MEDICAL PROGRESS:

Rheumatoid Spondylitis: Its General Features and Management*

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RHEUMATOID (ankylosing) spondylitis is one of the important causes of chronic back disability in young adult males. When detected and treated during its early stages, much can be accomplished toward ameliorating the symptoms and in preventing deformity; and at times the disease may be arrested. Unfortunately rheumatoid spondylitis often remains unrecognized until after marked spinal rigidity ("poker spine") and pronounced calcification of the paraspinal ligaments ("bamboo spine") have occurred; at such a late stage little can be expected from preventive or corrective therapeutic procedures. With the hope of encouraging early recognition and early treatment of this potentially crippling disease a brief discussion of its general features and management is presented herein.

Rheumatoid spondylitis is a chronic and usually progressive disease of the synovial joints of the spine and of the adjacent soft tissues. The pathologic changes in the joints consist of synovitis, chondritis and juxtaarticular osteitis, and are similar to those found in peripheral rheumatoid arthritis.[8,9] The process almost invariably begins in the sacro-iliac joints and, when the disease is progressive, it spreads upward to involve the apophyseal (small posterior intervertebral or facet joints) articulations of the lumbar, thoracic and cervical regions, and the costovertebral joints. Inflammatory changes probably also occur in the paraspinal ligaments, the apophyseal joint capsules and the erector spinae muscles.[8] Later in the course of the disease, calcific and osseous changes develop in the paraspinal ligaments. The intervertebral discs are not affected, nor are the vertebral bodies except for secondary demineralization.

The disease is known by many other terms, such as, rhizomelique spondylitis, Marie-Strumpell's disease, spondylitis ossificans ligamentosa, von Bechterew's syndrome, ankylosing spondylarthritis, atrophic spondylitis and spondylitis ankylopoietica. The confusion in terminology has been prompted by differences in opinion regarding the fundamental nature of the disease, and by classifications based on locations of the predominant findings in the spine.

There are several facts to substantiate the belief that this disease is merely rheumatoid arthritis as it involves the spine: (1) typical peripheral rheumatoid arthritis coexists in approximately one-fourth of cases; (2) the peripheral joints so involved show histopathologic changes identical to those found in rheumatoid arthritis (without accompanying spondylitis);[21] (3) pathologic specimens taken from apophyseal joints during active phases of the disease reveal microscopic findings similar to those seen in peripheral rheumatoid arthritis;[8,9] (4) the elevated erythrocyte sedimentation rate and the clinical pattern resemble rheumatoid arthritis. Some investigators, especially those in Europe, do not accept this identity but believe that ankylosing spondylitis is a separate disease entity because (1) ligamentous calcification and ossification, so characteristic of advanced spondylitis, are not features of rheumatoid arthritis as it involves peripheral joints, and (2) the sex incidence favors males (20:1[1]) while peripheral rheumatoid arthritis favors females (3:1).

INCIDENCE

The frequency with which rheumatoid spondylitis affected soldiers of World War II was surprisingly high. In one army general hospital, 7.5 per cent of all patients admitted to the medical service had this disease. Moreover, 18 per cent of soldiers admitted to that hospital for chronic back complaints had spondylitis.[4]

At the Army Rheumatism Center, Army and Navy General Hospital, 1,084 cases of rheumatoid spondylitis were admitted during a period of two years.[5] These comprised 18.1 per cent of 6,000 consecutive admissions for all types of rheumatic diseases. In other words, approximately one out of every five soldiers admitted had rheumatoid spondylitis. Moreover, almost as many soldiers were admitted with spondylitis (with and without accompanying peripheral arthritis (1,084) as were admitted with peripheral rheumatoid arthritis alone (1,127).

These figures are in sharp contrast to those which have been based on civilian practice. Hare,[14] for example, found only 26 instances of spondylitis among 1,179 patients with arthritis, an incidence of 1.7 per cent. And the ratio of peripheral rheumatoid arthritis to spondylitis among civilians has been reported as 11.1,[8] 13:1[30] and 19:1.[14] The influence of strenuous physical activity and adverse living conditions incident to military service in bringing to light mild and early cases, and the predilection of the disease for males of military age, probably explain why spondylitis was encountered so frequently in soldiers.

CLINICAL PICTURE

Onset: Because the early symptoms of rheumatoid spondylitis are frequently mislabeled as

* Presented before the Second Annual Clinical Conference of the Chicago Medical Society, March 4-7, 1946.

muscular rheumatism, fibrositis, lumbago, chronic low back strain, idiopathic sciatica or even kidney disease, and because the real diagnosis is often overlooked for years, the clinical features which characterize the onset are of considerable importance.[4] In approximately 80 per cent of cases the onset is insidious. The first complaints are usually located in the lower part of the back and most often consist of aching and stiffness. Sharp pains or "catches" in the buttocks, hips or lower back may also be complained of.

Usually at first aching and stiffness are mild and recur periodically, lasting only a few days at a time. These symptoms usually present typical qualitative characteristics of "fibrositis" in that they are most pronounced in the morning on arising, are accentuated by physical inactivity and damp weather, and are ameliorated by mild exercise, local heat, dry weather and acetylsalicylic acid. Occasionally the first episodes are temporarily disabling and may be described by the patient as "attacks of lumbago." Later, after the disease has progressed, the aching and stiffness tend to become persistent and to lose their typical "fibrositis" characteristics.

Less frequently the first symptoms are described as a "dull ache," a "tired feeling" or a "soreness" in the lower back which often are aggravated by prolonged weight bearing or physical activity entailing movement of the spine. Such discomfort may be pronounced at night. In approximately 10 per cent of cases the first symptom is sciatic pain. Occasionally, thoracic girdle pains or radicular pain in the costovertebral angle, abdomen or inguinal region, simulating visceral disease, is the initial symptom. Occasionally, progressive limitation of back motion without actual discomfort is the only complaint.

Symptoms and physical findings: The pattern of rheumatoid spondylitis is fairly characteristic but the clinical picture at the time of examination is variable and depends upon: (1) the severity of the disease, (2) its duration, (3) the extent of spinal involvement, and (4) the activity of the process at individual levels of the spine. The disease may be localized to the sacro-iliac joints or at the other extreme the entire spine may be affected. The disease may be quiescent in on region and active in another. It may be mild, slowly progressive and accompanied by little actual disability. Or conversely, it may be rapidly progressive and disabling from the onset. The intensity of the symptoms and extent of the physical findings depend upon such qualifying factors.

Those clinical features which serve to indicate active involvement of the various regions of the spine may be summarized as follows:

Sacro-iliac involvement: When the disease is localized to the sacro-iliac articulations the symptoms and findings consist of: aching, stiffness and pain in the lower back as already described; intermittent sciatica (10 to 20 per cent of cases); tenderness over the sacro-iliac joints on percussion and palpation (in approximately 50 per cent of cases); pain on sacro-iliac joint motion as produced by orthopedic maneuvers; and mild lumbar muscle spasm without actual restriction of motion. But in early or mild cases, or when the sacro-iliac joints are ankylosed (and unaccompanied by higher involvement) abnormal physical findings may be entirely lacking.

Lumbar involvement: Because the disease almost always begins in the sacro-iliac joints and then later spreads to higher levels, the lumbar spine is rarely involved alone; but the dominant physical findings are often located in this region. Those features which accompany lumbar involvement are: pain, aching and stiffness in the lower back; lumbar paravertebral muscle spasm (often pronounced); limitation of lumbar motion; straightening of the normal lumbar lordosis; tenderness on percussion over the lumbar spine; pain on forced motion of the lumbar spine; and later, muscle atrophy in the lower lumbar region. (Figure 1.)

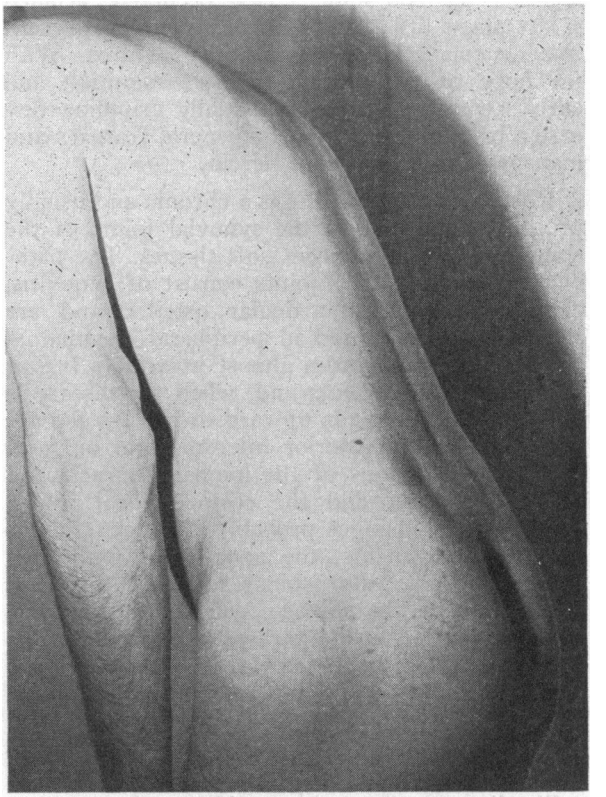

Figure 1.—Rheumatoid spondylitis with involvement of both sacro-iliac joints, the lumbar and thoracic spine. Note the straightening of the lumbar spine, the obvious restriction of motion and the lumbar muscle therapy. The lower back has an "ironed out" appearance.

Thoracic involvement: Essentially the same localizing signs as outlined for the lumbar segment are present in the thoracic region when it is affected. In addition the following special features usually develop: thoracic girdle pain; chest pain on deep inspiration; diminished chest expansion; flattening of the anterior chest (expiratory position); and thoracic stoop (thoracolumbar kyphosis. (Figure 2.)

Cervical involvement: With involvement of the cervical spine the same general features are

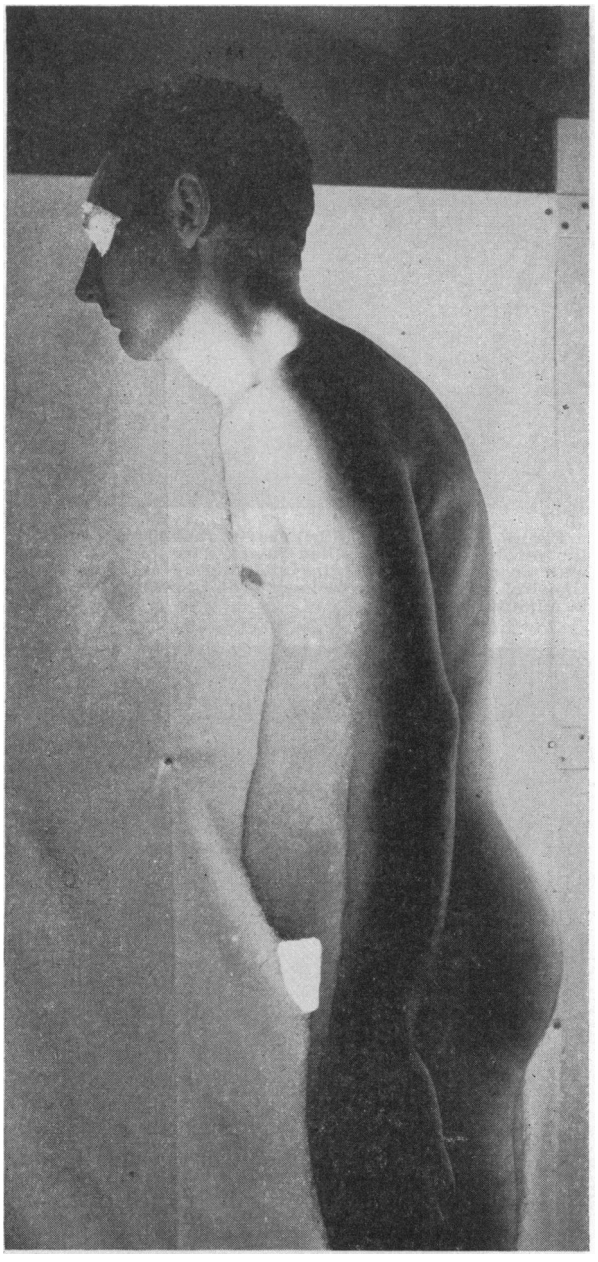

Figure 2.—Typical posture with involvement of all segments of the spine. Note the thoracolumbar stoop, the flattened anterior chest wall and protuberant abdomen. The neck is beginning to protrude. The spondylitis in this case was rapidly progressive, all segments being involved 18 months after onset.

present as in other regions. The neck often assumes a protruded position. Motion in all directions may be markedly impaired and the patient may have to pivot his entire body in order to look sideways.

Associated findings: Iritis or iridocyclytis occure with approximately the same frequency as it does in peripheral rheumatoid arthritis. General constitutional symptoms such as weight loss, anorexia, fatigue, low grade fever and weakness are not, as a rule, as prominent as in peripheral rheumatoid arthritis. In mild cases such symptoms may be entirely absent and even in cases of moderate severity they are rarely pronounced unless peripheral arthritis coexists. The constitutional reaction roughly parallels the height of the erythrocyte sedimentation rate.

Arthritis of the peripheral joints coexists in 18 to 25 per cent of cases. In our experience the small joints of the hands and feet are involved just as frequently as the larger joints of the extremities;[4] this is contrary to the experience of some. In early cases at least, the hips and shoulders are not commonly affected. The clinical and roentgenographic manifestations in the spine appear to be identical regardless of whether peripheral joints are or are not also affected.

Laboratory findings: The erythrocyte sedimentation rate is elevated in approximately 80 per cent of active cases; it serves as the most consistent laboratory gauge of activity in spondylitis. The usual range is between 20 and 60 mm. in one hour (modified Westergren technique, normal for males below 20 mm. in one hour). The rate may be normal in mild but clinically active cases. Marked anemia is rare but moderate hypochromic anemia is present in about 30 per cent of cases.

The cerebrospinal fluid was studied recently in 50 soldiers with spondylitis.[6] The initial manometric pressures, cell counts and concentrations of sugar were normal and the colloidal gold reaction was abnormal in only one of the 50 patients. But there was an increase in the total protein content of the lumbar fluid in 21 (42 per cent) of the 50 patients. The increased protein content was found to be moderate in amount, ranging between 46 and 105 mg. per cent. The protein content of the cerebrospinal fluid bore no consistent relationship to the duration of the disease or to the degree of spinal extension, but seemed to be related to the severity of the spondylitis: the total proteins were increased twice as often and their average concentrations were almost twice as high in severe rapidly progressive cases as in less severe progressive cases. Similar elevations of the cerebrospinal fluid protein in spondylitis have been reported by others.[12,19]

ROENTGENOGRAPHIC PICTURE

Abnormal x-ray findings in the joints of the spine result from destruction of articular cartilage and from alterations in juxta-articular bone. When the pathologic process is restricted to the synovial membranes roentgenograms are negative (swelling resulting from synovial effusion into the spinal joints cannot be visualized roentgenographically). As in peripheral rheumatoid arthritis, it may take months or years to develop sufficient cartilaginous or osseous alteration to be recorded on roentgenograms; the pathologic changes in some joints may never progress sufficiently to show positive x-ray findings. Therefore there is almost always a time lag between the development of localizing physical signs and the appearance of roentgenographic abnormalities. For example, x-ray changes in the sacroiliac joints may not appear for months or even years after the onset of back symptoms.[3]

Changes in the sacro-iliac joints: The most reliable and the earliest x-ray changes in rheumatoid spondylitis are found in the sacro-iliac joints. The findings are usually bilateral but may be more pronounced on one side or the other. The joints at first appear blurred and their margins are indistinct; the joint space may give the false impression of being widened or it may appear narrowed. The first definitive abnormalities consist of sclerosis and/or spotty demineralization of subchondral bone. These are usually located in the juxta-articular portion of the ilium, especially at the caudal one-third of the joint; later similar changes develop in the sacrum. As the process progresses, demineralization and sclerosis gradually cover a wider subcortical zone. Later, varying degrees of joint dissolution occur; the margins may appear serrated or the joint may look irregularly mottled. Finally, the joint space becomes traversed by bony trabeculae and fusion between the sacrum and ilium takes place. With the development of complete ankylosis subchondral sclerosis gradually fades but if spotty rarefaction has been pronounced, residues of such defects may be evident for years.

The severity of spondylitis is often reflected by the character of the sacro-iliac changes.[3] When the disease is mild, subchondral sclerosis together with narrowing and blurring of the joint are the dominant features; rarefaction and joint mottling are minimal or absent. (Figures 3 and 4.) In cases of moderate severity subchondral

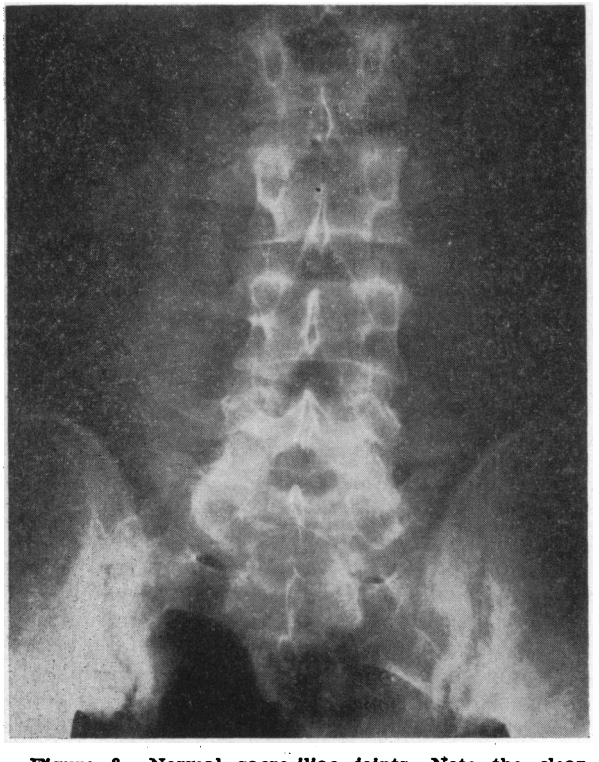

Figure 3.—Normal sacro-iliac joints. Note the clear joint spaces and the well-defined articular margins.

rarefaction and sclerosis are usually present in fairly equal proportions and mottling of the joint is definite. (Figure 5.) When the disease is

Figure 4.—Mild and fairly early rheumatoid spondylitis involving the sacro-iliac joints. The joints are hazy with poorly defined margins and appear narrowed. Subchondral sclerosis is prominent while spotty rarefaction is minimal.

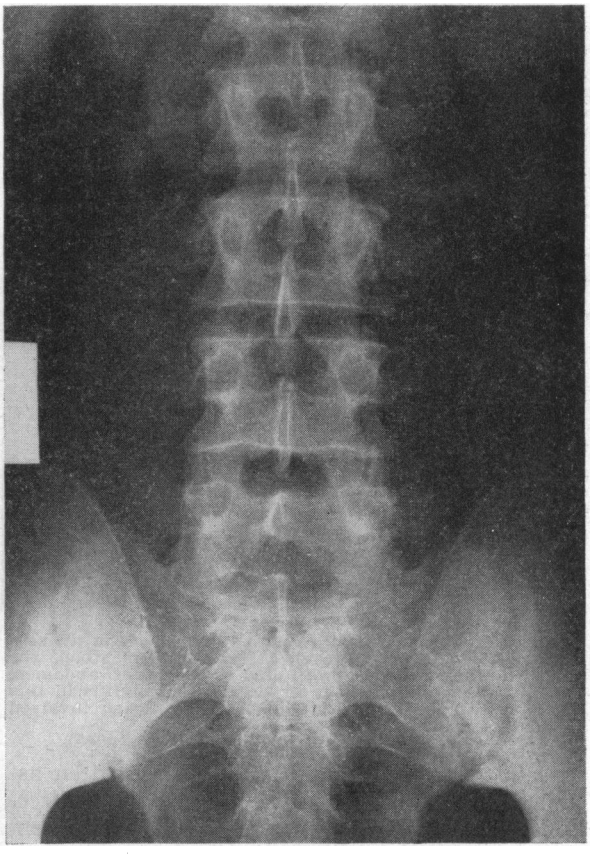

Figure 5.—Sacro-iliac joint changes in rheumatoid spondylitis of moderate severity. The joint spaces are mottled. Subchondral rarefaction and sclerosis are present in fairly equal proportions.

severe, subchondral rarefaction and joint destruction are extreme, but sclerosis is rarely conspicuous. (Figure 6.)

Changes above the sacro-iliac joints: Abnormal x-ray findings in the lumbar, thoracic and cervical regions are not found as consistently nor are they as reliable from the diagnostic stand-

point as the changes which occur in the sacro-iliac joints. The most common finding above the sacri-iliac joints consists of calcification of the paraspinal ligaments. This is a relatively late

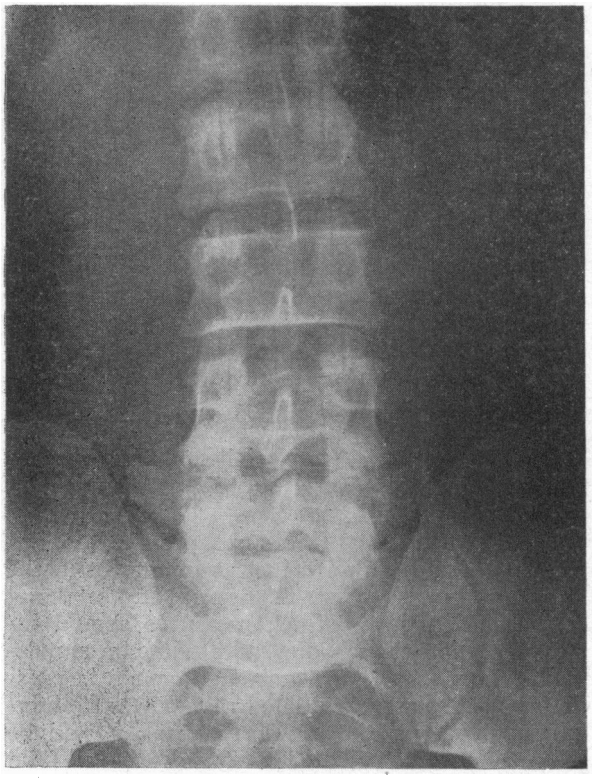

Figure 6.—Severe rapidly progressive rheumatoid spondylitis. Note the marked destruction of the sacro-iliac joints.

manifestation, however, and the lumbar spine may be involved clinically for several years before ligamentous calcification appears. Calcification is usually first noted at the lower thoracic and lumbar levels, especially in the anterior longitudinal ligament. With extensive calcification and ossification of the ligaments the well-known picture of a "bamboo spine" is produced. (Figure 7.)

Definite x-ray changes in the apophyseal joints usually develop even later than ligamentous calcification (except in severe rapidly progressive cases).[3] Further, alterations in these joints are inconstant; even after the disease has been present in the lumbar spine for several years only one or a few scattered apophyseal joints may appear abnormal. Moreover, examination of these joints is difficult because of the wide variations which exist in their planes; often several views with different degrees of obliquity are needed for accurate interpretation. But such detailed study seldom gives any information which is not already obvious from physical examination and x-ray study of the sacro-iliac joints. When findings in the apophyseal joints are present they consist of subchondral rarefaction and/or sclerosis of the facets, irregularity of the articular margins, narrowing of the joint spaces and eventually ankylosis.

Late in the disease the vertebral bodies may be osteoporotic but otherwise they are not affected. The intervertebral discs remain normal. Straightening of the normal lordotic curve is common when the lumbar segment is involved. Calcification of the costovertebral joint capsules is an infrequent late finding. The symphasis pubis occasionally may be affected; it may appear widened with ragged margins; later ankylosis may develop.

DIAGNOSIS

The diagnosis of rheumatoid spondylitis is not difficult when the disease has advanced sufficiently to produce its characteristic physical changes (such as limitation of spinal motion, persistent muscle spasm, straightening of the lumbar spine, restricted chest expansion, etc.) and its characteristic x-ray alterations in the sacro-iliac joints, paraspinal ligaments and apophyseal articulations. But early in the disease when physical and roentgenographic findings are minimal or absent, and in mild cases when constitutional symptoms may be lacking and the erythrocyte sedimentation rate may be normal, diagnosis is more difficult.[6]

Early symptoms such as persistent or chronic recurrent low back aching and stiffness occurring in a young man should make one suspect rheumatoid spondylitis, especially if the erythrocyte sedimentation rate is elevated. The disease should also be suspected when vague pains or soreness in the lower back are persistent, especially if

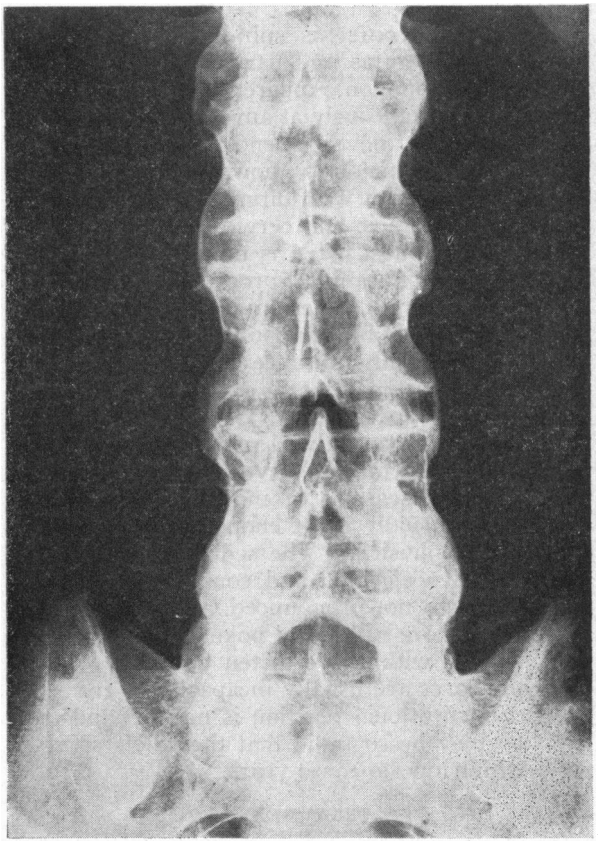

Figure 7.—Terminal picture of rheumatoid spondylitis illustrating a typical "bamboo" spine and complete ankylosis of the sacro-iliac joints.

accompanied by tenderness over the sacro-iliac joints, and an elevated erythrocyte sedimentation rate. Persistent back symptoms developing in a patient with peripheral rheumatoid arthritis are usually indicative of a spread of the disease to the spine. *But* an unequivocal diagnosis of spondylitis cannot be made until characteristic roentgenegraphic changes are demonstrable in the sacro-iliac or apophyseal joints; such changes may not appear for two or three years after the onset of symptoms.

It should be kept in mind that radicular pains, especially sciatic and thoracic, are common symptoms of rheumatoid spondylitis. Sciatic pain usually is not severe, is often intermittent, and may alternate from side to side; abnormal neurologic findings, such as diminished or absent Achilles reflexes or sensory changes, are not found as a rule. In making differential diagnosis between spondylitis and other causes of low back disability accompanied by sciatica (such as spinal cord tumor, ruptured intervertebral disc, etc.) it is important to remember that the cerebrospinal fluid protein is often (also) elevated in spondylitis. But the protein content in spondylitis is rarely increased above 100 mg. per cent; thus in patients with chronic low back disability with sciatica, if the protein is elevated notably above 100 mg. per cent, some cause for the increase other than spondylitis should be sought even though spondylitis is (also) present.[6]

CLINICAL COURSE

The clinical course is subject to wide variations. Exacerbations and partial or complete remissions are common. Apparently the disease may terminate spontaneously at any point and in some instances it may never extend beyond the sacro-iliac joints. The tendency, however, is toward relentless progression with ultimate involvement of the lumbar, thoracic and cervical regions.

The disease most often is mild or moderate in severity; severe rapidly progressive cases are rarely encountered. When mild, the disease tends to run a relatively benign course; the early symptoms may have only nuisance value to the patient, and even after the spine is extensively involved, disability may not be great. When mild cases are progressive it may take 15 to 25 years for a poker back deformity to develop.[3]

When the disease is of moderate severity the disability is usually great enough for the patient to consult a physician. The sedimentation rate is almost always elevated and constitutional symptoms, although not pronounced, are present. Progression is more rapid and poker back deformity may develop within five to ten years.

Severe cases are usually incapacitated from the onset. Constitutional reaction is marked and progression may be so rapid that the whole spine is rigid within one to three years.

TREATMENT

Although there is no known cure for rheumatoid spondylitis, much can be accomplished toward ameliorating the symptoms and preventing and correcting spinal deformity if treatment is instituted early. Apparently, as a result of therapeutic effort, the disease may at times even be arrested.[11] Only an outline of the more important medical, physiotherapeutic and orthopedic measures used in the treatment of early or relatively early cases will be presented herein; orthopedic corrective procedures designed for patients with long standing advanced disease will not be discussed.

Education of the patient: As with all victims of chronic disease, cooperation is best obtained by familiarizing the patient with the facts relating to his disability. The spondylitic patient should be fully instructed regarding the nature of his disease, its potentially crippling end result (especially if treatment is neglected), and what can be expected from treatment. If so indoctrinated, he will be more apt to persist in carrying out the various exercises and other home measures which form such an essential part of his regime. At the Army's Rheumatism Centers such instructions were successfully given by group lectures.[16]

General measures: Measures designed to improve general health are just as important in the treatment of spondylitis as they are in peripheral rheumatoid arthritis. Such measures should include a high caloric diet with vitamin supplements, iron salts if hypochromic anemia is present, and adequately regulated rest. Physical activity requiring undue use of the back should be curtailed routinely. Patients with disease of mild or moderate severity should have at least nine hours of bed rest at night and an additional one or two hours in bed during the day. Complete bed rest is rarely indicated; occasionally it is advised for patients with severe rapidly progressive disease. Acetylsalicylic acid should be given at frequent intervals, if necessary, to control pain. Baking, massage, diathermy and other locally applied physiotherapeutic measures may at times be of help in giving symptomatic relief; occasionally they tend to aggravate the symptoms.

Prevention and correction of postural deformities: Much can be accomplished in preventing postural deformities with relatively simple exercises if these are carried out conscientiously day after day for a period of years. Patients should be made to understand that the supervised exercises performed at the hospital or physician's office are merely instruction periods; when instruction is completed the rest is up to the patient himself. When the disease is early or relatively early, great emphasis should be placed on making the patient posture conscious. He must be taught to assume a proper stance at all times, with the lower abdominal muscles pulled in, the thorax raised, the shoulders squared and the head back. In addition he must be taught trunk stretching exercises (in both the erect and supine positions), hamstring and calf stretching exercises, deep breathing exercises and exercises for the correction of special postural defects; these should be performed twice daily at home. Simple analgesics, such as acetylsalicylic acid, given 30

to 45 minutes beforehand, and/or a hot tub bath often allow such exercises to be accomplished more readily. The spondylitic patient should be instructed also in the use of a firm bed (with boards), without pillow and in the use of a blanket roll for spinal hyperextension. Such measures should be carried out as preventive therapy even though postural deviations are minimal or have not yet occurred.

In a surprisingly large percentage of patients with relatively early postural deformities correction can be accomplished by postural exercises alone. Spinal braces should be reserved for patients with more advanced disease whose postures cannot be adequately corrected or maintained by exercises alone and for those whose pain and muscle spasm cannot be relieved by other means. Plaster or leather jackets, as advocated by some,[29] are seldom necessary in the earlier stages. Hyperextension frames, hyperextension beds, and plaster half shells are needed only when spinal deformity cannot be corrected with other methods; occasionally plaster half shells may aid in controlling muscle spasm and pain in severe cases.

Roentgen therapy: Although the results of roentgen therapy applied locally to joints for relief of pain and local manifestations in peripheral rheumatoid arthritis have been unpredictable and unreliable, consistently favorable reports regarding the results of x-ray therapy for rheumatoid spondylitis have appeared in the literature since 1930.[13,17,18,23,24,25,26,31]

In 1941, Smyth, Freyberg and Lampe[28] reported their results in 52 patients with rheumatoid spondylitis treated with roentgen therapy. Seventy-two per cent of these 52 patients obtained significant subjective relief and 50 per cent had definite improvement in objective clinical findings. In 41 per cent of those with elevated erythrocyte sedimentation rates, significant reductions in the rates resulted. In some instances all clinical evidences of the disease disappeared and the erythrocyte sedimentation rate returned to or toward normal, suggesting that at times the disease may possibly become arrested as a result of x-ray therapy. Similar results have been reported by Hare[14] and others.[2,15,20,22]

The technique of therapy used by Smyth, Freyberg and Lampe, and now the one most commonly used in this country, is as follows: 200 kilovolts, with 0.5 mm. of copper and 1 mm. of aluminum filtration, a half value layer of 0.9 mm. of copper, and a 50 cm. skin target distance with an output of 50 "r" (measured in air) per field (usual size of field, 200-300 square cm.). Each portion of the spine involved clinically or roentgenographically received three series of 600 "r" each. Recently Freyberg[11] has advocated additional x-ray treatment when recrudescences of symptoms occur, treatment being directed to the sites of recurrent symptoms.

Recently a controlled study of the effect of roentgen therapy in rheumatoid spondylitis was made at an Army Rheumatism Center.[27] Seventy-five soldiers with typical rheumatoid spondylitis (mostly early or relatively early cases) were divided into three groups of 25 each: one group received roentgen therapy only (using a technique similar to that described above), the sacro-iliac joints and all other involved regions of the spine receiving two series of 600 "r"; a second group was given only placebo or psychotherapy, the patients going through the same routine as the roentgen therapy group but receiving no actual irradiation (the x-ray apparatus was not turned on); a third group was treated with breathing and postural exercises only.

The results of this study indicated that roentgen therapy applied locally to the sacro-iliac joints and to the involved regions of the spine was of definite value in rheumatoid spondylitis; 92 per cent of those so treated were improved symptomatically and 68 per cent were improved objectively. The degree of improvement noted at individual levels of the spine often depended upon how long the particular region had been involved and how far the structural changes had advanced; recently involved regions demonstrated better symptomatic response to x-ray treatment than did regions where the disease had been present for years. Although the degree of improvement was pronounced in some, evidence of complete remission was not noted in any case (the patients, however, were observed for a period of only six months). The results obtained from breathing and postural exercises alone were inferior to those obtained from roentgen therapy. That the effect of roentgen therapy was not psychic in origin was evidenced by the fact that objective improvement occurred in only 8 per cent and subjective improvement in 28 per cent of the placebo therapy group.

Whether roentgen therapy actually modifies the activity of the disease process, or only produces analgesia resulting in a lessening of the clinical manifestations, cannot yet be determined. Controlled follow-up studies for at least ten years will be needed to clarify this important point. Nevertheless, roentgen therapy applied to those areas of the spine which are sites of active involvement is, at least, an important adjunct in the treatment of rheumatoid spondylitis. But x-ray therapy should not be relied upon alone; it should be combined with other measures such as those designed to improve general health and to prevent or correct postural deformities. Even if roentgen therapy should prove to have only an analgesic effect, such treatment is worthwhile as it allows better results to be obtained from postural and breathing exercises.

Other measures: Gold salts are said to be of little or no value in the treatment of rheumatoid spondylitis,[7] but have been used in only a small number of reported cases. It is probable that they deserve further trial especially in the earlier stages of the disease. Favorable results have been reported by Forrestier with subcutaneous injections of radon.[10] Intravenous injections of typhoid vaccine to produce foreign protein reactions have been used for years and may possibly be of

value at times in altering the activity of the disease; whether actual remissions may be produced by such a method of treatment is questionable.

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