



A Case Report: Overview of Idiopathic Scoliosis in Adolescent Female

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ABSTRACT

Introduction. Adolescent Idiopathic Scoliosis (AIS) is the most common form of scoliosis, affecting children aged 10 to 18, characterized by a lateral curvature of the spine with an unknown etiology. This case report aimed to present overview and management of adolescent idiopathic scoliosis.

Case Presentation. A 15-year-old female presented with shoulder and waist asymmetry and occasional lower back pain. Physical examination revealed asymmetry and a right thoracic prominence. Radiographs confirmed a 28-degree right thoracic curvature, leading to a diagnosis of AIS.

Conclusion. The patient was managed with observation and physical therapy, with bracing considered if progression occurs. Regular follow-up is crucial to monitor curve progression and adjust the treatment plan accordingly.

Keywords: Idiopathic, Scoliosis, Adolescent, Management

BACKGROUND

Scoliosis comes from Greek which means curve, meaning a pathological condition. Scoliosis is defined as a lateral curvature of the spine that has a Cobb angle of more than 10°. This abnormal curvature can occur due to congenital abnormalities, bone formation abnormalities or neurological disorders, but in some cases it is idiopathic. Vertebrae are an important part of the body and have many functions. The spine or vertebral column is located in the central or posterior part of the body. The spine is very necessary for forming body structure, flexibility, support and movement of the body. Movement by attaching to the muscles in the back, which are in the posterior part of the ribs. The spine also functions to cover and protect the bone marrow.¹

Scoliosis is a spinal deformity that describes lateral and rotational deviation of the vertebrae. About 80% of scoliosis is idiopathic. Idiopathic scoliosis with a curve of more than 10 degrees is reported with a prevalence of 0.5-3 per 100 children and adolescents. The reported prevalence of a curve of more than 30 degrees is 1.5-3 per 1000 population. The incidence of infantile idiopathic scoliosis varies, but is reported to be more common in Europe than North America, and in more males than females.³

The most common form of scoliosis is trypantal deformity with lateral, anterior posterior and rotational components. Scoliosis can be divided into two, namely structural and non-structural (postural) scoliosis. In postural scoliosis, the deformity is secondary or as compensation for some condition outside the spine, for example with short legs, or pelvic tilt due to hip contracture, if the patient sits or is flexed the curve disappears. In structural scoliosis there is irreversible deformity in the affected spinal segments. An important component of the deformity is vertebral rotation; The spinous processes rotate towards the concavity curve. Structural scoliosis can be divided into three main categories, namely congenital, neuromuscular, and idiopathic scoliosis.⁴

Scoliosis can be found on physical examination or radiological examination. The incidence of scoliosis ranges from infants to adults. However, what is most often found is that in adulthood there are complaints due to scoliosis that has not been detected since birth and adolescence.²

Radiographs are performed to confirm the diagnosis of scoliosis (which is made on a clinical basis), to exclude underlying bone segmentation abnormalities, to assess the severity of the curvature, to monitor the progression of the curvature (which is done by measuring the index), to assess skeletal maturity by noting opification of the iliac apophysis, to evaluate cardiac anomalies and associated lungs, and to assess patient follow-up and to evaluate complications during and after surgery.^{5,6}

Scoliosis is a common spinal disorder. The incidence rate depends on the angle of curvature formed. The most frequently found cause is still idiopathic. And scoliosis that occurs in children is more severe than in adults. This occurs because the progression of spinal curvature growth in children occurs more quickly. In addition, the incidence of scoliosis also increases in people who have neuromuscular disorders or other predisposing factors.⁷

The prevalence of scoliosis worldwide reaches 1% of the population. Scoliosis affects 2-3% of the population in the US or around 7 million people. 2 Most scoliosis is diagnosed in children aged 10 to 15 years. In 2004, based on data from The American Academy of Orthopedic Surgeons, around 1.26

million patients with spinal problems were seen in health services, 93% of whom were diagnosed with scoliosis. 85% of scoliosis patients have idiopathic scoliosis, 60-80% of idiopathic scoliosis cases occur in women.⁸

A typical characteristic of scoliosis patients is a tall body posture. Adult woman with scoliosis as a teenager with thoracic curvature to the right. Scoliosis affects men and women, but not in the same ratio. Spinal curvature is often found in the thoracic or thoracolumbar area and in most cases it often curves to the right. The difference in incidence between men and women is related to the degree of curvature. However, in patients with spinal curvature of 25° or more, it often occurs in women.⁷ Infantile idiopathic scoliosis or idiopathic scoliosis in babies is often found at the age of 6 months and occurs mostly in males and of European descent. The curvature often occurs in the thoracic spine and curves to the left. In most cases, the curvature can be treated by the age of 3 years. Scoliosis in infants accounts for only 0.5% of all idiopathic scoliosis in the United States and 4% to 5% in European countries.³ Juvenile idiopathic scoliosis or scoliosis in children is almost the same as in adults. Women are more affected by this type. The curvature of scoliosis in children is often to the right. Because of the high rate of progression of curvature and the need for surgery, this type of scoliosis is called the malignant subtype of adolescent idiopathic scoliosis.³

CASE PRESENTATION

A 15 year-old female came to hospital polyclinic with main complaint of her concerns as she felt and saw noticeable asymmetry in her shoulders and waist, as well as occasional back pain. Patient's mother noticed that her daughter had uneven shoulders about six months ago. She also started experiencing mild, intermittent lower back pain, particularly after prolonged periods of standing or physical activity. There was no history of trauma, and the pain did not radiate to her legs. The patient had no significant past medical history, Up-to-date with vaccinations, no known allergies and no previous surgeries. The patient's mother had mild scoliosis, and treated non-surgically, however no other family history of musculoskeletal disorders.

From the physical Examination, the patient had height of 160 cm and weight of 50 kg. Patient's general appearance were healthy adolescent female, well-nourished and well-developed. Her Posture was Asymmetry noted in the shoulders and waistline. Examination on her spine based on Adam's forward bend test revealed a right thoracic prominence. Neurological Examination showed normal reflexes, strength, and sensation in lower extremities. The patient also had radiographic Finding, which were x-Ray and Anteroposterior and lateral radiographs of the spine were performed. It was found that in Cobb Angle, 28 degrees of right thoracic curvature. The patient was then diagnosed with Adolescent Idiopathic Scoliosis (AIS).

The management of the patient includes regular monitoring due to a Cobb angle of 28 degrees and skeletal immaturity at Risser stage 2. The patient was referred to a physical therapist for exercises aimed at improving core strength and posture. Bracing will be considered if the curvature progresses beyond 30 degrees. A follow-up appointment was scheduled in six months for repeat clinical and radiographic evaluation.

DISCUSSION

Adolescent Idiopathic Scoliosis (AIS) is the most common form of scoliosis, occurring in otherwise healthy children and adolescents without a known cause. The diagnosis and management of AIS require a comprehensive understanding of clinical presentation, diagnostic criteria, and evidence-based treatment options. This discussion will explore these aspects in relation to the case of a 15-year-old female presenting with symptoms consistent with AIS. AIS is typically diagnosed during periods of rapid growth, such as adolescence, and is characterized by a lateral spinal curvature of unknown origin.²

The following factors were instrumental in diagnosing AIS in the patient. First, The patient's primary concerns were noticeable asymmetry in her shoulders and waist, along with occasional back pain. These symptoms are frequently reported by individuals with AIS, as asymmetry in shoulder height and waistline, as well as rib prominence, can be visible signs of spinal curvature. The patient's mother first noticed her uneven shoulders about six months prior to the consultation, suggesting a gradual development of the condition. A detailed physical examination revealed asymmetry in the patient's posture, particularly in the shoulders and waistline. The Adam's forward bend test, which is a standard screening tool for scoliosis, showed a right thoracic prominence. This test is particularly useful in detecting vertebral rotation, a key feature of scoliosis. Additionally, the patient's neurological examination was normal, with intact reflexes, strength, and sensation in the lower extremities, indicating no neurological impairment.¹

Radiographic Findings are to confirm the diagnosis, anteroposterior and lateral radiographs of the spine were obtained. These radiographs showed a Cobb angle of 28 degrees with a right thoracic curvature. The Cobb angle is the most widely used measure to quantify the degree of scoliosis and assess the severity of the curvature. A Cobb angle greater than 10 degrees is indicative of scoliosis. In this case, the 28-degree curvature falls into the moderate category, necessitating further evaluation and management. Exclusion of Other Causes, AIS is a diagnosis of exclusion. The absence of trauma, neuromuscular conditions, or congenital spinal abnormalities in the patient's history supports the diagnosis of idiopathic scoliosis. Furthermore, her unremarkable past medical history, including no previous surgeries or significant illnesses, reinforces this diagnosis. The family history of scoliosis in her mother, treated non-surgically, suggests a possible genetic predisposition, as familial patterns of scoliosis have been documented in the literature.⁷

Management strategies for AIS are tailored based on the severity of the spinal curvature, the patient's age, and the risk of progression. The primary goals are to monitor the curvature, prevent progression, and address any associated symptoms. The management plan for this patient aligns with current best practices and literature recommendations, emphasizing a multifaceted approach:

1. Observation:

Regular observation is essential for patients with Cobb angles between 10 and 30 degrees, especially during periods of rapid growth. Studies indicate that curves less than 30 degrees at skeletal maturity are unlikely to progress significantly. Observation involves periodic clinical and radiographic evaluations to monitor the curvature.^{4,5}

Given the patient's Cobb angle of 28 degrees and her skeletal immaturity (Risser stage 2), regular monitoring was advised. This approach is critical during her growth phase to detect any progression of the curvature. Monitoring involves repeat evaluations at intervals, typically every 4-6 months, to track changes in the spinal curvature.⁵

2. Physical Therapy

Physical therapy is a non-invasive treatment aimed at strengthening the muscles supporting the spine, improving posture, and potentially reducing pain associated with scoliosis. Scoliosis-specific exercises have been shown to be effective in managing the condition and may help reduce the risk of curve progression. Physical therapy can enhance muscular support and improve overall spinal alignment, which is crucial for patients with AIS.⁹

The patient was referred to a physical therapist to engage in exercises designed to enhance core strength and posture. This intervention aligns with the goal of providing muscular support for the spine and alleviating discomfort. A tailored exercise program can help stabilize the spine and potentially slow the progression of the curvature.¹⁰

3. Bracing

Bracing is recommended for adolescents with Cobb angles between 25 and 45 degrees who are at high risk of progression. The BrAIST study demonstrated that bracing significantly reduces the progression of high-risk curves to the surgical threshold. Bracing aims to halt or slow the progression of the curvature during the growth phase.

Although the patient's current Cobb angle does not immediately necessitate bracing, it will be considered if the curvature progresses beyond 30 degrees. The decision to brace will be based on the rate of curve progression and the patient's remaining growth potential. Bracing can be an effective intervention to maintain the curvature below a surgical threshold until skeletal maturity is reached.

4. Follow-Up

Regular follow-up is crucial in managing AIS to monitor curve progression and adjust treatment plans as needed. Recommendations suggest follow-up intervals of 4-6 months during rapid growth periods. Follow-up appointments allow for timely detection of any significant changes in the curvature.⁹

A follow-up appointment was scheduled in six months for repeat clinical and radiographic evaluation. This interval allows for the assessment of any progression in the curvature and the effectiveness of the physical therapy regimen. If significant progression is detected, further interventions such as bracing may be considered.^{9,10}

Conclusion

The diagnosis and management of AIS in this 15-year-old female patient align with current clinical guidelines and evidence-based practices. The diagnosis was supported by clinical presentation, physical examination findings, and radiographic evaluation, with the exclusion of other potential causes. The management plan includes regular monitoring, physical therapy, and potential bracing, aiming to prevent curve progression and maintain the patient's quality of life.

Regular monitoring is essential to track changes in the spinal curvature, particularly during periods of rapid growth. Physical therapy provides a non-invasive approach to strengthen core muscles, improve posture, and alleviate discomfort. Bracing, while not immediately necessary, remains an option if the curvature progresses beyond a certain threshold. Follow-up appointments are scheduled to ensure timely intervention and adjustment of the management plan as needed.

This comprehensive, interdisciplinary approach involving orthopedic specialists and physical therapists underscores the importance of individualized care in managing AIS effectively. By addressing the unique needs of each patient, the goal is to achieve the best possible outcomes and prevent the progression of the curvature to a point where surgical intervention might be necessary.

Conflict of Interest

No potential conflict of interest relevant to this article was reported

Acknowledgements

The manuscript preparation was supported by Research and Community Services (LPPM) Universitas Andalas, Andalas University and all the sectors involved.

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