friction, with chorea, which became most severe, and terminated fatally in 4 days. Solid lymph of various dates in pericardium; vegetations on aortic and mitral valves; firm coagula in each ventricle.	Do.

borders of one or more valves, which might be easily overlooked after death, while their auscultatory signs during life would be masked by those of the pericarditis which existed in all the cases, and that in the fatal cases attention would probably be directed chiefly to the extensive disease presented by the pericardium, especially in cases 1 and 3, which occurred at periods (1821 and 1824) when the appearance of minute granules on the valves of the heart would have attracted much less attention than at the present time, and if seen, might have been deemed unworthy of note,—we may conclude that the non-existence of endocarditis is at least not proved in any of these cases. We might, indeed, go even further than this, and conclude, not unreasonably, that the endocardium was probably affected in one or more of them, remembering "that pericarditis is more frequently found in combination with endocarditis than alone."* It may, perhaps, be thought that, by parity of reasoning, the absence of pericarditis in those cases in which its existence is not stated ought to be considered as also unproved; but the likelihood of the disease being overlooked, either before or after death, is so much less in the case of pericarditis than of endocarditis that this mode of reasoning could have but little weight.

Since, therefore, we have tolerably strong proof that the endocardium was affected in twenty-one out of the twenty-six cases in which the condition of the heart was stated, and some reason for believing that it might be affected in some of the remaining five; while, on the other hand, we have proof of the pericardium being affected in only fifteen, and no positive reason for believing it to be affected in the remaining eleven,—we are, I think, justified in concluding that of the two diseases the affection of the endocardium is more closely associated with the development of nervous phenomena in acute rheumatism than is affection of the pericardium. Such conclusion naturally leads to the supposition that the cardiac murmurs, so frequently heard in cases of chorea unassociated with rheumatism, may also be dependent on some organic disease of the interior of the heart, "an insidious endocarditis affecting the mitral valves," †

* Latham, Diseases of the Heart, vol. i. p. 145.
† Dr. Todd, Medical Gazette, 1849, p. 664.

and that such a morbid condition may have an important share in the production of the chorcic phenomena. The mode in which such affection of the endocardium can bring about the nervous symptoms involves inquiries too lengthened for the present communication: yet it may be observed that there are reasons for believing that the efficient cause is in some way closely connected with that condition of the endocardium, or of the blood, or of both, which leads to the deposition of the fibrinous granules on the margins of the valves of the heart.*

Whatever may be the immediate exciting cause which calls the nervous phenomena into existence, there appears to be sufficient reason for believing that in most of the cases in which such phenomena arise there pre-exists a peculiar proneness to the development of nervous disorders, and that the rheumatic or cardiac affection occurring in persons possessed of such an evidently irritable nervous system, gives rise to symptoms which, in persons less predisposed to nervous affections, would probably not be developed. This opinion seems to suggest itself from a further analysis of the thirty-six cases I have tabulated, for such analysis demonstrates three important points:—1st, that the chorea is much more common (as has been often observed before) in females, in whom the nervous system is peculiarly prone to disorder, than in males, in whom this proneness does not exist; thus of the thirty-six cases two-thirds (twenty-four) occurred in females, one-third (twelve) in males. 2dly, that a large majority of the cases occurred at that period of life in which there naturally exists, especially in females, a peculiar tendency to nervous affections,—namely, the period of puberty, or of the first onset of the menstrual functions. Thus, on examining the ages of the several cases, we find that among

* As bearing on the comparative frequency with which the pericardium and endocardium are affected in chorea, I may also notice that the valves of the heart were affected in all six of the fatal cases of chorea tabulated by Dr. Hughes, in which the condition of this organ is named; while the pericardium was found inflamed in only thrice of them, and in no case without coincident affection of the valves. The affection of the valves in four of the cases consisted in the presence of granules of fibrine on the borders of one or more of the valves, while in the other two cases the mitral valve is described as being merely "opake" and "thick."

the females the chorea occurred in one at 11 years old, in two at 13, in five at 14, in six at 15, in four at 16, in two at 17, in two at 19, in one at 20, and in one at 27. Out of the twenty-four females, therefore, no less than seventeen were between the ages of 13 and 17,—*i. e.*, during the critical period attending the development of the catamenial functions. A review of the male cases affords very similar results; for with the exception of one case, in a boy of 10, all the other cases occurred between the ages of 13 and 18.* 3dly, that in several of the cases there was distinct evidence of predisposition to nervous affections. Thus it is noted that no less than nine of the patients (5, 7, 8, 10, 11, 12, 21, 22, 24) had suffered from previous attacks of chorea, which, with one doubtful exception (10), were unassociated with rheumatism; and another case (17) occurred in a nervous hysterical girl. This number might probably have been greatly enlarged had attention been paid to this point in the history of the other cases; but unfortunately in nearly all of them there is no mention of the existence or non-existence of any previous nervous affection.

There are one or two other points exhibited by the cases, to which I may briefly allude before concluding this communication. On glancing at the fourth column, which relates to the severity of the rheumatic attack when present, it will be observed that of the thirty-three cases in which the chorea was more or less directly associated with rheumatism, the rheumatic attack is described as being

Severe in	5	cases.
Ordinary or moderate in	17	„
Slight in	2	„
Severity not stated in .	9	„

* I need not go further into this part of the subject, since the same views in relation to chorea in general, though not to chorea in rheumatism, have been fully developed by Dr. Hughes in his valuable paper in Guy's Hospital Reports (vol. vi.), with which I did not become acquainted until after the substance of this communication was read before the Abernethian Society.

It may be assumed that in the last nine cases, in which there is no record of its severity, the attack was either slight or ordinary. But even supposing these nine to have been severe, we still find that in more than half the number the rheumatic attack was moderate or of an ordinary kind, and that therefore the development of the nervous phenomena cannot be ascribed to the severity of the rheumatism. From the sixth column, again, we learn that in those cases in which the period of the commencement of the chorea is noted, the nervous symptoms usually arose, not at the beginning or climax of the rheumatic attack, but on its subsidence. The ninth column, relating to the precedence of the cardiac or nervous symptoms, is occasionally incomplete, from the impossibility in many cases of obtaining the requisite information; but in most of the instances in which such information was procured, it will be seen that the cardiac affection preceded the development of the nervous phenomena.

Of the thirty-six cases here tabulated no less than eleven, almost one-third, terminated fatally. In all of these there was found some affection of the heart after death,—viz., pericarditis in 8, and endocarditis in 9. The brain and spinal cord, when stated to have been examined, as they were in at least five cases (2, 7, 8, 19, 25), presented no trace of inflammation, and nothing which seemed to bear particularly on the pathology of the disease. This is important in reference to the opinion which has been advanced, that the choreic symptoms are dependent on extension of the rheumatic inflammation to the fibrous membrane of the brain or spinal cord; for it shows that such symptoms may ensue and terminate fatally, without leaving any trace of inflammatory affection of the membranes or substance of the nervous centres, and fairly allows of the inference that in favourable cases also the nervous centres are equally free from inflammatory changes.