FROM THE ORTHOPEDIC CLINIC OF LUND, SWEDEN
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SPONDYLITIS DEFORMANS OF THE CERVICAL SPINE AS A CAUSE OF SO-CALLED BRACHIAL NEURALGIA AND OTHER NEURALGIFORM PAINS. A CONTRIBUTION SPECIALLY TO THE QUESTION OF TREATMENT

BY

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In the fall of 1928 there was transferred from the medical to the orthopedic clinic of Lund a man, thirty-seven years old, with brachial neuralgia of the left side and, at the same time, spondylitis deformans of the sixth and seventh cervical vertebræ. On certain turnings of the head and neck the pains would become paroxysmal and go shooting all along the arm, right out into the ulnar fingers; they were so severe that they kept the patient in a state of distress night and day. It was thought that the spondylitis was responsible for the condition, and as a rational treatment it was therefore decided to try fixation of the cervical spine. The effect at once showed itself in the disappearance of the lancinating pains, and the patient's continuous suffering became much less pronounced. As attention had thus been called to the possibility that a spondylitis of this kind might be the underlying cause of these so-called "brachial neuralgias", all similar cases thereafter received by the orthopedic clinic, and also, through the courtesy of Prof. *Ingvar*, a great many from the medical clinic, were now systematically examined in the light of that experience. As a result, it was found that in a surprisingly large number of cases of neuralgiform pains in an arm, and also in many cases of radiating pains up along the back of the neck—the so-called occipital neuralgia—and

down into the shoulder, such a spondylitis really existed. All these cases were then treated on the same principle as the first one, by fixation of the cervical spine. In the beginning, while the whole matter was yet in the experimental stage, this fixation was done by what was then deemed to be the most effective method, namely by means of a plaster jacket, with arrangement for supporting the head; but later, after it had become increasingly evident that the principle was the right one, it was tried to obtain the same result by means of a smaller and simpler bandage, and since then the clinic has gone over, more and more, to the use of such an easier appliance in these cases. As already remarked, it is not only cases of the so-called brachial neuralgia that have been dealt with by this method, but also cases of neuralgiform pains in the occipital- and shoulder regions. Common for them all, however, has been the presence of roentgenologic changes in the cervical spine, most often in the lower part of the latter, due to spondylitis deformans.

In studying the literature on the various subjects appertaining to this matter, one notices how a new and ever livelier interest is being taken in the old question of radicular symptoms in connexion with the systemic diseases of the spine. And especially of very late—in 1932—several observations have been published, similar to the ones here recorded, concerning neurologic symptoms in connexion with spondylitis deformans, precisely of the cervical spine. In that connexion, it has been pointed out that this syndrome is a by no means unusual pathologic condition, to which sufficient attention has not been paid hitherto, but the importance of which is, as a matter of fact, sufficiently great to be deserving of interest.

To the therapy of these painful conditions, on the other hand, relatively little attention has been paid in the literature, and especially has but little been published hitherto concerning the treatment used here in Lund, by fixation of the cervical spine. An account of our observations with regard to that method may therefore be of interest, firstly because the results in themselves have been good, secondly because the very fact that fixation of

the cervical spine lessened the radiating pains, lends a definite, not before advanced support to the theory that the origin of those pains is really to be sought in a pathologic condition of that region.

In the following is given first, in abbreviated form, the history of five of the most typical cases. They all belong to our earliest ones, in which plaster jacket was used, before a simpler method of bandaging was adopted, as mentioned above.

CASE I.—481/28. Stable-man, aged 48 years. Formerly well. In 1913, he had a collision with a railway engine, in which he was thrown down and hurt his left shoulder. Was in hospital for nine days in consequence, and was roentgen-examined, with the result, as it seems, that "a crack was found in his left shoulder". He then went through an after-treatment for two months, and after that time had been able to do his full measure of heavy work without the shoulder troubling him in the least. During the night of 14th Oktober, 1928, he began to get radiating pains from the left shoulder out into the upper arm and down into the hand, specially into the ulnar fingers. In the following days they grew stronger, and finally became so severe that he was quite unable to work. On 25th October he was admitted into the medical clinic, and on 1st November was transferred from there, for consultation, to the orthopedic clinic.

Status, 1st November, 1928. Strongly built man, general condition good. Mobility in both shoulder joints free and painless. Head carried with a slight forward inclination; its movements in all directions, except forward, just slightly restricted. Lengthwise impact on the head and percussion over the spinous processes of the lower cervical vertebræ cause radiating pains along the arm and out into the ulnar fingers. Sensibility, as tested with cotton, unimpaired. *Roentgen:* Narrowing of the intervertebral discs between the sixth and seventh cervical vertebræ, and osteophytic accrescences in the same location. Spondylitis deformans (see Fig. I).

Treatment with heat and rest in bed, with the head steadied by sand bags, brought no noticeable improvement. When he

lay still on his back, without moving his head, there were no pains, but any movement of his head caused them to start again. They disturbed his sleep, and often woke him up in the night. In order to obtain a more effective fixation of the head it was decided, on 12th December, 1928, to try with a *plaster jacket* extending up above the back of the neck, with a strap across the forehead keeping the head steady. The pains ceased almost at once, and two days after, on 21st December, he left the hospi-

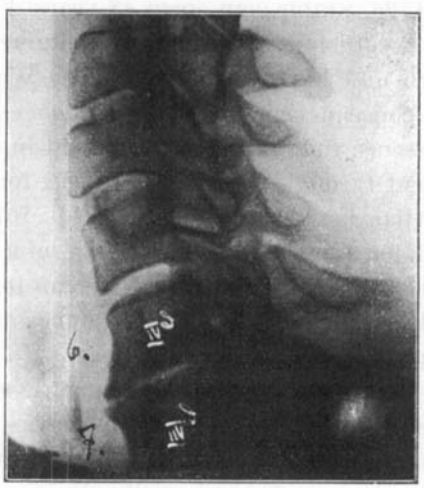

Fig. I (CASE I).

tal. At home he continued to wear the appliance for twenty days, during which time he had some purely mechanical trouble with it, but no, or hardly any, pains. On 1st January, 1929, he entered the orthopedic clinic again, and the plaster was removed. At first this resulted in a renewed increase of the pains, but afterwards they again began to get less. The mobility of the head continued to be somewhat restricted, and on any violent movement he got pains in the back of the neck. There were no longer any pains in the arm. A course of physical treatment was then instituted, and eventually the symptoms disappeared almost completely. On 20th February, 1929, he left the hospital to resume his usual occupation.

Subsequent course. 15th June, 1933: Except during a short period a year ago, when he had pains in the left shoulder and up in the neck, he has not experienced any discomfort, and has done his heavy work all the time. There is no noticeable restriction of the mobility of the cervical spine; no neurologic symptoms; no positive change in the roentgenologic picture since 1928.

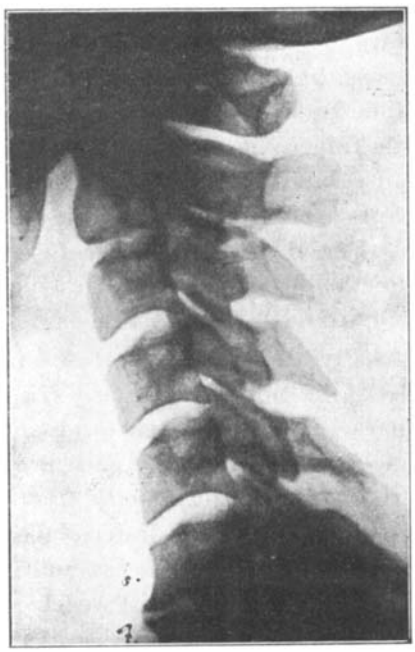

Fig. II (CASE II).

CASE II.—219/29. Brick worker, aged 37 years. Formerly well. In the end of March, 1929, while he was pushing a heavily loaded cart before him, he was suddenly seized with acute pains in the left shoulder, radiating down into the arm and out into the little finger. The pains continued from that day on, and eventually became so severe that he had to cease his work. They troubled him even at night, and it was only in certain positions that he could find any rest at all. The pains were always of the

radiating type. There was a feeling of lacking strength in the arm. On 15th May he was admitted into the medical clinic, and ten days later he was transferred thence to the orthopedic clinic.

Status, 25th May, 1929. Strongly built; general condition good. Mobility in the shoulder joints free and painless. Carries his neck stiffly, with some inclination toward the right. The mobility of the cervical spine is only slightly restricted, but inclination and turning to the left give some difficulty, and are executed with care. Certain of these movements, not always the same, cause intense, lightening pains to shoot along the underside of the arm, down as far as the elbow, and sometimes even out into the little finger. The arm has lost a little of its active strength. No muscular atrophy. No sensory disturbances. Reflexes normal. *Roentgen:* Narrowing of the interarticular space between the sixth and seventh cervical vertebræ, with osteophytic outgrowths on the opposing anterior margins of the two bones. Spondylitis deformans. (Fig. II).

Treatment.—As treatment with heat and rest in bed during the first few weeks did not result in any improvement, and as the character of the pains continued to point to movements of the cervical spine as their cause, the patient was, on 31th May, 1929, fitted with a *plaster jacket with fixation for the head.* The pains got less almost immediately, though without disappearing completely. The intense, lancinating pains ceased. On 6th June, he left the hospital, still wearing the appliance, to which he had by then become accustomed, so that he felt his condition to have become much better than before he got it. He wore it at home for a month, and during that time, apart from the physical discomfort of wearing it, had no trouble worth speaking about, except for some slight pains in the shoulder region when he moved his head in certain ways. There was no radiation of the pains into the arm; he was able to sleep at night. The plaster jacket was removed on 3rd July, and he was then treated with heat and massage. During the days immediately following, the pains increased somewhat, but eventually subsided again. He left the hospital finally on 23rd July, at which time he could move his head much more freely, though

not entirely so. The lancinating pains had disappeared; he still had a little pain, specially in the lower arm, but not more than that he thought he might begin to work again.

Subsequent course. Until the end of 1929 he was occupied in lighter tasks, but from then on he went back to his usual heavy work, and at this he has stayed since, except during some periods when he was unemployed. Until 1931 he was never entirely free from his pains, but at no time were they in any way nearly as severe as before his stay in the hospital, and on no occasion was he obliged to take sick-leave on their account. Even now, he has some reminiscences of them from time to time, though very rarely, if he happens to be doing some specially heavy work. During the first time after he left the hospital in 1929, the character of the pains changed, in so far as they disappeared from the arm and shifted to the left side of the neck, sometimes radiating up into the left temple. On an after-examination 13th July, 1933, there were no objective changes to be observed, except a very slight restriction of the mobility in the cervical spine. In the roentgen picture, there are no demonstrable changes since 1929.

CASE III.—443/29. Farmer, aged 55 years. During the last fifteen or twenty years he has sometimes felt a little difficulty in moving his head freely. Otherwise he has always been in good health. In July, 1929, he felt for a couple of weeks some radiating pains from his neck out into the right shoulder and even down into the two ulnar fingers, when doing any heavy work. During about three weeks' following rest they disappeared, but came again in the fall, during harvesting. Since then they have gradually increased, until for the last two weeks he has been completely unable to work. He has noticed himself that they come on when he is moving his back, especially with any movement of the cervical spine. At certain movements of the latter they come like running pains out into the arm. He was first admitted into the medical clinic, but was transferred from there to the orthopedic one.

Status, 22nd October, 1929. Rather lean build; general con-

dition good. Mobility in both shoulder joints free and painless. Carries his head bent slightly forward, and moves it very carefully. When he bends it backward, or strongly forward, he feels a pain along the internal side of his right shoulder blade and out into the right arm, whose active strength is slightly diminished. No atrophy. Reaction to sensibility tests with cotton and pin, normal. *Roentgen:* Narrowing of the interarticular

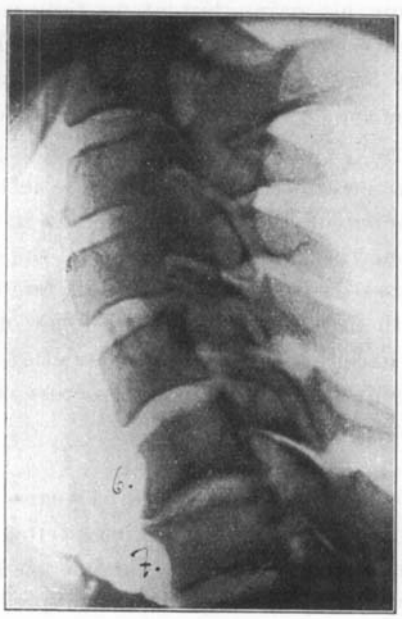

Fig. III (CASE III).

space between the sixth and seventh cervical vertebræ. Osteophytic outgrowths along the opposing anterior margins of the latter. Cervical vertebræ otherwise intact. Spondylitis deformans. (Fig. III).

Treatment: As the pains were chiefly evoked by movements of the cervical spine, and were, besides, so severe that they troubled him almost constantly, night and day, and as all other attempts at treatment had been without result, it was decided, on 31st October, 1929, to apply a *plaster jacket with*

fixation for the head. This had to be fitted on, at first, with the head bent forward as he held it; but after a week, when the pains had become less intense, and he could move the head more freely, it was easily changed, so that the head was held in a normal position. On 6th November, he left the hospital and remained at home until 4th December, same year, when he returned, and the plaster appliance was removed. During the intervening month the pains had been noticeably better, and in spite of the subjective inconveniences which the wearing of it had caused him he had therefore been feeling fairly well. When the jacket was removed, the mobility of the cervical spine was found to be much better, but on certain movements of the latter there were still pains, though not so strong as formerly. He was himself of the opinion that the appliance had benefitted him very much. On 11th December, 1929, he left the hospital for good.

Subsequent course. By letter, 20th June, 1930: During the first two months after his return from the hospital in 1929 he had been unable to work, owing to continuing pains, and not until after a year was he entirely free from his trouble. During the whole of that time, the pains had been of the same character, as if caused by the movements of the cervical spine. He is still thankful for the way in which the plaster jacket helped him over a difficult period in his affection.

CASE IV.—783/30. Laboring-man, aged 62 years. When he was about eighteen years old, he had had »glands« on the left side of his neck; otherwise he had always been in good health. Since 1916 he had on five different occasions been under treatment in the medical clinic for what was diagnosed as brachial neuralgia of the left side. The pains had been radiating chiefly down along the radial side of the arm and out into the three radial fingers. They had always been to a great extent connected with his labor, which was usually of the heavy kind; in as much as they became worse when he worked, and less severe when he rested. They often troubled him even at night. During the last few years their character had changed somewhat; so

that while they formerly were felt in the shoulder and arm more like rheumatism, they now radiated, instead, up along the neck and out into both his temples. Beside from pains, he has suffered from paresthesias and a feeling of numbness. During these latter years he has, owing to his illness been unable to work for periods amounting, all together, to a considerable aggregate.

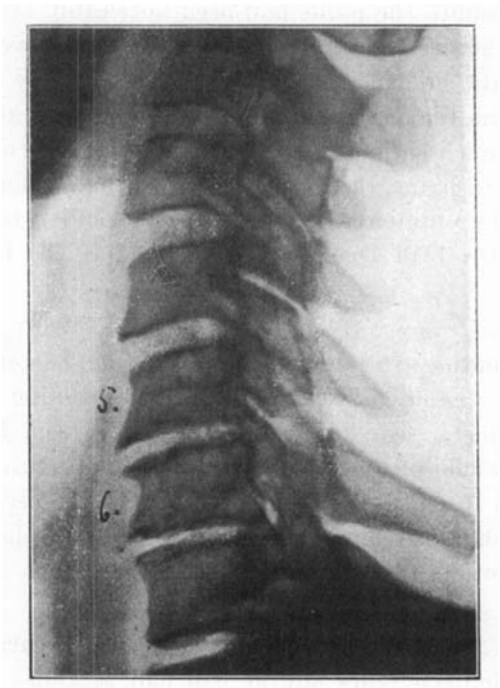

Fig. IV (CASE IV).

Status. Lean, muscular build. No visible or palpable signs of glands in the neck. During one of his stays in the medical clinic, in 1916, it was noticed that the sensibility to pain and contact of his left thumb, index finger and the radial side of the palm of his left hand was slightly diminished. Otherwise the sensibility has always been normal. On some occasions, though not in recent years, there was likewise found a slight atrophy of the musculature in the region of the left shoulder; and in

1916 the active strength of the flexors and extensors of the left elbow was reduced. Otherwise there was no noticable difference in the muscular strength of the two sides. The mobility of the cervical spine has often been restricted, but never to any great extent; on certain movements of this part of the vertebral column the pain in the arm would sometimes become more intense. *Roentgen:* Changes due to spondylitis deformans, with osteophytic outgrowths along the anterior margins of the fourth to seventh cervical vertebræ; most pronounced between the fifth and sixth. (*Fig. IV*).

Treatment. At first, a medicamental and general physical therapy was tried. In March, 1929, he was fitted, in the orthopedic clinic, with a *plaster jacket with fixation for the head.* He wore this for four weeks, and in spite of the mechanical discomfort which it caused him, he nevertheless thought that during that time he felt better than under any other treatment. In the fall of 1930 he got a *similar fixation bandage.* As the pains returned just as severe as formerly when this was laid off, he got a *celluloid neck-bandage* (Fig. VIII).

Subsequent course, 14th February, 1931. He is free from pain as long as he wears the bandage, but as soon as he leaves it off the pains return. Considering his age—sixty-three years—and the extent to which the steady wearing of the appliance restricts the movements of his head, he is attested for obtaining a pension on the ground of greatly diminished working capacity.

26th June, 1933. He still wears the celluloid bandage, but is now able to dispense with it for longer periods than before; sometimes even for so long as a week or two at a time. When the pains return he puts it on again, whereupon they quickly subside. He wears the bandage, on the whole, for a longer time than he goes without it. He does not use it at night. He considers the fixation to be without comparison the best treatment he has ever had. *Status 26th June, 1933:* No muscular atrophy. No sensory disturbances. Muscular strength the same in both hands. Mobility of cervical spine restricted in medium degree throughout. The roentgenologic picture shows no change since last examination.

CASE V.—500/31. Farmer, aged 53 years. Formerly well. Has never had any articular troubles, lumbago, or the like. In May, 1931, he began to have pains, first in his neck, afterwards in the left shoulder. After a week these pains began to radiate out into the left arm, and even down into the fingers, specially into the index and third fingers. They became worse when he moved his head in certain ways, especially when he turned it from one side to the other, or backwards. Also movements of the arm would evoke them; they were felt least when he held it adduced in the shoulder joint, and the elbow flexed. He also had a feeling that the arm was numb and lacking in strength. At times he thought that the index and third finger were pale and cold. The pains soon became so severe that he was unable to work, and at last they »did not leave him rest either night or day«. In July, 1931, he was admitted into the orthopedic clinic.

Status, 9th July, 1931. Coarsely built, somewhat fat. Mobility in the shoulder joints free, but at times he has pains down along the left underarm. When he bends his head to the right, he gets sticking pains in the left arm and hand; when he bends it backward, he gets a violent pain in the shoulder region. The sensibility is slightly diminished over an area of the dorsal side of the left arm, down towards the hand. Slight, but perceptible, atrophy of the left upper- and underarm. *Roentgen:* Medium degree spondylitis deformans, with osteophytic outgrowths along the anterior margins of the vertebral bodies, between the sixth and seventh cervical vertebræ. (*Fig. V*).

Treatment. The pains were so intense that he at once, on 14th July, 1931, consented to the application of a *plaster jacket with fixation for the head. 18th July:* Pain in the left arm worse; the plaster jacket causes the patient great discomfort. *28th July:* The pains in the arm are not nearly so bad, but still trouble him somewhat at night. He now supports the wearing of the jacket fairly well. *4th August:* For the last few days he has been almost free from pain, also during the nights. To-day the jacket was removed, but immediately afterwards he happened to make a careless movement with the head, which im-

mediately resulted in an intense pain, radiating from the shoulder out into the fingers. Everything got black before his eyes, he nearly collapsed, and had to be carried back to bed on a stretcher. *18th August:* Since the jacket was dispensed with, his trouble has again become worse, especially of late,

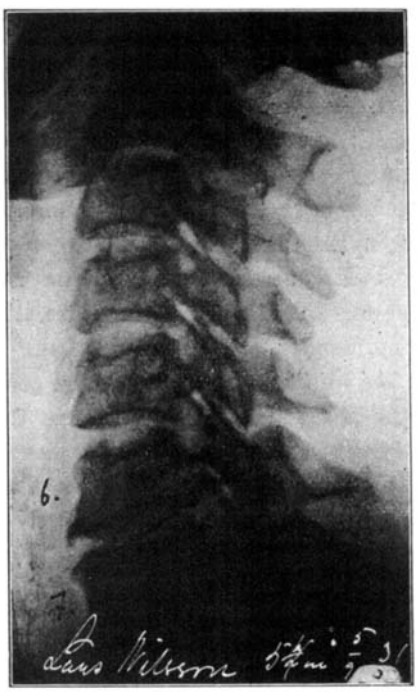

Fig. V (CASE V).

because he is beginning to move about more. To-day *another jacket* is put on. *22nd August:* The pains have disappeared, he is up and moves about; can use his arms freely. There is hardly any trace of diminished sensibility any longer. Muscular atrophy as before. He leaves the hospital to-day, still wearing the jacket. —He continued wearing the latter until 31st August, when it was dispensed with. Kept well, and was able to take part in all the work on the farm until November, same year, when the

pains came back again. He was then fitted with a *fixation bandage of cotton and bands* (*Fig. VII*), whereupon they disappeared once more. As they would not go away entirely without fixation, this was exchanged, later in the fall of 1931, for a *celluloid bandage.*

Subsequent course. 29th June, 1933: He wore the celluloid bandage only for one month, and has since been so free from pain that he has been able to do his full share of work at all times. Still, the pains have not left him altogether, but come again from time to time, though never in any way so severe as in the beginning of his illness. On such occasions he will then put a narrow strip of felt several times firmly around his neck and lie down; and he has found that by lying thus, with nothing to prop up his head, he gets the best relief. Of the several bandages he was made to wear when his illness was at its worst, he says that he liked best the small one of cotton and bands, which he thinks helped him just as much as any of the others, in spite of its being smaller and less rigid. That the pains were evoked by the movements of the cervical spine, and that the fixation treatment was therefore the only rational one, he has realised clearly all the time. The mobility of his cervical spine is more or less restricted in all directions, but chiefly from fear that some extreme movement might start the pain. Sensory disturbances, none. Muscular atrophy, none.

SUMMARY OF THE CASE REPORTS

All the five patients were men who did bodily work, and their ages were between thirty-seven and sixty-two years. In them all, the pains took the form chiefly of what is called »brachial neuralgia«—in four cases of the left arm, in one case of the right. In all five, the pain became stronger on any movement of the cervical spine, and at times certain movements would evoke lancinating pains, sometimes so intense that the patient could not suppress a cry of distress. In no case were there any serious neurologic changes, either in the form of lost sensibility or paralysis. In two cases, the usual manual tests with cotton and a pin showed a slightly diminished

sensibility in the arm that was the seat of the pain. In two cases there was also a certain degree of atrophy of the musculature of the arm. Roentgen examination showed in all five cases typical changes characteristic of spondylitis deformans, localised to the lower part of the cervical spine, and generally confined to two vertebræ next to one another. *In all the five cases, fixation of the cervical spine brought considerable relief from the trouble.*

SURVEY OF THE LITERATURE

In a paper from 1922, *W. Alexander* has expressed the radical opinion that, with the possible exception of the so-called »true trigeminal«, there hardly exists any such thing as primary or idiopathic neuralgia. According to him, the pains are always secondary; that is to say, they are evoked, for instance, by inflammatory or other organic changes in the nerves themselves, in the musculature, in neighboring joints, bursæ, or the like. It is this tendency to find the corresponding anatomical basis for each separate type of neuralgia, and thus restrict the field of the so-called idiopathic neuralgias, which at present seems to govern research in regard to this subject.

Among Scandinavian investigators who have contributed to the study of these questions, may be mentioned *Linstedt, Hellweg,* and the Danish neurologist *Jansen,* recently deceased. The last named, whose hypothesis may be of special interest in connexion with the problems raised in the present paper, held that the neuralgic pains are evoked as the result of an irritated condition of certain muscles, or groups of muscles, so situated, anatomically, that they are able to affect the nerves in question. As regards the brachial neuralgia, these muscles should be the scaleni and, to a certain extent, the trapezius and omohyoid muscles, by which the neuroplexus is closely surrounded.

As regards the special question whether spondylitis deformans can give rise to neuralgiform pains or other nervous symptoms, it seems to have been the opinion, at least formerly, before the advent of roentgenology, that this was not infrequently the case. It is probable, however, that in those days spondyli-

tis deformans was sometimes confused with other spinal diseases, or that, as *Kahlmeter* (1918) has pointed out, spondylitis may sometimes, in the days before the frequency of its occurrence was fully recognised, have been held etiologically responsible for certain nervous disorders whose genesis was, as a matter of fact, an entirely different one. To-day, after the researches of *Sievén* (1903), *Simmonds* (1903) and *Fraenkel* (1903, 1907) have resulted in those spinal affections which formerly went under the names of Bechterew's and Struempell-Marie's diseases being grouped together under the single pathologic term of ankylopoietic spondylarthritis, as sharply distinct from spondylitis deformans, the continued study of the latter disease has become very much easier. Another circumstance which, especially in recent years, has probably also contributed to a more general knowledge with regard to spondylitis deformans, is the study which is daily being made, in all hospitals and clinics, of roentgenograms taken with the purpose of picturing, for instance, the kidneys or the digestive tube, and in which appear also parts of the vertebral column. This study has taught us how enormously common the disease actually is, and how little correspondence there is between the morphology and the symptoms. While, thus, even deformities of the highest degree often cause hardly any subjective distress at all, it seems that, on the other hand, a spondylitis deformans with only slight roentgenologic changes may become the source of even intense pains.

The conception of the neurologic symptoms in spondylitis deformans to which this wider experience has led, and which now seems to be the generally accepted one, is that those symptoms—or, at any rate, such serious symptoms as paralysis and loss of sensibility—do not form part of the usual symptomatic picture of the disease. This is, at least, the opinion generally reflected in the Scandinavian and German literature.

At the same time, there has in the last few years been evinced a steadily growing interest in the subject, and a number of researches have been published, tending to show that neurologic symptoms in connexion with spondylitis deformans are

not, after all, so unusual as generally supposed. French authors —*Léri* (1916), *Sicard* (1918), *Barré* (1921)[1])—were the first ones to call attention once more to this question. Since then, most of the contributions to its discussion have come from America. Thus, in 1924, *Rosenheck* says about »radicular symptoms in spondylitis deformans« that orthopedists are not unfamiliar with this type of pain, but otherwise it is but little known. In 1929 *Gunther* and *Kerr*, on the basis of thirty examined cases, published a thorough study of the neurologic symptoms in connexion with hypertrophic osteoarthritis of the spine, and came to the conclusion that such symptoms are not unusual, that they consist in radiating pains and frequently in sensibilitory disorders, both of radicular character, that they are caused by movements of the spine, and are often called forth by coughing, sneezing, or the like. They point out that these pains are often wrongly interpreted, and that, when localised for instance to the abdomen or the region of the heart, they are apt to simulate affections in the underlying organs.

Elliot (1926) was probably the first to notice the frequent localisation of spondylitis deformans to the lower part of the cervical spine, and to indicate as its symptom the radiating pains into the neck, shoulder and arm. After him, several others have called attention to the frequency of that syndrome. In 1932, *Bisgard* has collected the considerable number of sixty cases in which radicular symptoms coexisted with arthritis of the cervical spine. He says that those symptoms can express themselves as well through the sensory as through the motor- and sympathetic nerve fibres, but that in most cases the subjective symptoms are confined to sensory disturbances,—pains, paresthesias, feelings of numbness—localised to the neck, the back of the head or the arm. Movements of the cervical spine will call forth the symptoms. To judge from the description and roentgenograms, the spinal changes seem to be the typical ones of spondylitis deformans, and in most cases localised to the lower vertebræ of the cervical section. At the very same

[1]) cit. GUNTHER and KERR.

time as this American contribution by *Bisgard,* there appeared from Germany another on the same subject, by *Goette* (1932), and it is surprising to see how similar are the results arrived at independently by the two authors. They also both make the same observation as to how the disease, in spite of its common occurrence, has attracted relatively little attention, and ascribe this to the fact that the peripheral symptoms are by far the dominating, while the local ones, from the cervical spine, are, as a rule, only slightly prominent.—Also symptoms of another kind than the above mentioned have been ascribed to spondylitis of the cervical spine. *Terracol* (1927), for instance, would see a connexion between the latter condition and certain sensory and functional disturbances in the throat, and *Oulmann* (1928) says he has frequently found arthritic changes in the cervical spine in cases of alopecia areata.

Authors whose communications chiefly deal with the roentgen-anatomical changes in spondylitis of the neck are *Bársony* (1929), *Thoma* (1931) and *Kienboeck* (1933). *Holitsch* (1930)[1]) and *Schingnitz* (1932) have had their attention attracted by the fact that exostoses in the margins of cervical vertebræ are a matter of frequent observation in roentgenograms, and show that the presence of such exostoses is not always necessarily associated with clinical symptoms.

SYMPTOMS AND DIAGNOSIS

As a matter of fact, the cases presenting symptoms belonging to the disease here described constitute so large a group that any general practitioner must have met with them, and the rheumatologist certainly be familiar with their complaints.

In most of the cases, the subjects are men, generally past middle age. Sometimes the patient has been going with the trouble for several months, or even longer; but more often the pains are so severe, right from the beginning, that they seek help earlier,—after one, or perhaps a few weeks' time. Some of them have already consulted a doctor before, or have been in

[1]) cit. SCHINGNITZ.

hospital; and not infrequently their case has then been diagnosed as brachial or occipital neuralgia. In some instances the sufferer will himself ascribe the condition to some trauma,—a fall, or having overstrained himself in lifting something heavy; but more often the pains will have come on spontaneously, and not infrequently he will be able to tell the precise day, or night, when they started.

Common for the condition as a whole is, as *Bisgard* and *Goette* have already pointed out, the absolute predominance of the peripheral symptoms from the arm, neck or shoulder; while the spondylitis of the cervical spine is so slightly apparent a feature of it that it probably often escapes notice, unless attention is expressly directed to it. The outstanding element of the subjective trouble are the pains, usually in the arm, the neck or the shoulder region. In most cases they are unilateral, but sometimes they can be present in both sides; and it seems as if such bilateral pains are more frequent in the neck and shoulders than in the arms. Their radiating character is usually pronounced, though not always to quite the same extent as in the cases whose histories we have detailed in the foregoing. In the arm, it seems that the radiation usually follows the underside of the latter, sometimes extending all the way out into the fingers. The pains in the neck often radiate all the way up into one temple; in the shoulder they often follow the inside of the scapula.

That the pains depend on movements of the cervical spine will often be demonstrable either from the anamnesis or by the clinical examination, when certain movements of the head will evoke intense, lightening pains with a definite radius of radiation (see Cases I and II); or the patient may say himself that they get particularly bad when he holds his head in some definite, stated position. Sometimes he will tell that the trouble is less pronounced in the daytime, when he is going up and can hold his head in the way he feels most comfortable; while at night, when it is less easy to do so, it gets worse, and disturbs his sleep, so that he only finds rest when he has changed his position in bed, maybe to lie in some certain way

which experience has taught him as giving the greatest ease. The so-called Déjérine's sign, repeatedly mentioned by *Gunther* and *Kerr,* and which consists in the pains being particularly easily evoked by such rapid, involuntary movements of the spine as caused, for instance by sneezing, coughing and the like, has been observed not infrequently, but has not been the rule in our cases. In one case, the patient stated that when the pain was particularly bad he found relief if he steadied his head firmly with both hands.—It will probably not in all cases, however, be possible by the clinical examination to establish the fact of such a connexion between the pains and the movements of the head; nor will it, in most instances, have been noticed by the patient himself. Beside of pains, the patient will often complain of a feeling of numbness, of paresthesias, formications and similar sensations; and, if the trouble is in the arm, of its getting weaker than it used to be.

The findings resulting from the *objective examination* are usually not very great. In our cases, the objective nerve symptoms were very little pronounced, and in no instance were there any such serious ones as paralysis or total loss of sensibility. In some instance there would be a certain, not very marked degree of muscular atrophy of one arm, which might then have its corollary in a corresponding lessening of the active strength of that member. The sensibility, which was only tested manually, usually with cotton and a pin, was in a few instances slightly reduced, but was in every case eventually fully recovered. Any markedly segmental distribution of this sensory disturbance was not discovered. It must be added, though, that these sensibility tests were not carried out with any such thoroughness of detail as the ones made by *Gunther* and *Kerr,* who, as the result of their very minute methods of investigation, think that they, in most of the cases examined, have been able to prove the existence of radicularly distributed sensory changes, in the form of either hyper-, hypo- or anesthesias. It is not possible, however, that in our cases any really marked changes of sensibility should have been overlooked.

As already pointed out, the local symptoms from the cervical

spondylitis itself are remarkably little noticeable, even to an examination directed expressly with a mind to their possible discovery. It is therefore imperative that all cases presenting symptoms like the ones described above should be *roentgen*-examined. Here, the picture in lateral projection is without comparison the most important, and especially is it absolutely necessary that the view should include *the whole* of the cervical spine, even its lowest vertebræ; because it is in that part, especially between the sixth and seventh vertebræ, that the spondylitis in most cases seems to be located. The usual technic will generally suffice for obtaining a picture like this; but if there should be any difficulty, a special procedure indicated by *Bársony* and *Koppenstein* may be used to advantage. The roentgen-anatomical changes are the usual, well known, characteristic ones of spondylitis deformans, and need therefore not be described in detail; besides, their appearance may be seen from the accompanying illustrations. It should be specially noted, however, that they often are localised chiefly to two adjoining vertebræ, generally of the lower part of the cervical spine.

As a matter of fact, the symptoms of this disease are so characteristic that a fairly exact diagnosis can often be made on the basis of the case-history alone, with resort to a positive roentgenogram for confirmation. It is possible, however, on the one hand, that a spondylitis deformans of recent origin may exist even if the roentgenologic picture proves negative to that effect; or, on the other hand, that a roentgenologically demonstrated spondylitis deformans of the cervical spine may, after all, have nothing to do with the trouble of which the patient complains. In such cases, fixation of the head and neck as a diagnostical measure may settle the matter definitely, one way or the other. If the condition is due to spondylitis of the cervical spine, such fixation will result in its improvement.

Of course it must also be borne in mind, at least, that pains in these regions *can* have their origin elsewhere than in the cervical spine; for instance, in the shoulder joint or its nearest surroundings. It should therefore never be omitted to examine also with that possibility in view.

PATHOGENESIS

Holitsch's and *Schingnitz*'s demonstrations of the frequency of marginal outgrowths on the cervical vertebræ may perhaps result in the question being raised whether there really need be any connexion, after all, between the cervical spondylitis and the symptoms here ascribed to that condition. Might not the spondylitic changes observed in the roentgen picture be merely incidental secondary findings, without any etiologic connexion with the origin of the pains? To this question, the answer must undoubtedly be an absolute: No. In the first place, because the almost invariable coexistence of the two phenomena is altogether too strikingly apparent; in the second place because, as specially *Gunther* and *Kerr* have pointed out, the radicular distribution of the sensory disturbances, in all the cases where any such are present, indicates that their starting point must be sought in, or close to, the cervical spine. Besides, there is in most cases a rather noticeable conformity between the area of distribution of the peripheral symptoms and the localisation of the spondylitic changes (*Goette, Gunther* and *Kerr*). Another argument for the existence of a connexion is the already mentioned observation that in many cases certain movements of the cervical spine will cause an accentuation of the pains, or evoke lancinating pains; and, finally, the method of treatment regularly followed at the clinic here has shown that on fixation of the neck the pains and other peripheral symptoms immediately become less pronounced, or even disappear altogether; and that this happens in such a way as to make a causal connexion seem evident. For all these reasons it would seem clear that the affection from which these patients are suffering is really caused by the spondylitis deformans of the cervical spine.

With regard to the manner in which the symptoms, especially the pains, are evoked, the most generally accepted opinion seems to be that the osteophytic outgrowths cause a narrowing of the intervertebral foramina, as a result of which the nerves, during their passage, become exposed to irritation or pressure (*Bisgard, Goette, Rosenheck, Elliot* et al.). This opinion is, however, to a very great extent based exclusively on the roentgen-

ologic material; and while the latter certainly shows the narrowing of the foramina, it cannot, of course, visualise any pressure on the nerves during their passage through these. The proof of such compression would be possible only as the result of direct anatomical studies; and, as a matter of fact, the theory of a direct lesion of the nerves as a result of the osteophytic outgrowths has not been allowed to go uncontradicted. Thus, *Thoma* (1931), in his pathoanatomical and roentgenologic studies of the rich material of cervical-spine cases from the Schmorl Institute found no such changes of the intervertebral foramina as would explain disturbances of the nerves or vessels passing through them, and therefore expresses his agreement with a theory emitted by *Braun-Ehrlich,* according to which the pains should be due to pressure changes, caused by inflammation, in the vessels surrounding the nerves during their passage.

As a matter of fact, it is likely that in spondylitis deformans there may, beside the outgrowths visible in the roentgenograms, be changes—»inflammatory conditions»—in the nearest surrounding muscles and other soft tissues. At least must this be the case when a condition of irritation exists, as for instance after a strain or a trauma. We know that in such cases the muscles are usually found to be tense and painful,—»overstrained«—under their attempts to protect the spinal column. Under those circumstances it would not be difficult to imagine a mechanical irritation of the efferent nerves, produced, for instance, during their passage through edematous soft tissues in the intervertebral foramina, or through the muscles nearest to the spine. It is the latter possibility which forms the basis of *Jansen*'s already mentioned hypothesis with regard to the genesis of neuralgia. The possibility of a similar pathogenesis of the pains described in the present paper is supported by the course usually taken by the affection under the fixation treatment employed in the clinic here. If, namely, the irritation of the nerves were due to the purely osseous narrowing of the foramina,—that is to say, to the osteophytic outgrowths as such, —the improvement obtained while the fixation treatment was in progress would hardly last after the appliance had been

removed and the spine again given its free capacity for movement; because the conditions under which the pains had manifested themselves would then be precisely the same as before, and they might therefore be expected to start again immediately. This they have not done, however; after a shorter or longer period of fixation, the improvement has nearly always been lasting; and this will be easier to understand if we suppose the irritation of the nerves to be due to reversible processes in the soft tissues. What also goes against the supposition of a compression directly caused by the osteophytic outgrowths is the rather sudden manner in which the pains not infrequently declare themselves without any demonstrable trauma, and the observation that there hardly ever seems to be any severe symptoms of damaged or extinguished nerve functions.

TREATMENT

The authors who have hitherto dealt with the syndrome of radicular pains in connexion with spondylitis deformans of the cervical spine have chiefly made it their object to call attention to the syndrome as such, showing that it is much more common than generally supposed, and deserving of greater notice than has hitherto been given it. They deal with its anatomy, pathogenesis and symptomatology; but to its treatment very little attention has been paid. The cases observed at the clinic in Lund have all been treated according to one principle, namely by fixation of the cervical spine; and as this treatment has given good results, and, as just remarked, very little has been written before concerning the therapy in such cases, a description of our method may not be out of place. It is true that methods of treatment similar to ours are mentioned by a few authors, but they do not appear to have been carried out in any methodical manner; and, at any rate, very little has been communicated, so far, concerning the results obtained. *Goette* (1932) has used Glisson's bandage, and *Bisgard* (1932) says that considerable improvement can be obtained by a few weeks' fixation of the cervical spine by means of Thoma's collar, for whose use in cases of this kind he indicates a special method. *Kienboeck* (1933)

mentions fixation by means of supporting collar or Glisson's bandage, but is of the opinion that the use of such appliances is seldom necessary.

In the first cases treated, here in Lund, by fixation of the cervical spine, the symptoms were chiefly in the form of brachial neuralgia, and the fixation was accomplished by means of a

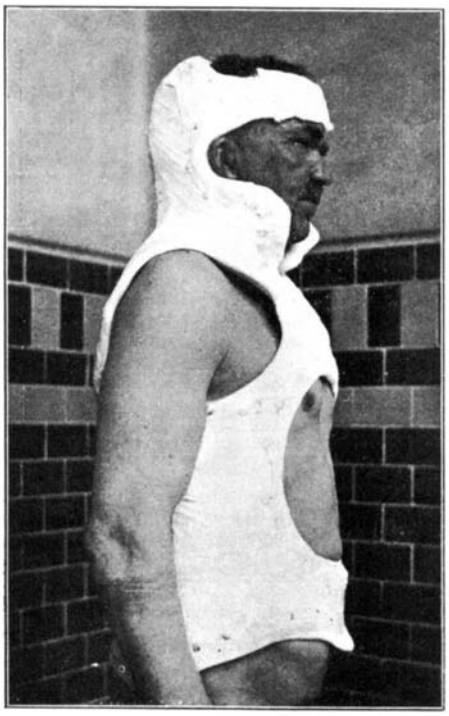

Fig. VI.—Fixation bandage of plaster of Paris for the cervical spine.

plaster bandage in the form of a jacket reaching up above the neck, and extending from there forward along the temples and the jaw (Fig. VI). In the beginning, the method was used only experimentally, and the plaster, at that time, seemed to us the best material for securing an effective fixation. The results also showed us that the principle of fixation was right; for in every instance the radiating pains either disappeared or became less

severe. In spite of the great discomfort unavoidably caused by the wearing of the heavy jacket, all the patients willingly admitted that it had helped them; and in the cases where the pains eventually returned we had never any difficulty in making them agree to have a new one put on, even though it was in the hottest season of the year.

It soon became our wish, however, to find a means of fixa-

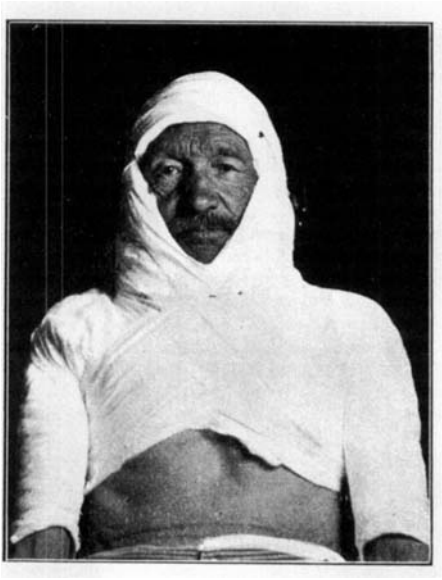

Fig. VII.—The bandage of hydrophile cotton and strips of material usually employed for fixation of the cervical spine.

tion which, while still effective, would be lighter and more comfortable than the plaster jacket, and especially one that might be used also in the out-patient department. The result of our efforts in that direction was a bandage constructed only of hydrophile cotton and strips of material and this we gradually began to use more and more, instead of the plaster. To-day it is the method of bandaging we normally employ. The principle of it is, by means of the cotton and strips to prevent all movement of the head, whether sideways or anteroposterior; and

this is accomplished by applying the strips in figure-8-turns from the chest and upper part of the arms up around the neck and head, at the same time placing several layers of cotton, chiefly around the neck, with several turns of the strip between each layer, in order to make the whole as firm and rigid as possible. The object with the cotton is to make a supporting collar around the neck, all the way up to the base of the head, so solid that it will absolutely prevent any turning or bending movements. The appearance of the finished bandage will be seen from Fig. VII. The technic of its application is easy, though it of course requires some practice to apply it in such a manner that the full maximum of its effectivity is ensured. It is important that the layers of cotton around the neck should be sufficiently thick, and firmly laid on, and that they should reach from the shoulders all the way up under the head, so as to carry the latter, so to speak.

Since we have succeeded in perfecting this lighter bandage of only cotton and strips, and giving it its present effective form, it has been our principal method of treating all cases of this character, and the plaster jacket is only resorted to in exceptional cases.

The course of the treatment varies a good deal, according to the individual differences in each case. Usually, the first bandage is applied as soon as the diagnosis is made, and in most cases the patient feels a subjective improvement already after one, or perhaps a few, days. After a week or two the bandage is removed, and one will then often, in cases where the mobility had been restricted, find an improvement in that respect, or that neck muscles that were formerly tense have become softer. During the first nights it is generally necessary to give some sedative, or even narcotic. After the bandage has been discarded, diathermy or some similar, mild treatment may be tried; but often it is necessary to repeat the fixation treatment for another, or perhaps several, succeeding periods. In the very great majority of cases, this will sooner or later result in the symptoms disappearing entirely, or at least in so great improvement that the patient is able to return to his usual life and occupations.

In certain exceptional cases it may be found, however, that the freedom from symptoms only lasts as long as the patient is wearing the bandage, and that the trouble invariably returns as soon as the latter is discarded, no matter how often and for how long periods at a time the treatment is repeated. In such

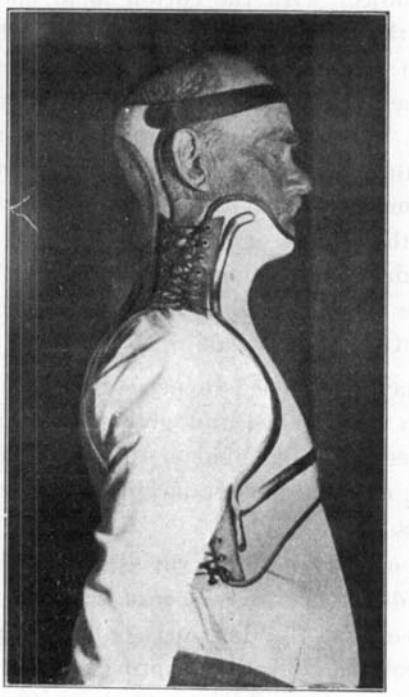

Fig. VIII.—Celluloid fixation bandage for the cervical spine.

cases, of which we have had three, we have had made a light, comfortable bandage of reinforced celluloid, of the same construction as the plaster jacket, except that, owing to its lightness, it does not have to rest on the hips (Fig. VIII). The help which a patient may for a long time derive from the use of such an appliance is illustrated by CASE IV.

In these stubborn, long drawn out cases, the question may

also arise of adopting *De Quervain*'s suggestion of operative fixation of the cervical spine by Albee's method.

SUMMARY

1. In a great many cases of so-called brachial neuralgia, and of radiating pains in the neck or shoulder, spondylitis deformans is found in the lower part of the cervical spine, usually confined to two opposing vertebræ of the latter.

2. For a number of reasons, set forth in detail by the author, this spondylitis must be considered to be the pathogenetic origin of the pains.

3. The resulting, often extremely distressing, and sometimes disabling, condition can in a great measure be relieved, or even completely overcome, by fixation of the cervical spine.

4. The simplest method for this fixation treatment is by means of a bandage of hydrophile cotton and solid bands. In certain cases, a bandage of rigid material—celluloid or plaster —may be employed. The author describes in detail the indications and technic for the use of these various procedures.

RÉSUMÉ

1. Dans un grand nombre de cas de soi-disant névralgie brachiale, ou de douleurs de caractère irradiant localisées dans la nuque ou dans l'épaule, on trouve une spondylite déformante dans la partie inférieure des vertèbres cervicales, le plus souvent ne dépassant pas deux vertèbres contiguës.

2. Pour plusieurs raisons exposées en detail dans notre article ci-dessus, cette spondylite doit être regardée comme le foyer pathogénique de ces douleurs.

3) Les souffrances souvent très graves et amenant quelque-

fois l'invalidité, peuvent être considérablement allégées par la fixation des vertèbres cervicales.

4. Cette fixation est obtenue le plus facilement au moyen d'une cravate de ouate et de bandes serrées. Dans certains cas un appareil en matière solide, (plâtre ou celluloïde) peut être utilisé. Les indications et la technique de ces différents procédés sont expliquées en détail.

ZUSAMMENFASSUNG

1. In einer grossen Anzahl von Fällen sog. Brachialisneuralgie sowie von Fällen mit Schmerzen von ausstrahlendem Typ im Nacken oder in der Achsel findet man eine Spondylitis deformans im unteren Teil der Halswirbelsäule, meistens beschränkt auf zwei benachbarte Wirbel.

2. Diese Spondylitis muss aus verschiedenen näher angeführten Gründen als pathogener Ursprung der Schmerzen angesehen werden.

3. Die oftmals sehr starken Beschwerden, die mitunter sogar Arbeitsunfähigkeit verursachen, können durch Fixation der Halswirbelsäule erfolgreich behandelt werden.

4. Diese Fixationsbehandlung kann am einfachsten mit Hilfe einer Bandage aus Verbandmull und festen Binden bewerkstelligt werden. In gewissen Fällen kann eine Bandage aus festem Material (Gips oder Zelluloid) zur Anwendung kommen. Indikation und Technik dieser verschiedenen Verfahrensarten wird näher beschrieben.

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