Fractures and Dislocations of the Spine Complicating Ankylosing Spondylitis

A Report of Six Cases*

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Since the original descriptions of ankylosing spondylitis by Marie, in 1897, and by Strümpell, in 1898, there have been many descriptions of patients with typically rigid spines. Many patients with this disease remain very active and in our mobile society are involved in accidents. Fractures through the ankylosed vertebral column may, or may not, be complicated by injury to the spinal cord. Woodruff and Dowling reported four patients with ankylosing spondylitis complicated by fractures of the cervical spine. Our review of the pertinent literature revealed few reports of such injuries and very little information regarding their management.

During the past two years, we saw six patients with ankylosing spondylitis who had sustained vertebral fractures, five of them complicated by varying degrees of neural involvement, ranging from mild sensory loss to quadriplegia. In addition, we surveyed 1646 patients hospitalized in our Center for other reasons and among them found six patients with ankylosing spondylitis, five of whom showed evidence of having had unrecognized fractures of the vertebral column.

It is our purpose to point out the frequency of fractures of the ankylosed spine, to describe the complications associated with them, and to discuss the diagnostic and therapeutic difficulties encountered in the management of these fractures.

Case Reports

Case 1. F. M., a man, fifty-six years old, fell backwards, striking his head, five days prior to admission. At the time of injury, he noted severe pain in the neck, some swelling in the cervical region, and numbness of the left hand. On admission, examination revealed marked paravertebral muscle spasm and motion of the neck was limited and painful. Neurological examination was normal. Roentgenograms (Fig. 1) showed complete osseous fusion of the cervical spine and a fracture-dislocation of the sixth on the seventh cervical vertebra with slight anterior displacement of the sixth cervical vertebra. Skeletal traction with Credefield tongs was applied and maintained for twenty days. Roentgenograms showed the fracture-dislocation to be well reduced. The patient then wore a four-poster cervical brace for four additional months. At examination six months later, he had no complaint, examination was normal except for limitation of motion of the spine, and roentgenograms revealed that the fracture-dislocation was reduced and healed.

Case 2. S. A., a man, thirty-eight years old, had had ankylosing spondylitis for seventeen years when he was involved in an automobile accident. He sustained fractures of the cervical and thoracic spine, for which he was treated initially in another hospital. Three weeks after his accident, he was transferred to our Center for further treatment. On admission he complained of numbness of both upper extremities from the shoulders to the hands and examination showed loss of extension of all of the fingers of the right hand and loss of abduction and adduction of the fourth and fifth

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Fig. 1: Fracture-dislocation of the sixth cervical vertebra on the seventh cervical vertebra with anterior displacement of the sixth cervical vertebra.

Fig. 2: Fracture of the body of the tenth thoracic vertebra; note slight anterior displacement of the vertebra.

fingers of this hand. Hypalgesia was found over the eighth cervical dermatome on the right. Roentgenograms revealed a fracture-dislocation of the fifth on the sixth cervical vertebra and a fracture-dislocation of the tenth thoracic vertebra (Fig. 2). The patient was fitted with a four-poster cervical brace and a program of physical therapy was started. No brace or other immobilization was used for the fracture-dislocation of the tenth thoracic vertebra. Gradually the signs of compression at the level of the eighth cervical vertebral root subsided and the patient became asymptomatic. The cervical brace was discontinued four months after the accident. At follow-up one year after his accident, the patient had no complaint and examination showed no neural deficit. Roentgenograms showed the fracture-dislocation of the fifth on the sixth cervical vertebra and the fracture-dislocation of the tenth thoracic vertebra to be solidly healed with slight anterior subluxation of both the sixth cervical and tenth thoracic vertebrae.

Case 3. W. S., a man, sixty-two years old, had had ankylosing spondylitis for many years. Ten days prior to admission he lost control of his car and was thrown out of the vehicle and rendered unconscious for an unknown period of time. Pain in his chest and neck developed but he did not receive any medical attention because he was in jail for ten days. On his release, he was admitted to our Center complaining of severe pain in the neck. Examination showed tenderness on palpation of the cervical spine and hypalgesia from the sixth cervical through the second thoracic dermatome bilaterally. Roentgenograms (Fig. 3) showed a fracture-dislocation of the fourth on the fifth cervical vertebra with posterior displacement of the body of the fourth cervical vertebra. Presumably this was an extension type of fracture resulting from force applied to the forehead but this could not be proved since the patient had no recollection of his accident. Roentgenograms (Fig. 4) also showed an old compression fracture of the body of the third lumbar vertebra. The patient was treated with a four-poster cervical brace and gradually became asymptomatic. At examination three months later, he had no complaint and examination showed no residual neural findings. Roentgenograms made at that time showed the fracture-dislocation of the fourth cervical vertebra to be well healed.

Case 4. A. M., a man, forty-five years old, was admitted to the hospital twenty-four hours after a fall. Details of this accident were unknown. He had become quadriplegic immediately and had respiratory distress. Examination on admission showed complete absence of sensation distal to the fourth cervical dermatome. Roentgenograms of the cervical spine (Fig. 5) revealed ankylosing spondylitis and a fracture-dislocation of the fourth on the fifth cervical vertebra. In view of the im-
mediate onset of quadriplegia, it was assumed that the cord was transected and laminectomy was not performed. The patient was treated with skull traction for four weeks and with a four-poster cervical brace thereafter. The sensory and motor level failed to improve. One year after injury, roentgenograms (Fig. 6) showed the fracture-dislocation of the fourth on the fifth cervical vertebra to be in good position without definite evidence of solid fusion. The patient refused to have surgery to stabilize his cervical spine and at the time of writing he was still bedridden.

Case 5. R. S., a man, fifty years old, had ankylosing spondylitis for twenty years. Prior to admission he was incarcerated overnight because of acute alcoholic intoxication. On release from confinement, he complained of weakness in his lower extremities and pain in the neck. He was admitted to the hospital with the diagnosis of possible cerebral vascular accident. At this time, roentgenograms of the cervical spine (Figs. 7 and 8) revealed ankylosing spondylitis with sclerosis and deformity of the third and fourth cervical vertebrae believed to be the result of an old injury. No evidence of a recent fracture or dislocation was noted. Twenty-four hours later, however, the patient complained of loss of motor power in both upper extremities. Examination then showed tenderness on palpation of the cervical spine, marked thoracic kyphosis, and loss of voluntary motion of the hands, forearms, and lower extremities. Suddenly, during this examination, his breathing became quite labored. Immediately, skeletal traction with Crutchfield tongs was applied and the patient was taken to the operating room where an exploratory operation was performed. At the cervicothoracic junction—an area not visualized on the previous roentgenograms—there was a transverse fracture in the lamina of the seventh cervical vertebra, which was dorsally displaced 0.5 centimeter in relation to the first thoracic vertebra. Laminctomy of the third cervical through the first thoracic vertebra was carried out and a large, organized epidural hematoma was found extending from the fourth through the seventh cervical vertebra. The hematoma was removed. Thereafter, the dural sac was noted to pulsate. Because of marked instability at the interspace between the seventh cervical and first thoracic vertebrae, a fusion from the second cervical to the second thoracic vertebra was performed using iliac grafts wired to the spinous processes of the second cervical and second thoracic vertebrae. Postoperatively, hand movements improved, but no voluntary movement returned in the lower extremities. Six months later, roentgenograms showed the grafts to be in place and solid fusion of the spine. Seven months postoperatively, the patient suddenly died due to massive pulmonary embolism. Autopsy disclosed solid fusion at the site of

![Fig. 3](image1)  ![Fig. 4](image2)

Fig. 3: Fracture-dislocation of the fourth cervical vertebra on the fifth cervical vertebra with posterior displacement of the body of the fifth cervical vertebra.

Fig. 4: Old compression-fracture deformity of the body of the third lumbar vertebra.
fracture. The spinal cord was not examined at the time of autopsy.

Case 6. N. F., a man, fifty-six years old, was struck by a car and sustained open fractures of the left tibia and femur. Three days later, abdominal distension developed and while roentgenograms of the abdomen were being made, he complained of excruciating pain in the middle of his back. Several hours later he could not move his legs. Examination at this time revealed flaccid paraplegia and analgesia distal to the eighth thoracic dermatome. Spinal fluid manometric testing showed a complete block of the subarachnoid space. Roentgenograms of the thoracic spine disclosed ankylosing spondylitis, an old compression fracture of the fourth thoracic vertebra, and a fracture-dislocation of the seventh on the eighth thoracic vertebra. An exploratory operation was performed immediately. There was a transverse fracture through the lamina of the seventh thoracic vertebra with 0.5 centimeter of anterior displacement of the distal portion of the spine. A laminectomy of the sixth, seventh, and eighth thoracic vertebrae was carried out. It was then observed that during controlled respiration, the two segments of the spine above and below the fracture moved independently. The dura was entered and the spinal cord was found to be transected at the level of the fracture. A spine fusion from the fifth through the ninth thoracic vertebra was performed. Postoperatively the patient remained paraplegic. Two weeks later, he suddenly died, probably due to pulmonary embolism. No permission for autopsy could be obtained.

During the two years covered by this study 1646 patients were examined at our hospital. Review of their records revealed that six who were hospitalized for other reasons also had ankylosing spondylitis. These patients were from forty-eight to sixty-eight years old and had the typical history, symptoms, and findings of this disease. All of these patients had had chronic back pain for years and all had had more or less severe episodes of trauma over the years but they were not aware of having had a vertebral fracture. Roentgenograms (Figs. 9 and 10) revealed that five of these six patients showed evidence of old, unrecognized fractures of the spine, one in the cervical spine and two each in the thoracic and lumbar spines.

**Discussion**

During a two-year period, six patients with ankylosing spondylitis were ad-
mitted to two hospitals for fractures of the vertebral column, three with slight displacement and three with complete transection of the column and gross instability. Five of the six patients had associated neural involvement ranging from mild sensory impairment to quadriplegia. In any patient with severe Marie-Strümpell disease who has had a traumatic injury, fracture or fracture-dislocation of the vertebral column should be suspected, especially if the patient complains of pain in the neck or back. Such a patient should be handled as if he had an unstable fracture-disloca-

Fig. 7: Case 5. Ankylosing spondylitis of the cervical spine. Note the sclerosis and deformity of the third and fourth cervical vertebrae, probably the result of previous trauma.

Fig. 8: Oblique view of the cervical spine. No fracture could be detected.

Fig. 9: A man, sixty-eight years old, with no history of fracture. The roentgenogram shows an old, healed fracture-dislocation of the seventh cervical vertebra on the first thoracic vertebra.

Fig. 10: A man, fifty-nine years old, with no history of fracture. The roentgenogram shows an old compression fracture of the body of the fifth thoracic vertebra and probably of the ninth thoracic vertebra.
tion until thorough clinical and roentgenographic evaluation have ruled out the presence of such a lesion. Neck or back pain after injury should not be assumed to be arthritic in origin.

Routine roentgenograms of the spine of patients with spondylitis may fail to demonstrate a fracture or fracture-dislocation. Because of the deformities produced by the disease, certain areas of the spine, notably the lower cervical and upper thoracic portions, may be difficult to visualize (Cases 1 and 5). Special projections or repeated roentgenograms should be obtained to provide clear visualization and exclude all possibility of fracture, dislocation, or both. Tomograms should be obtained if clear visualization is not possible by other means.

Once the diagnosis is made, every effort should be made to prevent or minimize cord injury, especially in the presence of a complete transverse fracture which converts the ankylosed spine into two rigid segments which move as independent units exerting large forces at the fracture site.

If the displacement is slight and there is no neural involvement, immobilization by an efficient cervical brace for six to eight weeks would appear to be sufficient. We allowed our patients to become ambulatory as soon as they were fitted with their braces. In only one patient in this series (Case 4) did solid healing fail to occur promptly.

In the presence of appreciable subluxation or instability, skeletal traction for about three weeks is indicated; a cervical brace may then be worn until the spine is stable, or for about four months. We allow these patients to walk after they are fitted with a satisfactory brace. Obviously, the traction must be adjusted with great care to ensure accurate restoration of the spinal canal in a vertebral column which is ankylosed in a position of deformity.

When there is progressive neural involvement, especially in the presence of an unstable fracture, immediate laminectomy and decompression followed at the same operation by a definitive stabilization procedure using internal fixation and bone grafts is essential. Decompression by laminectomy alone is not sufficient. Continuing movement at the fracture site may further damage the neural elements or even rupture epidural veins, producing an epidural hematoma like the one observed in Case 5. That these fractures are common and easily overlooked is indicated by the evidence of old fractures in Cases 3 and 6, found incidentally when roentgenograms were obtained after the most recent injury, and by the fact that in five of the six patients with Marie-Strümpell arthritis who were hospitalized for other reasons, during the two years covered by this study, evidence of old, previously undiagnosed fractures of the vertebral column was found.

Summary and Conclusions

Six patients with Marie-Strümpell arthritis and recent fractures of the vertebral column, associated with neural involvement in five, were treated in a two-year period. Six other patients with this disease, seen during the same period for other reasons, showed evidence of old unrecognized vertebral fractures.

Fractures of the vertebral column in patients with Marie-Strümpell arthritis are relatively common after trauma and may be overlooked because of the history of chronic pain in the neck and back before the injury. Careful examination and adequate roentgenograms are mandatory in all patients with Marie-Strümpell disease who complain of pain in the spine after injury.

Conservative management is indicated for the treatment of patients without neural involvement. If there is progressive neural involvement, instability of the vertebral spine, or both, immediate exploration followed by fusion is indicated.

We wish to acknowledge our appreciation to Dr. Paul W. Meyer for his permission to include Case 1.

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had been followed for two years since operation and there had been no recurrence of the lesion. The operative defect in the ilium was gradually filling in with bone.

Comment
A case of a non-osteogenic fibroma in the posterior part of the ilium of a Negro boy, eight and one-half years old, is reported. The lesion enlarged considerably over a period of two years and was associated with pain intermittently. Because of the unusual location of this lesion, the case is recorded. Although excision relieved this patient’s pain and the outcome was satisfactory, the patient might have done equally well with no more than biopsy to establish the diagnosis or simply observation, to judge from the behavior of non-osteogenic fibromata in other bones.

References

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