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RESEARCH ARTICLE

ADOLESCENT IDIOPATHIC THORACIC SCOLIOSIS - CASE REPORT OF A PATIENT WITH RESPIRATORY SYMPTOM

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Abstract

Respiratory function within populations of patients with thoracic scoliosis, in general, is inversely correlated with curvature magnitude, with increasing impairment as Cobb angle increases. Therefore, the proper initial management options are critical, as early failures and subsequent salvage surgery can be accompanied by significant morbidity. This is the case report with detailed history, examination of 17 years old male patient, diagnosed with idiopathic thoracic scoliosis that associated with breathing difficulty.

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Introduction:-

Scoliosis is defined as spinelateral curvature of more than 10° in the coronal plane as measured by the Cobb angle.⁽¹⁾ It is typically accompanied by a variable degree of rotation of the spinal column⁽²⁾ and classified broadly as congenital, neuromuscular, syndrome-related, idiopathic and spinal curvature due to secondary reasons.^(3,4) However, Curves with Cobb angle less than 10° are within the normal limits of spinal asymmetry and have no long-term clinical significance.⁽⁴⁾

Adolescent idiopathic scoliosis (AIS) is a common form of idiopathic scoliosis, accounting for between 80 and 85 percent of cases with unknown etiology.⁽⁵⁾ Twin and family history studies support a genetic contribution.^(5, 6) It is a worldwide problem with similar prevalence in different parts of the world.⁽⁴⁾ The prevalence of AIS with a Cobb angle $\geq 10^\circ$ is approximately 0.19 to 5.2 percent, but only 10 percent of adolescents with AIS require treatment.^(5,7) Although there is no gender predominant but the risk of curve progression (and therefore the need for treatment) is 10 times higher in females than in males.⁽⁸⁾

Patients with AIS usually come to medical attention because of truncal asymmetry noted by the patient or parents, during school-based scoliosis screening, or as an incidental finding during physical examination or on chest radiograph or other imaging test.⁽⁵⁾ Patients with severe thoracic curves (Cobb angle $\geq 70^\circ$) may present with restrictive pulmonary disease,^(9, 10) but curves of this severity usually have onset before age 10 years (i.e. infantile or juvenile idiopathic scoliosis).^(5, 11) Patients with idiopathic scoliosis also may have obstructive lung disease; in a retrospective review of 176 patients with idiopathic scoliosis and Cobb angle $\geq 40^\circ$, 39 percent had obstructive lung disease.⁽¹²⁾

This report documents improved chest wall function and resolution of respiratory symptoms in response to surgical approaches in 17 years old male patient, diagnosed with idiopathic thoracic scoliosis.

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Report of the case:**Clinical presentation and history:**

17-year-old male patient presented to orthopedic clinic without medical history of chronic diseases or congenital abnormalities. He suffered from right rib hump for two years associated with difficulty of breathing. The patient lived in a rural area, never suffered from asthma or seasonal allergy. He never smoked, and used to be away of smokers and smoking area due to his sensitivity to secondhand smoke..

Examination:

On examination, he was conscious and alert with normal and stable vital signs. Locally, there was no skin changes or discoloration. Upon the Adams forward bend test, there was obvious right rib hump with different shoulder level (Right higher than left). There was normal abdominal reflex with no truncal shift or pelvic tilt.

Investigations and Procedure:

Initial X ray radiographs (**Figure 1**) and CT scan (**Figure 2**) revealed that there was right side thoracic scoliosis with Cobb angle 80 degree. Pulmonary function was normal. The patient was advised to undergo surgery to prevent possible future negative impacts of the long-term signs and symptoms of scoliosis upon his health.

Patient underwent posterior spine fusion under neuromonitor and O arm with correction and fusion from T2 to L2 by using pedicle screws. During the operation and as a part from the positioning to aid the correction, the skull traction with 5 kg and bilateral lower limbs skin traction had used instead of femoral skeletal traction. However, there was a good correction after posterior column osteotomy and three ribs thoraco-plasty. (**Figure 3**)

Postoperative Management and Follow-up:

Following the surgery, the patient developed right foot drop (power of Right L4 and L5: 1/5 with normal sensory distribution) most likely from the pressure of the skin traction over the common peroneal nerve. The patient admitted to ICU 10 days for observation, Ankle foot orthosis applied to right lower limb to improve the peroneal neuropathy. However, this condition was reversible by using the ankle foot orthosis and physiotherapy.

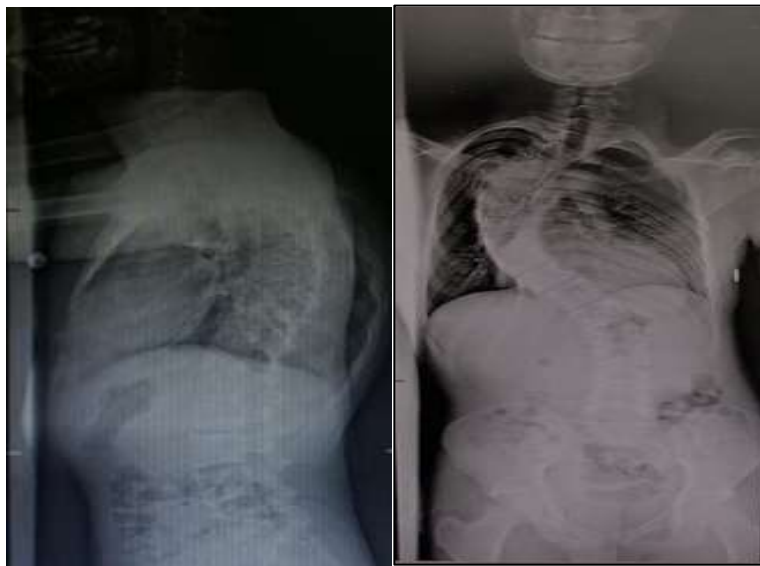


Figure 1- : x ray radiograph showing right side thoracic scoliosis.
Lenke Classification type 2A-n



Figure 2:- CT scan showing lateral curvature of the spine at thoracic section.

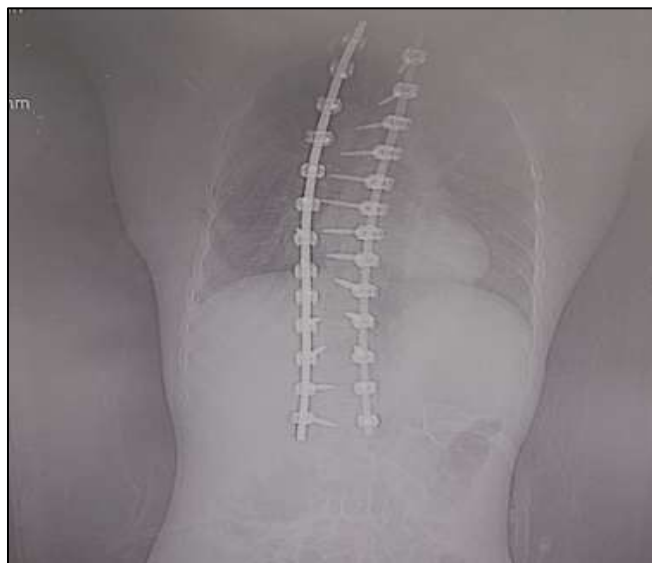


Figure 3:- Post-operative X-ray and fused spine with hook and screw construct.

Discussion:-

The negative impact of thoracic spinal deformity on respiratory function is a major concern in patients with thoracic scoliosis.^(13, 14) AIS affects pulmonary function by decreasing the volume and compliance of the lung parenchyma.⁽¹⁵⁾ The present case suffered from right rib hump for two years associated with difficulty of breathing although his pulmonary function was normal thus supported by previous study that showed the spirometry and functional capacity restrictions are not correlated with the degree of spinal curvature in adolescents with mild AIS.⁽¹⁶⁾

There are many studies showed that chest cage rigidity of thoracic scoliosis may contribute to pulmonary function deficits in scoliosis patients, increases with age, could in part account for the observation that respiratory failure can occur in adult IS patients even when there is no progression of the curvature.^(15,16) Yet in recent years some spine surgeons have argued that, with the exception of cases diagnosed before the age of five years and with a Cobb angle of >100 degrees, IS patients suffer from 'no functional limitations' and that, moreover, the improvement of 'appearance and deformity with all its social and psychological deprivation is the only indication for treatment'.^(15,17)

In context of treatment, the goal of the treatment is a curve with a Cobb angle of <40° at skeletal maturity. Natural history studies indicate that curves <40° do not progress after skeletal maturity.^(18,19) Options for treatment of AIS include observation, bracing, and surgery.^(19,20) Observation includes clinical and radiographic follow-up which is recommended for patients with AIS and Cobb angle <40°. On other hand, the bracing used to be indicated for skeletally immature patients with AIS, many studies concluded that bracing reduces the risk of curve progression to ≥50° (the usual threshold for surgery) at skeletal maturity.⁽²⁰⁾ The efficacy of bracing is directly related to the

number of hours per day that the brace is worn. Physical therapy or exercise programs have been increasing in popularity, but the evidence for their efficacy is limited.^(21,22)

Moreover, the surgical correction of scoliosis is another option of treatment that is indicated for skeletally mature patients with Cobb angle $\geq 50^\circ$ and skeletally immature patients with curves with Cobb angle $\geq 50^\circ$.⁽²⁰⁾ However, the primary goal of surgical treatment of AIS is prevention of curve progression through spinal fusion, which may be performed posteriorly or anteriorly.^(23,24) The surgical treatment plan of the present case was indicated to surgical correction as he had thoracic scoliosis with Cobb angle of 80° , he underwent to posterior column osteotomy and three ribs thoraco-plasty with posterior fixation through pedicles screws.

Conclusion:-

Scoliosis is a deviation of the spine consisting of lateral curvature and rotation of the vertebrae. While scoliosis is associated with many diagnoses, the vast majority of patients encountered are idiopathic in nature. Mild pulmonary and functional restrictions requires immediate intervention to prevent further deterioration. The treatment for idiopathic scoliosis is based on age, curve magnitude and risk of progression, and includes observation, orthotic management and surgical correction.

Ethical consideration:

The patient was informed that data from the case would be submitted for publication, and he gave his consent.

Conflicts of interest:

None.

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