

## Utilization of Spinal Manipulation in a Case of Adolescent Idiopathic Scoliosis (AIS)

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### Abstract

This study describes the utilization of spinal manipulation in a case of Adolescent Idiopathic Scoliosis (AIS). A 15-year-old female presented to the clinic with musculoskeletal back pain, and cosmetic concerns regarding progression of her scoliosis. After clinical exam and radiographic studies, an angle of 18° of Idiopathic Dextroconvex Scoliosis of the thoracolumbar spine was recognized, with obvious muscle asymmetry and body deconditioning. Spinal manipulation was utilized as primary interventional procedure for a 6-month period of treatment. Adjunctive therapies for body conditioning, such as therapeutic exercises, and nutritional counselling was suggested. By the end of the treatment plan, the magnitude of the scoliotic curve was reduced by 7°, remaining virtually unnoticeable, and asymptomatic.

### Background

Adolescent Idiopathic Scoliosis (AIS) is a three dimensional deviation of the spinal axis with unknown etiology [1]. It is defined as a lateral curvature of the spine occurring at or near puberty, diagnosed by the presence of a curvature greater than 10° measured by a Cobb method angle on a standing anteroposterior (AP) plain radiograph [2,3]. Roughly, AIS accounts for 80% of all the different proposed etiologies of scoliosis: neuromuscular, hormonal, congenital and idiopathic [3]. Scoliosis is called idiopathic when no other disease can be identified as a causative agent [4]. Idiopathic scoliosis may cause severe pain, and often leads to psychosocial problems such as cosmetic issues especially in young females, causing lack of self-confidence, tendency towards depression, suicidal thoughts, and elevated alcohol consumption [5,6]. The conservative treatment of AIS is directly related to the progression of the scoliotic curve, and generally occurs in the following order: observation for progression, physical medicine and rehabilitation exercises, pharmacological treatment with symptoms management, bracing, and surgery [4]. Clinicians should focus attention upon early detection and appropriate pain management, rather than aiming reduction of the curvatures [7]. Yet, if the diagnosis is detected early enough, and the curvature appears to be functional in origin (muscle/posture related), curvature reduction may be a reasonable treatment goal for consideration, if this definitive cause can be ascertained [8,9]. Therefore, the purpose of this study is to report successful results with non-pharmacological pain management, and scoliotic curvature reduction utilizing spinal manipulation and adjunct therapies, in a case of adolescent idiopathic scoliosis. It is also important to enhance awareness to spine care clinicians regarding the utilization of spinal manipulation and adjunctive therapies in the management of scoliosis, and musculoskeletal pain.

### Case Presentation

This is a case of a 5'4" (165 cm), 127lb (58 kg) 15-year-old female, who presented with musculoskeletal back pain, and associated abnormal spinal curvature. Past medical history was unremarkable.

She was greater than 2 years post menarchal status and had no medical problems. Clinical exam and full spine radiographs revealed 18° of dextroconvex thoracolumbar scoliosis with right-sided muscle asymmetry, core deconditioning, right-lower pelvic unleveling, and associated biomechanical motion restrictions of the thoracolumbar spine. Current radiographs were compared with prior radiographs from two years earlier, and both films demonstrated an augmentation of the scoliotic curve by 7° degrees. Additionally, the patient's current Risser's score was evaluated as stage two. Neurological and cardiovascular assessments were intact. Complete blood count, erythrocyte sedimentation rate, and a C-reactive protein measurement were found to be within normal limits. There were no systemic symptoms, nor major deficits upon clinical exam or diagnostic studies. Therefore, without the presence of the previous factors, there was no need for immediate concern, and the clinical diagnosis of Adolescent Idiopathic Scoliosis (AIS) was recognized.

### Differential Diagnosis

This was the case of a young female, with musculoskeletal back pain, scoliotic curvature, and cosmetic concerns. In cases like this, it is prudent to consider differential diagnosis related to bone growth disorders, spinal tumors, sickle cell crisis, and infections [10]. In the presence of systemic symptoms, night time pain, neurologic indicators, self-imposed activity limitations, fatigue, and changes in behaviour, additional studies and co-management with a specialist should be considered [11]. Such factors should warrant immediate re-evaluation, and consideration of additional studies, such as computed tomography, magnetic resonance imaging, and bone scan if appropriate [12].

### Treatment and Results

The initial treatment for AIS is usually observation for the progression of the curvature. In this case, the evidence of an unstable curvature was already established by a 7° augmentation in two years. The risks of no treatment were significant, considering the progression of the curve, the behavioural changes, and the painful symptoms

presented by the patient. Therefore, it was chosen initially to manage this case with spinal manipulation, therapeutic exercises and nutritional counselling, focusing on non-pharmacological pain management, muscle re-conditioning, but also aiming possible reduction of the curvature, considering its early detection. This patient followed a six-month plan with spinal manipulation as primary interventional procedure, and at-home adjunctive body exercises/reconditioning, and nutritional counselling focusing on muscle development. Regular swimming and Yoga or Pilates was suggested, for complementary reinforcement treatment. At the end of the six-months treatment plan, a new set of radiographs were taken demonstrating 7° reduction of scoliotic curvature, remaining virtually unnoticeable. The patient was asymptomatic, and with significant improved body conditioning. After one-year of follow-up, there was no evidence of progression of the curvature, the patient remained asymptomatic and compliant with body conditioning program.

## Discussion

Current research shows minimal guidance regarding the treatment approach for AIS. Observation and non-surgical approaches are always considered first line, but there is not enough emphasis on such models [4]. Spinal manipulation providers claim that this procedure can correct scoliosis [7]. Literature remains controversial, but is clear that appropriate differential diagnosis and early detection is the key for effective treatment, and improvements in quality of life [13]. Furthermore, there is not enough emphasis in similar cases, regarding the importance of the psychological issue involved with visual postural deformity with young females, and such topic should always be addressed, and considered as a valid treatment goal, with appropriate co-management if necessary [5,6]. Several similar studies reinforce the importance of spinal manipulation alone [8], or in addition to cranio-sacral therapy [14], exercises and adjunctive therapies [13], as an appropriate method for non-pharmacological pain management of musculoskeletal pain resulted from scoliosis. There are also significant results in similar cases with reduction of curvatures, and maintenance on body conditioning with overall no progression of symptoms, or scoliotic curves with utilization of spinal manipulative treatment (SMT) [15,16]. In addition, there is growing evidence supporting the utilization of physical activity, i.e., Yoga or Pilates, for conservation of appropriate muscle balance in patients with scoliosis, core deconditioning, and musculoskeletal back pain [17]. Evidence-based clinical guidelines [18] recommend the utilization of spinal manipulation in the treatment of musculoskeletal pain with intended goal or effect on positive symptomatic relief, and objective measurable gains in functional improvement (i.e., improvements in outcome assessment scores for pain, function, or behavioural components, reduction of curvature, or limiting progression in case of scoliosis, facilitate progression in the patient's therapeutic exercise program, and return to productive activities) [18]. Although this is the report of only one case, this option should be considered, as it is much less aggressive, and without the risk of disability caused by surgery. Spinal manipulation and adjunctive therapies can be useful for treating scoliosis with associated cosmetic concerns, and musculoskeletal pain.

## Summary

• Spinal manipulation may be an effective non-surgical option for non-pharmacological pain management of musculoskeletal pain associated with scoliosis. Although SMT it is still a controversial intervention in cases of AIS, in this case it was followed evidence

based clinical guidelines, with an excellent clinical course and positive outcome.

- Reduction of the scoliotic curvature with the utilization of spinal manipulation and adjunctive therapies may be of successful result, if diagnosis is detectable early.
- It is essential to recognize the importance of cosmetic concerns, and psychological changes associated with scoliosis in young females, and always address this as a valid treatment goal, with appropriate co-management if necessary.
- It is crucial to consider differential diagnosis related to back pain in children and adolescents. In the presence of systemic symptoms, night time pain, neurologic indicators, self-imposed activity limitations, fatigue, and changes in behaviour, additional studies and co-management with a specialist should be considered.
- It is the author's opinion that this case is considered educational and worthy in the field of spine care to consider such treatment intervention as a reasonable and valuable option in patients suffering from AIS.

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