## Some Points in the Symptomatology of Cervical Rib, with Especial Reference to Muscular Wasting.

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THE symptomatology of cervical rib is wide and varied, and it is not my intention to discuss it this evening with anything approaching to completeness. Such matters, therefore, as the shape of the neck in cases of cervical rib, the position of the subclavian artery—which in all probability is of much less significance than was formerly supposed—the question of difference in the radial pulses, and so on, will not be referred to here. Ordinarily, the symptoms of cervical rib may be divided into those of the motor, sensory, and vasomotor systems respectively. Again, for the sake of brevity, no reference will be made in this place to the last of these, although vasomotor symptoms, when they occur, are of considerable interest.

As far as sensory symptoms are concerned, they may be classed as subjective and objective. In the former group are placed the symptoms which are likely to be those to which the patient's attention is primarily directed. In the great majority of cases he complains of tingling, numbness, pins and needles; in a word, of paræsthesiæ in the hand and fingers, often in the finger-tips. In a majority of cases, moreover, these symptoms are unilateral, often strictly so; hence, unilaterality of paræsthesiæ is of importance in coming to a diagnosis. Again, it is in my experience very frequently the case that they are referred either to the ulnar or to the radial side of the hand, much more frequently than to all the fingers. This is a matter which should be carefully inquired into, and may constitute a point of diagnostic value. Pain, similarly, usually described as shooting or darting, is an early symptom, and its distribution is identical. It is rare to find that the pain is described as actually starting from the region of the neck or shoulder; commonly it is experienced only in the forearm, hand, or fingers, and most patients say, further, that it always radiates in a downward direction. The possible significance of downward as opposed to upward radiation is a difficult matter. In most cases of trigeminal neuralgia the pain is described as radiating from the periphery centralwards; in tabes, the lightning pains apparently radiate always upward in some cases, and always downward in others. It is

conceivable that where the lesion is in the sensory ganglion itself pain is described as radiating towards the centre, whereas if the lesion is distal to that point the pain radiates towards the periphery. Examination of a number of cases of different varieties of neuralgia, however, has not enabled me to establish this distinction with any certainty.

Objective sensory disturbances are notoriously variable. In some cases no definite alteration in cutaneous sensibility can be discovered. In others there is a diminution or loss to all forms of cutaneous sensibility, the limits of each not always strictly corresponding, in the distribution, roughly speaking, of the radial or ulnar nerve. It will

FIG. 1.

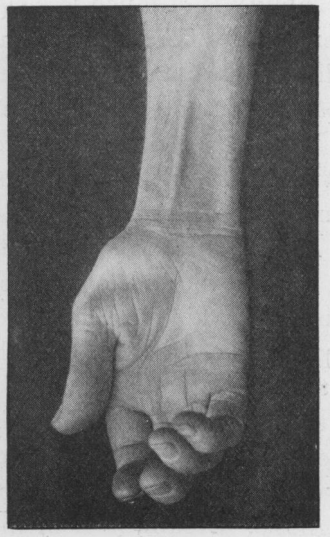

FIG. 2.

be found, as a rule, that the distribution is never exactly that of either of these nerves, and, on the other hand, it does not exactly harmonize with a root supply, at least not in its entirety. Clinical experience shows us that sometimes only that part of a root distribution which concerns the fingers is impaired, while the remainder of the root area escapes. In fact, the cutaneous loss, in relation to the motor loss, may present anomalies difficult of explanation.

It is my purpose this evening to direct attention more particularly to the motor phenomena accompanying the lesion, again premising that such motor phenomena may not be present in a given case; when they do occur their nature is such that it is, in my experience,

of considerable diagnostic, if not actually of pathognomonic, significance.

There are two main types of muscular involvement. The first of these, which may be designated the median type, is very frequent, yet apparently it has not been noted or sufficiently emphasized by previous writers on the subject. The first case of cervical rib that came under my observation was under the care of Dr. Buzzard in the National Hospital in 1906, and was eventually operated on by Mr. Sargent. A photograph of this patient's hands is reproduced as fig. 1. It will there be seen that there is a curiously local early wasting of the muscles of the thenar eminence on the right side, in which the muscles involved

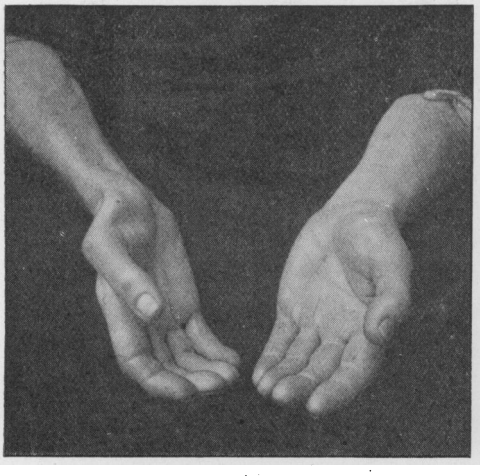

FIG. 3.

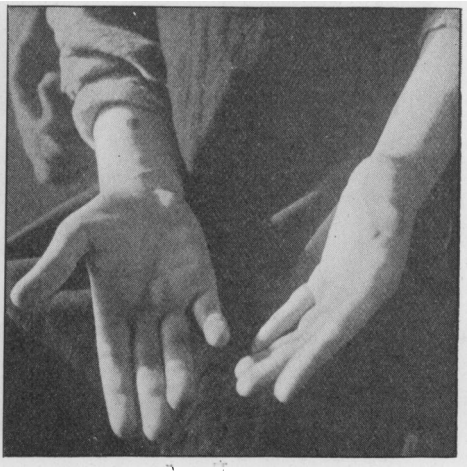

FIG. 4.

are the abductor pollicis and opponens pollicis alone ; all the other thenar muscles, including the flexor brevis pollicis, being intact. This definitely partial atrophy of the thenar muscles has come under my notice a large number of times, as a glance at the series of figures (figs. 2 to 6) will show. Sometimes the wasting is comparatively slight, sometimes it is profound, as in fig. 6, and yet the other thenar muscles escape. These cases have been under the care of one or other of my colleagues at the National Hospital, to whom I wish here to express my gratitude for kindly granting permission to refer to them. Fig. 6, for instance, representing the hands of a patient under the care of Dr. Aldren Turner, is peculiarly instructive. The outline of the metacarpal bone of the thumb is very readily traceable through the skin, the bone being

practically subcutaneous as a result of the atrophy, and the flexor brevis pollicis remains, perhaps not of normal size, but only little wasted and not paralysed, while the adductor groups are quite normal. Fig. 5 is from a case under the care of Dr. Farquhar Buzzard. It shows the special form of thenar atrophy very clearly. As a result of operation in this case the muscular wasting has largely disappeared. Again, through the kindness of Dr. Parkes Weber I was afforded an opportunity of examining for myself the patient with cervical rib whose hands are shown in fig. 4. This patient was seen only a week ago, and she presents the same muscular lesion as the first case of seven years previously.

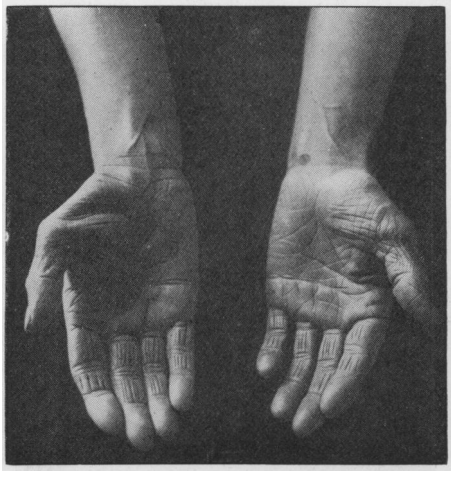

FIG. 5.

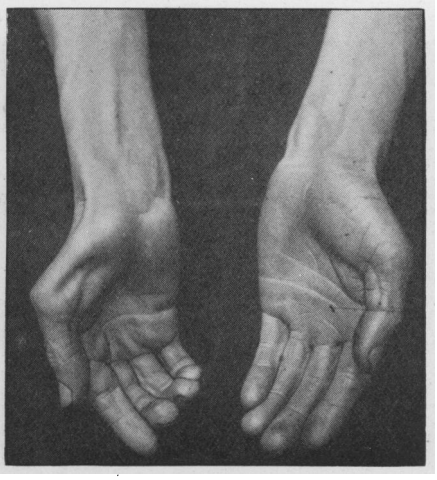

FIG. 6.

The importance of this local atrophy will be recognized when it is remembered that the median nerve supplies the abductor pollicis, opponens pollicis and flexor brevis pollicis; yet of these muscles two are taken and the other left. This can only mean, I submit, that although their peripheral supply is from the same source their root supply is from two sources, probably the seventh and eighth cervical; for these are the roots that may be involved in this condition, and the lesions of cervical rib, therefore, afford interesting evidence of the exact segmental supply of these muscles, and serve to establish their position in the cord. It may be fairly concluded that the root supply of the abductor pollicis and opponens pollicis is the seventh cervical, and of the flexor brevis pollicis the eighth cervical.

Further, a curiously local atrophy of this kind, of which the series of

photographs furnish striking evidence, contrasts so strongly with what obtains in progressive muscular atrophy that it is difficult for confusion to arise, although it has done so in the past. In the latter condition the atrophy is essentially a *global* atrophy, that is to say, it affects the muscles of the thenar group as a whole, and though it be slight to begin with, the observer will never find that selective atrophy which it has just been shown is so frequent in cervical rib. The figures here reproduced also indicate that the hypothenar eminence may remain unaffected, in fact does remain unaffected, although the atrophy of the two muscles concerned is complete. In progressive muscular atrophy, to have so

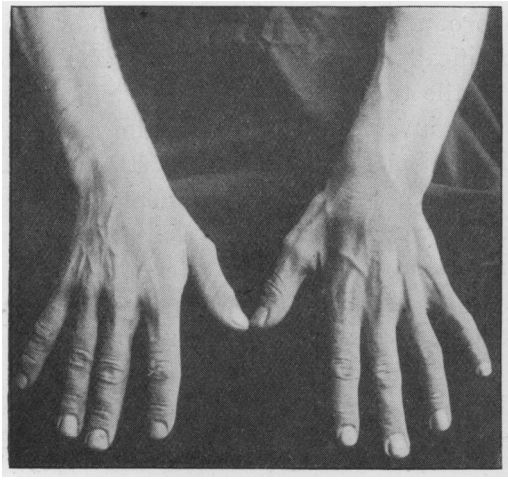

FIG. 7.

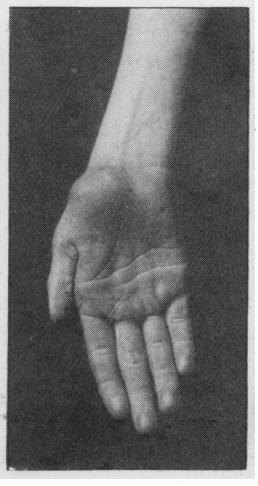

FIG. 8.

great a change unaccompanied by atrophy in the hypothenar group would be a rarity, if indeed it ever occurs at all. In this way, therefore, the muscular lesion here described has often proved of considerable diagnostic value.

This local atrophy presents another point of interest. In Mr. Sargent's interesting contribution to the evening's discussion, attention was drawn to the importance of the fibrous band, which is often all that represents the continuation of the aborted cervical rib to its insertion in or junction with the first dorsal rib. The roots which pass over the rib and its fibrous prolongation are the seventh and eighth cervical, and the symptoms of cervical rib are due to the involvement of one or other or both of these roots. Now in more than one of the patients who have had the local thenar wasting already referred to, the sensory change has been along the radial border of the wrist, hand and fingers, that is to

say, a distribution which from a root point of view is accepted by neurologists as representing the sixth cervical. That root, however, is not involved in cervical rib. We therefore find ourselves face to face with an apparent anomaly. The only way, so it appears to me, in which this can be satisfactorily explained is by utilizing our knowledge of the facts of pre- and post-fixation of the plexus, and by supposing that in cases of post-fixation the seventh root and not the sixth is the one that is implicated.

The other type of muscular atrophy in cases of cervical rib corresponds, roughly speaking, to an ulnar distribution, in other words, we find general wasting of the interossei and an approximation to the *main en griffe*, as in fig. 8. In one of the cases shown here this evening, by Dr. Hinds Howell, it is specifically noted that all the hand muscles are wasted, with the exception of the two above referred to, indicating that the eighth cervical was the root involved. In most of the cases of this kind it will be found that the patient complains of paræsthesiæ along the ulnar border of the hand and in the ulnar fingers, whereas in the cases offering the local thenar atrophy of the first type the paræsthesiæ are on the radial side. Fig. 7 also represents the eighth cervical type, with early wasting of the abductor indicis and interossei generally. In this case the thenar muscles escaped, so that it is a purer instance of the second type than the case represented in fig. 8, which is really a combination of the two. This patient was operated on by Mr. Donald Armour, and here also marked amelioration of the muscular defect has ensued.

It should be mentioned that there is another possible explanation of the local thenar atrophy—viz., that when a nerve trunk is involved in a lesion, certain muscles as a result may become impaired before others do; that is to say, there may be a selective action. This was pointed out by Sir David Ferrier in a paper on "Atrophic Paralyses" which appeared in *Brain*[1] thirty years ago. He believes there is a special proclivity for abductor muscles to be paralysed before adductors. Whether this explanation will suffice in cases where the abductor and opponens wasting is profound, while other muscles supplied by the same nerve are still normal, seems doubtful.

Occasionally muscular cramps in the hand and fingers are noted by the patient, without any muscular atrophy being discoverable, but it is not necessary to dwell further on this symptom at present.

[1] *Brain*, 1881-82, iv, pp. 217, 303.

Dr. FARQUHAR BUZZARD said he had been particularly interested in Dr. Wilson's observations about the types of muscular atrophy occurring in cases of cervical rib, and especially in relation to that type in which there was marked wasting of the abductor and opponens pollicis with comparative escape of the flexor brevis. He had noticed and figured a similar appearance in some cases which he had described under the title of uniradicular palsies of the brachial plexus about ten years ago. He was now convinced that some of those cases were cases of cervical rib, but the special connexion between the type of atrophy referred to and cervical rib had never occurred to him until Dr. Wilson had pointed it out.

Dr. Buzzard drew attention to a case he was showing in which there had been a complete recovery from muscular atrophy in the hand, after removal of the cervical rib by Mr. Sargent, and he referred to it as an exception to Mr. Thorburn's disappointing experience in this type of case. The recovery was to be attributed to the fact that operation was performed within six months from the onset of symptoms.

For some years he had been submitting almost every case in which pain in the arm was the predominant symptom to an X-ray examination of the neck. The results of these observations had been rather interesting, because they had convinced him that pain of almost any description and any distribution within the upper extremity could be associated with the presence of cervical ribs. He used to hold the opinion that in the cervical rib cases the pain was nearly always distributed longitudinally on either the radial or the ulnar side of the arm and hand. Now, however, he had come to recognize that cases of typical acroparæsthesia with pain confined to the hand and fingers could also be associated with cervical ribs. He referred to cases, generally in middle-aged women, who complained that soon after going to bed they woke up with intense burning pain in the hands and fingers. This was relieved to some extent by keeping the hands outside the bedclothes, but disturbed nights often resulted. When they got up in the morning their hands felt useless and clumsy, but after a time this would improve and the patient be able to carry on her work throughout the day. The pain and discomfort would return again at night. In several cases of that kind there were distinct cervical ribs, and in one such case Mr. Sargent had operated and given the patient relief. On the other hand, he had found that the symptoms could be relieved by other methods in several cases. Cervical ribs were also present in some cases of occupation neuroses associated with the upper extremity. He was convinced

that the question of occupation was a most important one, almost as important as the presence of the rib. There were a number of patients who first showed symptoms after changing their work or after beginning to work for the first time. Other patients were relieved by change of occupation. One lady he knew always had pain in the right arm when she wore a heavy fur coat, and subsequently lost the pain when she gave up that particular garment. The pain returned with driving and piano-playing, two forms of occupation in which the arm was used extended in front of the patient. In the course of operations which Mr. Sargent had done on his cases it had been demonstrated that the tension on the cords of the brachial plexus was more pronounced when the arm was extended forward than when it was abducted. Further, it was always intensified by inspiration. The pain of brachial neuralgia, however, was generally exaggerated by a forward position of the arm and by inspiration, whether a rib was present or not. He doubted whether there was anything about the sensory symptoms which were quite characteristic of cervical rib. Dr. Buzzard also referred to two cases of cervical rib in which vasomotor disturbances were the prominent features. One of them had been operated upon with excellent results. In conclusion, he felt that the cervical rib was only part of an anatomical peculiarity and that the questions of occupation and posture were extremely important with regard to the development of symptoms. Operation was the only treatment in some cases, but there were others of a milder type in which other measures, for instance, change of occupation when it was possible, might be attended with success.

Sir RICKMAN J. GODLEE sent the following communication: I have taken much interest in the question of cervical ribs ever since I saw Lister remove one—in the days when they were called exostoses—from a middle-aged major, who found trouble in raising his rifle. He was cured by the operation. I have never seen serious consequences follow the operation. My impression is that pain is always relieved, but that the recovery from paralysis is generally very slow. My principal object in writing is to say a word about the method of performing the operation. One reads shocking accounts of its difficulties and dangers. I have removed a considerable number of cervical ribs, large and small, and have not met with the difficulties described. I believe they may be avoided by making a sufficiently long *transverse* incision *above* the swelling — not over it—and first exposing the upper part of the

brachial plexus, without thinking about the rib. A broad retractor placed on the plexus then pulls it downwards, and with it goes the suprascapular nerve, which should thus stand no chance of injury. If the retractor is broad, no damage will be done to the plexus even by firm traction. By placing another broad retractor on the inner part of the wound, the sternomastoid, the large vessels and nerves, and the anterior scalenus are drawn aside, and the rib is satisfactorily exposed. By adopting this procedure the subclavian artery is never seen. The only vessels that come into view are the transverse cervical, and they are easily dealt with. I think the troubles that have been experienced must have come from (1) making a vertical incision, and (2) attempting to work straight down on the rib by separating the cords of the plexus. I have generally, but not always, left the periosteum. This avoids any risk of damaging the pleura; and I have not seen any trouble from re-formation of the rib. It is possible by such an incision as has been described, in most cases, to remove the head of the rib if one be present; but this appears to be an unnecessary refinement.