CASE REPORT

Chiropractic Care in the Management of Inactive Ankylosing Spondylitis: A Case Series

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ABSTRACT

Objective: This report describes chiropractic management for 3 cases of inactive ankylosing spondylitis (AS).

Clinical Features: A 25-year-old woman presented with chronic, mechanical neck pain and stiffness that was ultimately diagnosed as AS. A 23-year-old man presented with chronic low back and left hip pain that was diagnosed as AS. A 31-year-old man with low back pain presented with a known diagnosis of AS. Physical examination in 2 cases failed to identify systemic findings associated with AS. In the third case, examination revealed a history of ulcerative colitis. Laboratory examination of case 2 yielded a positive HLA-B27, but cases 1 and 3 were HLA-B27 negative. The acute reactants were negative in all 3 patients, indicating an inactive phase of disease. All 3 patients underwent spinal imaging including sacroiliac joint radiography. In case 3, magnetic resonance imaging of the sacroiliac joints was performed. All 3 imaging examinations revealed bilateral, symmetric sacroiliitis.

Interventions and Outcome: Patients were managed by both a medical rheumatologist and a doctor of chiropractic. Chiropractic care ranged from instrument-assisted spinal manipulation to diversified spinal and soft tissue manipulation and Cox flexion-distraction. Patients were given home stretches and rehabilitation exercises. All 3 patients experienced some relief of their symptoms including pain reduction and improved activities of daily living.

Conclusion: These 3 patients displayed differences and commonalities in clinical, laboratory, and imaging features. Chiropractic manipulation and rehabilitation seemed to be beneficial in reducing symptomatology and improving musculoskeletal function for these 3 patients. These findings suggest the potential for collaborative or integrative management in similar cases. (J Chiropr Med 2017;16:300-307)

Key Indexing Terms: *Ankylosing Spondylitis; HLA-B27 Antigen; Radiology; Chiropractic; Spinal Manipulation*

INTRODUCTION

Ankylosing spondylitis (AS) is a seronegative inflammatory spondyloarthropathy that affects 0.1%-1.4% of the young adult population.^{1,2} Diagnostic characteristics of inflammatory back pain include an age of onset <45 years, a duration >3 months, insidious onset, morning stiffness lasting >30 minutes, improvement of symptoms with movement, no improvement of symptoms with rest, night pain, and alternating buttock pain.² Clinical manifestations most commonly include inflammatory

back pain, but manifestations affecting the eye, gastrointestinal tract, skin, peripheral joints, heart, lung, and kidney are seen.³ Osteoporosis is also another feature of the disease.⁴ Radiographic examination is the most common imaging modality used in the diagnosis of AS. Diagnostic ultrasound (US), magnetic resonance imaging (MRI), bone scintigraphy, and dual-energy x-ray absorptiometry may be used to aid in the diagnosis or gauge treatment effectiveness.⁴⁻¹² Biomarkers are utilized in the workup of AS. Human leukocyte antigen B27 (HLA-B27) (90%-95%) and endoplasmic reticulum aminopeptidase 2 (ERAP2) are a few genetic markers.^{5,13} Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are acute reactants that help gauge disease activity, as inflammatory arthropathies, including AS, are known to periodically become inactive with persistence of pain, including nociceptive inputs from the joints, muscles, and fascia.¹⁴⁻¹⁷ Treatment using tumor necrosis factor- α (TNF- α) inhibitors and nonsteroidal inflammatory drugs (NSAIDs) are typical pharmaceutical interventions used to reduce pain and halt progression of this

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disease.¹⁸ Only a few case reports have been described using chiropractic manipulation in addition to rehabilitation and supplementation as a treatment for AS.¹⁹⁻²⁴ The objective of our case series was to describe clinical and imaging diagnostic characteristics in AS and how chiropractic care may be included in integrative care.

CASE SERIES

Case 1

A 25-year-old woman presented with neck and upper back pain and stiffness for a reported duration of 3 months. She rated the pain as 8 of 10, where 0 represents the absence of symptoms and 10 the most severe, unbearable pain on the verbal pain scale. The patient described the presenting complaint as a dull ache with sharp pain at end range of motion and overall general stiffness of the cervical and thoracic spine. She described feeling the pain and stiffness throughout the entire day, with worsening of symptoms by the end of the day that was aggravated by all ranges of motion and exercise. The symptoms were relieved by rest, heat, ice, and NSAIDs.

Physical examination revealed a moderate to severe global reduction in all cervical ranges of motion, the worst being lateral flexion bilaterally. Orthopedic tests, including cervical maximum compression, foraminal compression, shoulder depression, and Spurling test, were positive for localized cervical pain without radicular symptoms. There was bilateral hypertonicity of the scalene, sternocleidomastoid, levator scapulae, upper trapezius, erector spinae, and pectoralis major muscles. Neurologic examination was normal.

The global reduction in cervical ranges of motion prompted radiographic examination of the cervical spine, which revealed osteopenia of the articular pillars with indistinct cortical margins throughout the zygoapophyseal joints bilaterally (Fig 1). Some of the apophyseal joint cartilage was visualized; however, there was severe

reduction in sagittal plane range of motion (Fig 1). The intervertebral disk spaces were well maintained. A differential diagnosis of juvenile idiopathic arthritis leading to early-onset adult osteoarthritis versus ankylosing spondylitis was given, and an arthritis laboratory panel was recommended, including RA factor, CRP, ESR, and HLA-B27.

The arthritis laboratory panel revealed that the patient was antinuclear antibody (ANA) positive and RA factor and HLA-B27 negative. The ESR and CRP were within normal limits. Based on the imaging and laboratory findings, an inflammatory arthropathy, possibly inactive AS, was considered.

A treatment plan of 3 times per week for a month was established for myospasms and joint restrictions. The patient received manipulation of the full spine using an instrument-assisted mobilization device. Soft tissue manipulation techniques and interferential electric stimulation at 80-120 Hz for 10 minutes (LSI International, Kansas City, Kansas) were employed to reduce paraspinal hypertonicity and pain. The patient was given at-home range of motion exercises and stretches to be completed 3 times per day. To reduce systemic inflammation, omega-3 supplementation (1330 mg/d) was prescribed, and she was advised to avoid processed foods, increase fruit and vegetable intake, and increase water intake.

Four months after initial examination, a new complaint emerged consistent with right SI joint pain rated 5 of 10 on a verbal pain scale. The physical examination revealed a normal to mild decrease in range of motion in all directions. All orthopedic tests were negative, except for Kemp's test, which elicited pain in the right SI joint. In the light of the SI joint complaint, in combination with the cervical spine diagnosis, these findings elevated concern for AS.

A radiographic examination of the lumbar spine and SI joints revealed squaring of the vertebral bodies, particularly of the thoracolumbar and lower lumbar spine, and sclerosis and mild erosions of the SI joints, consistent with bilateral grade II sacroiliitis (Fig 2). A diagnosis of early-stage

Fig 1. (A) Radiographic examination of the cervical spine in case 1 revealed indistinct cortical margins and osteopenia of the articular pillars. The apophyseal joints were diminished, predominately in the mid to lower cervical segments, whereas the intervertebral disk spaces were well maintained. (B) Flexion and (C) extension revealed restricted sagittal range of motion of the cervical spine.

Fig 2. (A) Lateral view of lumbar spine and (B) anteroposterior view of sacrum in case 1 revealed squaring of the vertebral bodies and bilateral grade 2 sacroiliitis. There were no syndesmophytes, vertebral body corner erosions, or sclerosis. The apophyseal joints and intervertebral disk spaces were well maintained.

ankylosing spondylitis was confirmed. A rheumatology consult was advised, and a course of care was offered to the patient. A rheumatologist prescribed Enbrel (50 mg/mL) (Immunex Corp, Chicago, Illinois) and naproxen (500 mg, twice daily) for pain management and joint inflammation. The patient continued chiropractic care for 2 times per week for another month, which included full spine instrument-assisted manipulation, moist heat, and interferential E-Stim with the continuation of home stretching exercises.

Following 6 months of integrative care (combined care from both the rheumatologist and the chiropractor), the patient reported an interval decrease in pain (5/10) of the cervical spine and of the SI joints (1/10). There was a mild increase in all ranges of motion of the cervical spine and a reduction in hypertonicity of paraspinal musculature throughout the entire spine. The patient elected to self-discharge at this time.

Case 2

A 23-year-old man presented with left hip and low back pain of 6 years' duration. He rated the pain at 4 of 10 on a verbal pain scale. He described the pain as a dull ache with occasional flare-ups of sharp pain. The pain was aggravated by running and sometimes walking. The patient stated he would run 15-20 miles a week, but the pain would deter his weekly training. His symptoms were relieved by stretching and rest.

The review of systems revealed anosmia, which the patient attributed to a tonsillectomy when he was 8 years old and seasonal allergies. The remaining review of systems

was unremarkable. He stated he took Zyrtec (10 mg) (McNeil Consumer Healthcare, Fort Washington, Pennsylvania) daily for seasonal allergies.

Physical examination revealed normal lumbar and left hip ranges of motion. The orthopedic and neurologic examinations were unremarkable. The patient had hypertonicity of the erector spinae, gluteal muscles, piriformis, iliotibial bands, and hamstrings bilaterally. A radiographic examination of the left hip was ordered to evaluate for a stress fracture of the femoral neck.

Radiographic examination of the left hip (not shown) was negative, but incidental sclerosis adjacent to the left SI joint was noted. A dedicated SI joint radiographic series was recommended for evaluation of sacroiliitis. That examination revealed bilateral SI sclerosis without erosive changes (Fig 3). A radiographic series of the lumbar spine was obtained to exclude inflammatory spondyloarthropathy. The lumbar series yielded no squaring of the vertebral bodies, syndesmotic changes, erosive changes, or sclerosis of the lumbar spine. A differential diagnosis of seronegative spondyloarthropathy, most likely ankylosing spondylitis, was given. An arthritis laboratory panel was recommended, including CRP, ESR, and HLA-B27.

The laboratory results revealed a positive HLA-B27 and a negative ANA. The ESR and CRP were within normal limits. A rheumatology consult was advised, but the patient declined the recommendation. A diagnosis of probable AS was given, likely in an inactive state.

A treatment plan of 2 times per week for a month was established for myospasm and joint restrictions. The patient

Fig 3. (A) Left oblique view and (B) anteroposterior view of sacrum and (C) right oblique view of the sacroiliac joint in case 2 revealed grade II erosions and sclerosis of the sacroiliac joint bilaterally. The femoroacetabular joints were well maintained.

was adjusted full spine and left hip using a manual diversified technique. Soft tissue mobilization and trigger point therapy were employed to relieve hypertonic pelvic musculature. The patient was given at-home stretches to be performed daily, including Breugger exercises for posture once per hour while at work to alleviate stiffness and wall angel exercises 15 repetitions twice per day for correction of upper back posture.

Following a 4-week trial of care, the patient reported a decrease of pain (2/10), reduction of hypertonicity in the piriformis, hamstring, gluteal, iliotibial bands, and erector spinae musculature, and a return to running activities. The patient was advised to continue rehabilitative care but was lost to follow-up.

Case 3

A 31-year-old male army veteran reported with low back and bilateral SI joint pain for approximately 1 year. He was diagnosed with ankylosing spondylitis by a rheumatologist. The rheumatologist prescribed Humira (40 mg/0.8 mL) (AbbVie Inc, Thousand Oaks, California) and prednisone (5 mg). At that time, he decided not to fill the prescriptions and presented for chiropractic evaluation and treatment. There was a constant dull aching pain located primarily over the bilateral SI joints. He rated the pain 8 of 10 on a Borg pain scale, 0 being no pain and 10 being the worst pain, and reported that the condition was worsening. The pain was worse with sitting and recumbency and relieved with movement. The pain caused restriction of normal daily work and social routine, including caring for his 2 young children and an inability to work for 4 months.

He had previously seen a physical therapist, a chiropractor, and medical doctor with minimal relief. He received cortisone and Humira injections with minimal success before presenting to our clinic. The patient's previous medications included anti-inflammatory, nonnarcotic, and narcotic analgesics. He took the prednisone when needed. He supplemented with a multivitamin and omega-3. His past medical history included, ulcerative colitis, numbness and pain in his legs, muscle tension, weakness, headaches, insomnia, dizziness, and fatigue.

The clinical posture evaluation revealed a decreased lumbar curve, but the pelvis was well balanced overall. He did not have a limp but was guarded with his movements. The orthopedic tests revealed positive Ely, Hibbs, Nachlas, FABERE, and Yeoman tests, all reproducing SI pain bilaterally. The Milgram test was positive for pain on the left, and bilateral straight-leg raise also induced SI pain bilaterally. Sacroiliac compression provoked pain bilaterally. The sensory examination was within normal limits. Multiple trigger points were found within the posterior pelvic musculature.

In addition to his diagnosis of AS, bilateral sacral arthralgia, myospasm, and segmental dysfunction of the lumbar spine and pelvis were present. He was also diagnosed with segmental dysfunction of C1/C2 for a concomitant neck complaint. Prior to presenting at our clinic, he had undergone imaging with radiography of the lumbar spine, MRI of the cervical spine and pelvis, and computed tomography of the SI joints. Pelvic MRI revealed bilateral low signal on T1 and high signal on fluid-sensitive sequences consistent with bone marrow edema. The hyperintense signal was predominately located on the iliac side of the SI joints (Fig 4). Laboratory evaluation

Fig 4. Axial non-contrast short tau inversion recovery magnetic resonance imaging in case 3 revealed only subchondral bone marrow edema (arrows), predominately on the iliac side of the sacroiliac joint bilaterally, seen in early-stage ankylosing spondylitis. Erosions of the ilium or sacrum were not noted.

included CBC, ANA, RA factor, HLA-B27, and cyclic citrullinated peptide antibody immunoglobulins G and A, all of which were negative.

The patient declined pharmacologic treatment; he opted for continued chiropractic care. The plan included spinal manipulation with the Thompson technique for pelvic dysfunction, Cox flexion-distraction of the lumbar spine, and instrument-assisted adjustment of the cervical spine, as well as Logan Basic sacral unlock exercises, and a food diary including an inflammatory diet consultation. Following 4 weeks of treatment, the patient reported an interval pain reduction from 8 of 10 to 6 of 10. He was able to decrease his use of anti-inflammatory, nonnarcotic, and narcotic analgesics to taken as needed. He increased his daily activities to include more of his regular home routine and was able to go swimming for the first time in more than a year. He did not resume his occupation of taxidermy. He reported improved ability to walk and sleep through the night without pain. The patient was inconsistent with his treatment plan and was unfortunately lost to follow-up.

All 3 patients in this case series provided written consent for their health information to be published.

DISCUSSION

Chiropractic care can be combined with conventional medicine in some settings.²⁵ This case series describes the

diagnosis and management of 3 patients with ankylosing spondylitis in the inactive state.

The average age at presentation of AS is 26 years, but up to 15% of patients may have their first symptoms before 16 years.^{1,2} Our patients approximated the average age at presentation. The male-to-female ratio affected by AS has historically been cited around 10:1,¹ but is now known to be much lower at about 2:1.² Ankylosing spondylitis is more common among whites of North American and northern European ancestry.² Case 1 was of Latino ancestry, whereas cases 2 and 3 were of northern European descent.

For all 3 patients, the clinical features included inflammatory low back pain and stiffness of insidious onset that lasted more than 3 months. Typically, symptoms commonly improve with activity and return with rest. Our patients exhibited variations on this rule. Pain is often present in the thoracic and cervical spine, but this is usually seen later in the disease process.¹ Cases 2 and 3 had this typical presentation, unlike case 1, who initially presented with neck pain. Our female (case 1) patient exhibited osteopenia of the cervical articular pillars on radiography. Haroon et al reported that patients with AS had decreased bone mineral density and reduced trabecular bone microarchitecture and strength compared with patients without AS. They revealed increased vertebral body, hip, or distal radial fracture risk in AS patients.⁴

Extraskeletal manifestations of AS may coexist with axial skeleton symptoms including acute anterior uveitis

(20%-30%), inflammatory bowel disease (3%-10%), and psoriasis lesions (10%-25%).³ Cardiac pathologies including conduction disturbance, valvular disease, and cardiomyopathy (10%-30%) may be seen.³ Pulmonary manifestations including interstitial lung disease, apical fibrosis, emphysema, bronchiectasis, ground glass attenuation, nonspecific interstitial abnormality, and restrictive pattern in pulmonary function tests (~50%) are also prominent findings.³ Microscopic hematuria, microalbuminuria, and decreased renal function and creatinine clearance (10%-35%) are seen with associated renal abnormalities including glomerulonephritis, immunoglobulin A deposition, and amyloid deposition.³ None of the extraskelatal manifestations were seen in case 1 or 2, but ulcerative colitis was noted in case 3.

Laboratory testing is useful in the diagnosis of AS. Genetic markers, such as HLA-B27⁵ and ERAP2,¹³ may be present in patients with AS. One study with 386 patients (284 male and 102 female) diagnosed with AS reported that 90.7% were HLA-B27 positive, whereas 9.3% were HLA-B27 negative regardless of sex. The authors found that positive HLA-B27, male sex, elevated ESR, and longer disease duration were associated with more severe sacroiliitis on computed tomography.⁵ These ranges of clinical variables were not demonstrated in 2 of our cases. Cases 1 and 3 were negative for HLA-B27 and had progressively worsened radiographic appearance when compared with case 2. This may have been related to the disease duration. Another study found that a variant of the ERAP2 gene may be implicated in AS patients that are HLA-B27 positive or negative; therapeutic suppression of this gene requires further study.¹³ Acute reactants (ESR and CRP) are measured in AS patients to gauge active inflammation. The ESR and CRP carry a positive correlation in AS patients.¹⁴ They do not have the same utility in rheumatoid arthritis, as acute reactants have variability throughout the disease process.¹⁵ One study found that ESR and CRP are related to disease activity in patients with AS.¹⁵ None of our 3 cases had elevated levels of ESR or CRP, indicating an inactive phase of AS. We hypothesize that our 3 cases exemplified nociceptive or neuropathic pain without acute inflammation in AS.^{16,17}

Diagnostic imaging plays a major role in the diagnosis of AS. Radiographic examination of the spine and pelvis in AS may reveal erosions and sclerosis of the SI joints and corners of the vertebral bodies, pseudo-widening of the SI joints, squaring of the vertebral bodies, syndesmophyte formation, ligamentous calcification, diffuse symmetric joint space narrowing, and incomplete or complete ankylosis. The severity of radiographic sacroiliitis is graded using the modified New York criteria.⁶ Other radiographic scoring indices for the spine, such as the Bath Ankylosing Spondylitis Radiology Index and the Stoke Ankylosing Spondylitis Spinal Score, have been found to have good to excellent reliability.⁶ Skeletal scintigraphy (bone scan) has

also been found to be sensitive in detecting active disease in the SI joints, although unhelpful in the diagnosis of inactive AS.⁷ Magnetic resonance imaging has accuracy in diagnosing early-stage AS inflammatory lesions in the spine and SI joints using fluid-sensitive sequences with fat saturation and contrast enhancement.^{6,8} Hoffstetter et al found that lesions revealed on MRI were most likely to occur in the SI joints and spine (62%) and least likely to occur in the spine alone (10%).²⁶ However, the specificity of bone marrow abnormalities on MRI is controversial.⁹ Additionally, a recent systematic review indicated that bone marrow lesions seen in AS may also be seen in degenerative disease and normal populations.⁹ Dual-energy x-ray absorptiometry may also be warranted in these patients to evaluate bone mineral density and risk of osteoporotic vertebral fracture.^{4,13} Not all patients who are diagnosed with ankylosing spondylitis exhibit initial radiographic changes, suggesting pain without acute inflammatory changes. This presentation is known as nonradiographic ankylosing spondylitis. A large population cohort had an average progression time of 5.9 years before radiographic findings were visible, resulting in a delayed diagnosis of AS.¹⁰ Novel applications of advanced imaging are emerging in the evaluation of AS. Two studies revealed that diagnostic US with power Doppler helped reveal neovascularity in response to inflammation of the SI joints^{11,12} and decreased inflammation with anti-TNF- α inhibitors.¹² A 2016 study by Hemington et al, using functional MRI and diffusion tensor imaging, found abnormal functional and structural brain connectivity with elevated CRP in AS patients. The functional connectivity between the default mode network and the salience network was strongly correlated in chronic pain of AS, whereas these networks are anticorrelated in normal individuals.²⁷ Further studies are needed to understand how these altered neuronal pathways affect patients with inflammatory chronic pain.

The management of AS may include both pharmacologic and nonpharmacologic methods. Typical pain management for AS consists of NSAIDs and TNF- α inhibitors. Early utilization and longer duration of treatment with TNF- α inhibitors has been reported to reduce radiographic progression when compared with NSAIDs in AS patients.¹⁸ Rehabilitation exercises have been associated with beneficial outcomes in AS patients. Karamanlioglu et al found that patients undergoing physical therapy and therapeutic US applied to the paravertebral musculature had significant pain reduction and improvement in emotional stress and quality of life. The authors assert that the combination of back-strengthening exercises, stretching, breathing exercises, and therapeutic US was more effective for AS patients than pain and anti-inflammatory medications.¹⁹ The authors additionally reported therapeutic US of the paravertebral soft tissues was safe for management of AS patients when used with exercise therapy. Tissue healing

was likely due to changes in collagen elasticity. In a systematic review, by Sharan et al, a 4-phase protocol for AS was proposed.²⁰ Each phase was progressively more active than passive. Phase 1 included counseling, hot packs, electrotherapy, myotherapy, mobilization, range-of-motion exercises with relaxation/breathing exercises, kinesiotaping, and sleep training. Phase 2 involved stretching, vibration therapy, aquatic exercises, postural reeducation and biofeedback. Phase 3 included aerobic conditioning, endurance/strength training, biofeedback for strengthening, Pilates, and yoga, as well as cardiovascular training. Phase 4 involved functional rehabilitation of activities of daily living, a home exercise program, and sporting activities for aerobic fitness. The major outcomes studied in this review included decreased pain and stiffness, increased chest and spine mobility, and improved physical function measurements including quality of life.²⁰ Supplemental support for AS patients may also improve symptomatology. In a Swedish study, 18 patients with AS were separated into low-dose (1.95 g) and high-dose (4.55 g) omega-3 supplement groups. This study found that high, but not low, doses of omega-3 were associated with clinical improvement in AS.²¹ A 2016 systematic review reported that the gut microbiome may serve as a therapeutic target for systemic inflammatory cytokines in rheumatic diseases utilizing diet, probiotics, fecal transplantation, or antibiotics.²² The role of chiropractic management for AS has been reported in 2 case studies in which spinal manipulation and soft tissue mobilization were utilized. Both case studies had favorable outcomes, as assessed with the Bath Ankylosing Spondylitis Functional Index, in reducing symptomatology in advanced AS.^{23,24} Additional investigation into nonpharmacologic treatment for AS is clearly warranted.

Limitation

Our case series, as with all case reports, is limited as the diagnosis and interventions cannot be generalized among all ankylosing spondylitis patients or the general population.

CONCLUSION

Our case series is valuable as it serves to remind clinicians of the varied manifestations of AS, including its inactive state. It also suggests the potential for collaborative or integrative management in select cases. A range of diagnostic imaging tools may be necessary for the diagnosis and management of AS. Pain management of these patients includes both pharmacologic and nonpharmacologic interventions. Our cases had differences and commonalities in clinical, laboratory, and imaging features. Chiropractic manipulation and rehabilitation seemed to be beneficial in reducing symptomatology and improving musculoskeletal function for these 3 patients.

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No funding sources or conflicts of interest were reported for this study.

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Practical Applications

- The case series describes the varying presentations of AS, including its inactive form.
- Chiropractic can be a part of integrative management in complex cases, such as AS.

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