Spine Fractures in Patients with Ankylosing Spondylitis

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ABSTRACT

Introduction: Ankylosing Spondylitis (AS) is a progressive inflammatory disorder that affects the axial skeleton including the sacroiliac joints. Patients are 4 times more likely to suffer a fracture (10% at 10 years of illness), and there is a high percentage of delay in diagnosis. Stiffness and osteoporosis are key to suffering these injuries. CT and MRI scannings play a fundamental role in diagnosis. The current choice for treatment is decompression and surgical fixation. A series of cases is presented in order to: consider diagnostic difficulties; describe the injuries and therapeutic decision; analyze the presentation of complications and carry out a bibliographic update. **Materials and Methods:** This is a retrospective multicenter study of a case series of 6 patients. **Results:** Six males with an average age of 58.1 years. Four presented a fall from the standing position. The delay in diagnosis was 12.8 days on average. The most affected areas were thoracic and lumbar, with a predominant mechanism of hyperextension. Four patients underwent surgery. **Discussion:** Fractures in patients with AS are frequent complications related to osteoporosis. CT is the sensitive and specific method for diagnosing the lesion. The current literature supports the need for subsequent surgical treatment. **Conclusions:** AS carriers are more at risk of suffering a low-energy trauma fracture. A delay of 12.8 days in diagnosis. Surgical treatment, with long fixations and posterior release, is the most widely used treatment. We have not observed post treatment complications.

Key Words: Ankylosing Spondylitis, Fractures, Treatment, Complications.
Level of evidence: IV

Fracturas de la columna vertebral en pacientes con espondilitis anquilosante

RESUMEN

Introducción: La espondilitis anquilosante es un trastorno inflamatorio progresivo que afecta el esqueleto axial, inclusive las articulaciones sacroilíacas; el riesgo de sufrir una fractura se cuadruplica (10% a los 10 años de enfermedad), la tasa de demora del diagnóstico es alta. La rigidez y la osteoporosis son factores clave para sufrir estas lesiones. La tomografía computarizada y la resonancia magnética cumplen un rol diagnóstico fundamental. La descompresión y la fijación quirúrgica es el tratamiento de elección actual. Se presenta una serie de casos con el objetivo de considerar las dificultades diagnósticas, describir las lesiones y la decisión terapéutica, analizar la presentación de complicaciones y realizar una actualización bibliográfica. **Materiales y Métodos:** Estudio multicéntrico retrospectivo de una serie de casos con 6 pacientes. **Resultados:** Seis hombres, edad promedio 58.1 años. Cuatro habían sufrido una caída desde la posición de pie. El tiempo promedio hasta el diagnóstico fue de 12.8 días. Los sectores más afectados fueron el torácico y el lumbar, con un mecanismo predominante en hiperextensión. Cuatro pacientes recibieron tratamiento quirúrgico. **Conclusiones:** Los pacientes con espondilitis anquilosante tienen un riesgo más alto de sufrir una fractura por traumas de baja energía. La demora para llegar al diagnóstico fue de 12.8 días. La cirugía con fijaciones largas y liberación por vía posterior es el tratamiento más utilizado. No se observaron complicaciones después del tratamiento.

Palabras clave: Espondilitis anquilosante; fracturas; tratamiento; complicaciones.
Nivel de Evidencia: IV

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How to cite this paper: Bazán PL, Bravo MA, Gutiérrez EE, Terraza S, Cortés C, Borri ÁE, Medina M, Ciccioli NM. F Spine Fractures in Patients with Ankylosing Spondylitis. *Rev Asoc Argent Ortop Traumatol* 2021;86(1):58-63. https://doi.org/10.15417/issn.1852-7434.2021.86.1.1094

INTRODUCTION

Ankylosing spondylitis (AS) is a progressive inflammatory disorder which mainly affects the axial skeleton, including sacroiliac joints[1]. Patients with AS are four times more likely to suffer a fracture during their most active stage of life as compared to the general population[2,3], with a prevalence of 10% after 10 years of disease[4]. It must be noted that such fractures may be clinically undetectable at hospital admission[5-7]. Osteoporosis is currently considered a common feature of AS, even at the early stages of the disease[8], with a reported prevalence rate of 19% to 61%[9]. The cervical spine is the most frequent place of injury, followed by the thoracic spine[10-12]. Radiographs offer little help in diagnosing vertebral fractures. CT and MRI scannings provide more details about the fractured segments[1]. Cervical fractures tend to be very unstable and such condition may lead to secondary neurological damage[13,14]. Because conservative treatment has been correlated with high mortality[13], the current treatment of choice is surgical management, including decompression, fracture reduction, and instrumented fusion[15].

A series of cases are presented in order to evaluate kinematics, consider difficulties in diagnoses, describe injuries and therapeutic possibilities, analyze occurrence of complications, and update bibliography.

MATERIALS AND METHODS

A retrospective study was performed on 6 patients diagnosed with AS, all of whom presented spine fractures after trauma. They were treated in five different health care centers, four of them in Argentina and one in Chile. All of the patients were subjected to plain radiographs, CT and MRI scannings.

RESULTS

All of the patients were male, of an average age of 58.1 years. The age range was from 40 to 77 years. The injuries were due to fall from floor level in 4 patients and car accident in 2 patients. The first of the latter consisted in a side collision where the patient had the seatbelt on. The second was a motorbike accident, and the patient suffered an associated femur fracture.

The average time of diagnosis was 12.8 days, with a range of 0 to 22 days, on account of unclear radiographs or a disregard of pain due to the absence of neurological deficit, which led to an incorrect clinical evaluation. The most affected areas were the thoracic and the lumbar spine (Figure 1). The injuries were classified as: A1 in 2 patients, B2 in 1 patient, B3 in 1 patient (Figure 2), and C2 in 2 patients with an injury mechanism of hyperextension (Figure 3). Only one patient presented a complete spinal injury at hospital admission (Frankel Scale A, or AO Spine Classification N4). The rest of the patients did not present sensory-motor deficit (Table 1).

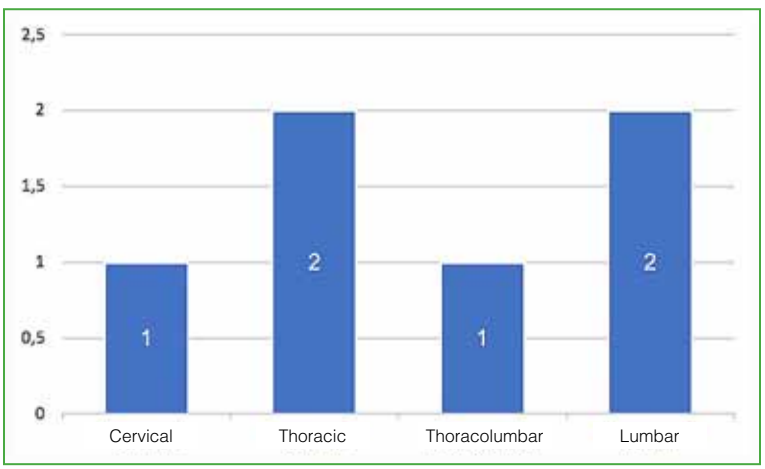

Figure 1. Topographic distribution of spinal injuries.

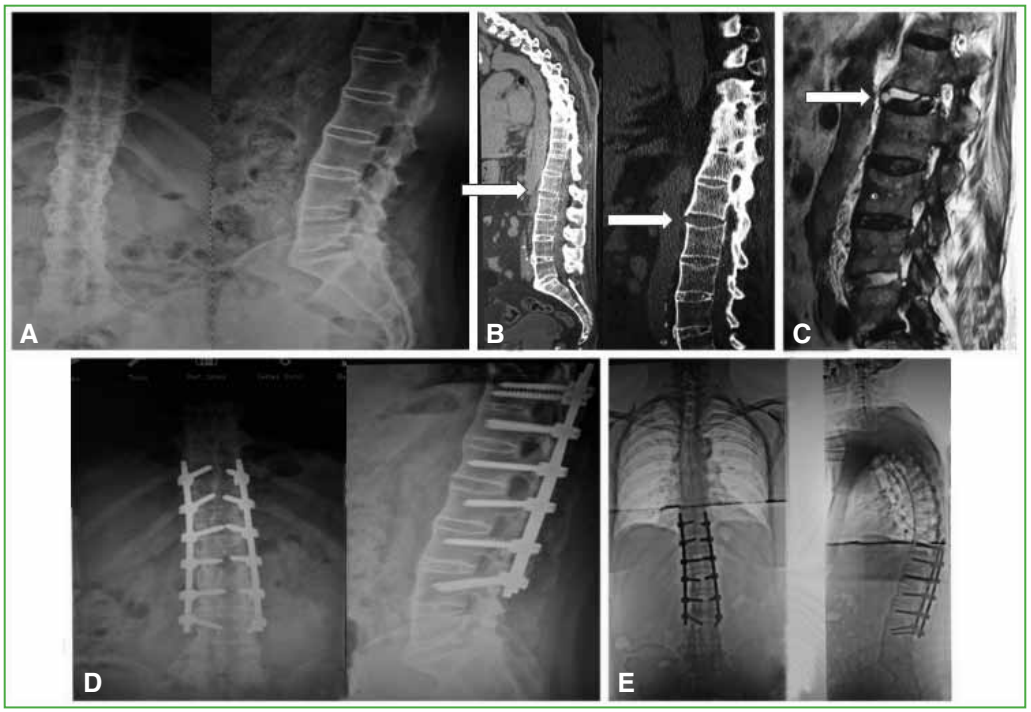

Figure 2. Patient 5. A 57-year-old man who suffered a fall from standing height.. **A.** Frontal and profile radiographs. **B.** Tomographic sagittal reconstruction, 15 days after the fall. **C.** Magnetic resonance. **D.** Postoperative radiographs. **E.** Spinogram, 6 months after surgery. The arrow in images B and C points to the hyperextension injury.

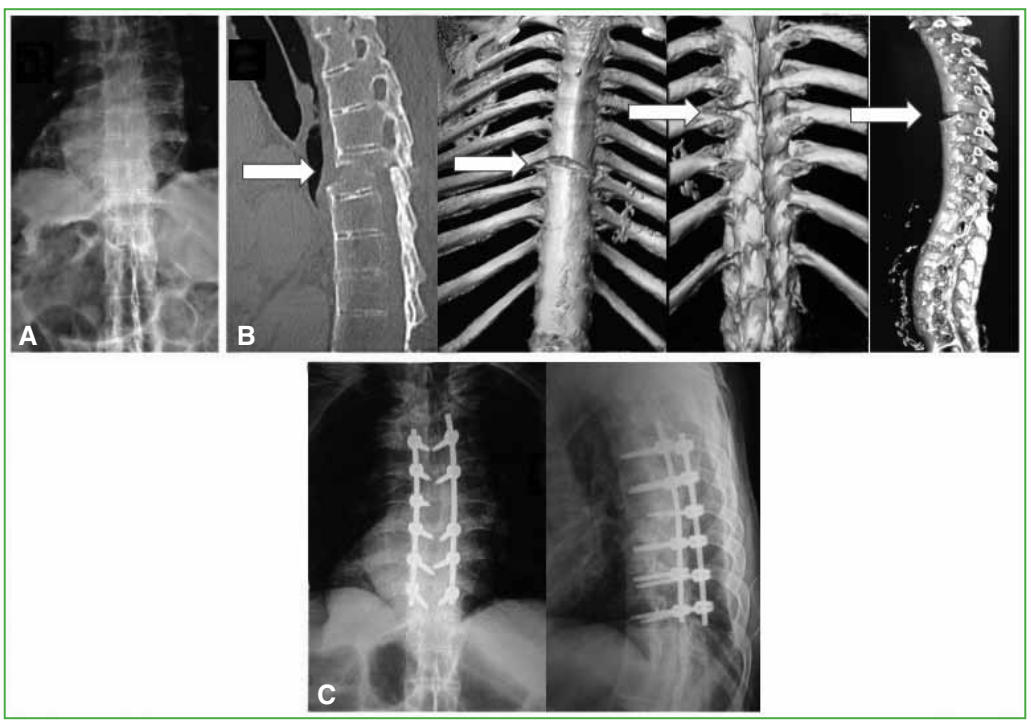

Figure 3. Patient 2. A 77-year-old man who suffered a fall from standing height. **A.** Frontal radiographs, 48 hours after the fall. **B.** Three-dimensional tomographic sagittal reconstruction, 22 days after trauma. **C.** Postoperative radiographs. The white arrow points to the hyperextension injury.

Table. Clinical characteristics of the patients

Patient	Age (years)	Type of fracture (AO)	Kinematics	Delay in diagnosis (days)	Treatment
1	66	C6C7 B2 (C7A1) N0 M3	Car accident	22	Surgical, posterior approach
2	77	T7T8 C N0 M2	Fall from standing height	22	Surgical, posterior approach
3	67	T6 A1 N0 M2	Fall from standing height	11	Orthopedic
4	42	L2L3 C N4 M2	Motorbike accident	0	Surgical, posterior approach
5	57	L1L2 B3 N0 M2	Fall from standing height	15	Surgical, posterior approach
6	40	L1 A1 N0 M2	Fall from standing height	7	Orthopedic

Four patients were subjected to posterior instrumented arthrodesis, which was performed with a long fixation of more than 2 levels above and 3 below the fusion. The other 2 patients were treated non-surgically but with an orthosis. A follow-up of an average of 3 years was documented, with a range of 10 months to 11 years and 7 months. No major follow-up complications were observed, either direct or indirect, and the course of the base disease was normal.

DISCUSSION

Vertebral fractures associated with higher rates of osteoporosis and poor bone quality are frequent complications in patients with AS[4]. The probability of suffering low-energy trauma is rather high[16], and the most frequent mechanism of injury is hyperextension[15]. The intrinsic causes which facilitate the injury are spinal stiffness and low bone mineral density. Besides, patients are predisposed to vertebral fractures if they meet mechanical risk factors like spinal fusion, decreased spinal mobility or presence of syndesmophytes[17-20].

It is strongly recommended to seek to detect osteoporosis within 10 years after the patient was diagnosed with AS. Treatment for osteoporosis should be started if the T-score of the patient is less than or equal to 2.5[4]. NSAIDs, which constitute the basic treatment for AS, can potentially reduce the risk of vertebral fracture by delaying bone loss, improving mobility and delaying bone fusion[8, 21, 22].

CT scanning is usually used to determine the fracture site, type, and severity. MRI scanning is used to identify tiny fractures in bone edema which are undetectable by CT. It is also used to detect spinal cord compression, and to determine the exact range of decompression needed in case surgery is required[23]. Complications such as spinal cord lesions, nerve root lesions and paravertebral hematoma are more frequent and more serious in patients with AS[23].

In their extensive meta-analysis, Westerveld et al. point out that surgical treatment led to neurological improvement and a lower overall complication rate compared to non-surgical treatment, both in the long and short term. The main objective of surgical treatment is to keep the fracture realigned and adequately stabilized until fracture consolidation is achieved[24]. The main surgical methods include anterior stabilization, posterior stabilization, and a combined anterior–posterior surgical approach. Decompression of spinal stenosis may be performed in the same operative session if necessary[23]. Single anterior approach cannot withstand the posterior column tension, which results in loosening, failure of the implanted graft, and loosening or breaking of internal fixation devices, which is associated to high failure rates[25]. In order to avoid such failure, posterior stabilization is recommended for treating patients with unstable fractures who have a risk of translation[26]. For most AS patients with spine fractures, vertebral foot pedicle screw fixation should be performed in 3 segments above and below the injured vertebral body to achieve good clinical efficacy[23]. A cervical fracture is a highly unstable

condition which commonly causes progressive neurological deficit[13, 14]. Luksanapruksa et al. performed a study in which surgical results of posterior and combined anterior-posterior approaches for the treatment of cervical fractures in patients with AS were compared. Such study shows that both posterior and combined anterior-posterior approaches yielded good results, including improvement of neurological status without the need for later reoperation[15]. Longo et al.[27], in a systematic review performed in 2015, showed that cervical fracture was more common in male patients (94%) and typically occurred in middle age patients (average age: 59.2 years). The affected levels were C6–7, C5–6, and C4–5. Most patients presented a post-surgical neurological improvement of at least one degree in the Frankel scale (78% for combined approach, 70% for posterior approach). The rate of postoperative complications was 19% (14% for anterior approach, 15% for posterior approach, and 18% for combined approach)[27].

CONCLUSIONS

Patients with AS have a higher risk of suffering a low-energy trauma vertebral fracture compared to the general population. It is important to hold a high level of suspicion when treating a patient who suffers AS and presents pain but no other symptoms, in order to avoid secondary neurological complications. In our study, the average delay in diagnosis was 12 days. Such average was related to a poor quality or absence of scanning procedures.

The most frequent mechanism of injury observed in this series was hyperflexion with a subsequent injury of the posterior tension band, either associated to translation or not. NSAIDs are thought to have a protective effect upon the risk of a vertebral fracture in patients with AS. Surgical treatment with long fixations and posterior release is the most widely used treatment. In this series, post-treatment complications have not been observed. It is considered necessary to perform a study with a larger sample.

Conflict of interests: Authors claim they do not have any conflict of interests.

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