
# Surgical correction of idiopathic scoliosis in adolescents using pedicle screws

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ABSTRACT

This study analyzed the method of surgical treatment of idopathic scoliosis in adolescents. All patients underwent surgery to correct idiopathic scoliosis using pedicle screws. 205 patients were operated on. All patients had good and satisfactory results.

**Keywords:** Idiopathic scoliosis in adolescents, spinal column, pedicle screw.

Scoliosis is a complex volume deformity of the spine characterized by a lateral deviation of at least 10 degrees with rotation of the vertebrae and is usually associated with a decrease in the normal kyphotic curvature of the spine (hypokyphosis).

The prevalence of AIS is related to geography. AIS is more prevalent in areas located at high northern latitudes than in regions of lower latitude 2 . A 2010 meta-analysis calculated the global prevalence of AIS using 36 studies from 17 countries that had evaluated scoliosis screening 3 (FIG. 3). The global pooled prevalence of spinal curves of ≥10 o was 1.34% (95% CI: 0.98–1.70%). However, the prevalence might have varied across studies and countries. For instance, a prevalence range of 0.7–7.5% was found for Spain, in North America this range was 0.4–3.9%, in Asia the range was 0.4–2.5%, in Israel the prevalence was estimated to be 0.1%, the Middle East had a rate of 1.9% and the reported prevalence in Australia was 1.9%. In addition, the pooled prevalence of spinal curves of ≥20o, which defines patients in need of clinical follow-up care, was 0.22% (95% CI: 0.15–0.30%) and the prevalence of individuals who had been treated for scoliosis using either or both a back brace or surgery (95% CI: 0–0.13%).

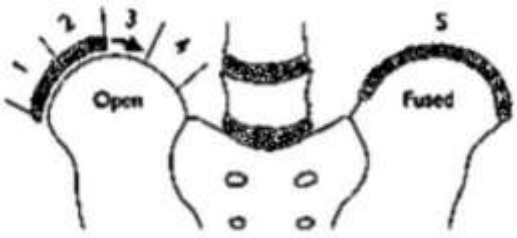
**Etiology:** The current consensus for adolescent idiopathic scoliosis (AIS) states that it has a multifactorial etiology with genetic predisposing factors. Numerous theories continue to cover a wide range of plausibility in the etiopathogenesis of PJI. To date, the literature has focused on genetic connections, metabolic and hormonal disorders, growth asymmetries, changes in the central nervous system, and mechanical and connective tissue abnormalities.

The development of scoliotic deformity has been consistently reported in chickens undergoing pinealectomy, suggesting melatonin deficiency as a possible cause. Others note that mean blood melatonin concentrations are significantly lower in animals with scoliosis compared to animals without it. A study of 30 ISP patients with progressive scoliosis showed a 35% decrease in melatonin levels overnight compared to controls. Despite these earlier studies suggesting that a defect in melatonin synthesis or metabolism may contribute to scoliosis, others have not been able to replicate these results.

Calmodulin has also previously been implicated in the etiology of scoliosis. Elevated platelet levels have been shown to be associated with PJI progression. Cohen et al. suggested that platelet calmodulin levels may be a better predictor of curve progression after finding a 2.5- to 3-fold increase in calmodulin activity in patients' platelets. with PIS. Lowe et al. also showed a direct relationship between higher platelet levels of calmodulin and progression of the curve.

The problem of spinal deformities in children is one of the most important sections of orthopedics. In addition, existing methods of treatment do not always give the desired result. Therefore, at the current stage of development of medicine, it is necessary to introduce modern technologies using the experience of treating children with scoliosis abroad.

Patients with PJI with an immature skeleton are at the highest risk for curve progression. For patients with curves with a Cobb angle <20°, watchful waiting is appropriate, while bracing is appropriate if the curve progresses to a Cobb angle >20°). The role of physiotherapy alone or in combination with bracing remains controversial. The goal of fixation is to prevent the deformity from progressing to a surgical grade, defined by a Cobb angle ≥ 50° in the thoracic region, before the patient reaches skeletal maturity. At this time, the risk of progression of the curve and therefore the risk of surgery is greatly reduced. The assessment of growth potential is assessed using the Risser scale. Risser's symptom refers to the degree of calcification of the human pelvis as a measure of maturity. On a scale of 1 to 5, it is based on the extent of ossification progression on a pelvic x-ray. Grade 5 indicates skeletal maturity. In all cases, the risk of progression of curvature in women is 10 times higher than in men.




**Surgical treatment.**

To date, the surgical options and goals of surgery in patients with PIS remain the same. In general, immature skeletal patients with a curvature of 40–50° or mature skeletal patients with a curvature greater than 50° should be treated with surgery.

In 2015-2022, only 205 patients with scoliotic deformity of the spine were operated on in the department of congenital skeletal deformities of the Republican Scientific and Practical Center for Healthcare of the Ministry of Health of the Republic of Uzbekistan. Of these, 86 boys, 119 girls Age of patients from 12 to 18 on average All patients underwent correction of spinal deformity using a modern CDI system.

The operation is performed as follows: In the position of patients on the stomach, an incision is made along the line of the spinous processes from the level of the Th3-L3 vertebrae. Skeletonization of the posterior bone structures is carried out along the access from both sides relative to the line of the

spinous processes. The supraspinous and interosseous ligaments are removed. In the bodies of the lumbar vertebrae, bone channels are formed on both sides for the installation of pedicle screws. In the bodies of the thoracic vertebrae, bone channels are formed for the installation of pedicle screws. X-ray control is performed in 2 projections, after it is determined that the position of the markers in the vertebral bodies is correct. Transpedicular screws are installed through the formed channels along the curvature arcs. In most cases, laminar hooks are placed on both sides of the upper thoracic vertebrae. Pedicle hooks are installed. On the left side, relative to the line of spinous processes, the supporting elements are connected by a rod. The rod is rotated by 90 degrees and the derotation effect of the vertebrae is achieved. The supporting elements are stabilized on the rod. After that, the rod is installed from the opposite side, by direct pressure in the thoracic spine, this achieves derotation of the vertebrae, segmental contraction of the supporting elements is given. After a positive wake-up test, the system finally stabilizes. A posterior spinal fusion is performed.

**Clinical example:**

**Patient A., 16 years old. Admitted to the clinic on 12/12/2021. The operation was performed according to the above method on 12/14/2021. On fig. 1 shows the radiograph and photo of the patient before surgery**

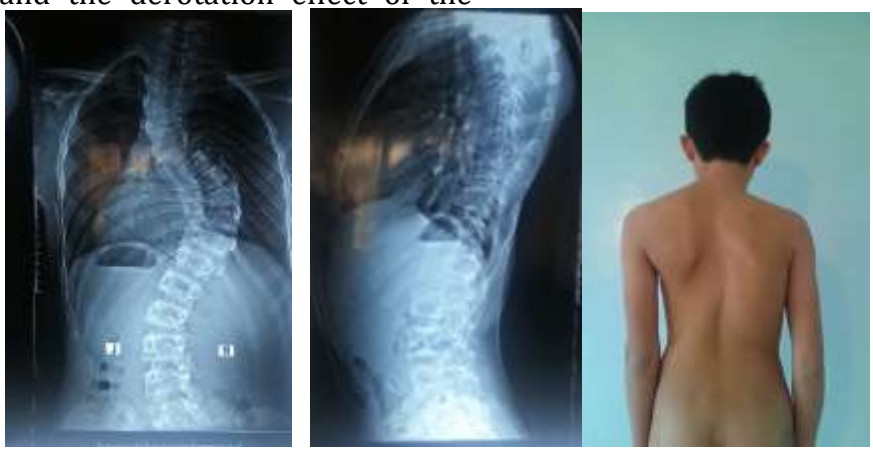


**Fig.1. X-ray and photo of patient A., before surgery.**

Laying the patient and preparation was performed according to the above method. At the stage of correction: in the vertebral bodies from L2, L1, Th12, Th5, Th4, bone channels were formed on both sides for the installation of transpedicular screws. Bone channels were formed in the vertebral bodies of Th6 on the right for the installation of pedicle screws. Transpedicular screws were installed through the formed channels along the curvature arcs. An infralaminar hook was also placed on the left side of the Th6. On the left side, relative to the line of spinous processes, the supporting elements are connected by a rod. The rod was rotated by 90 degrees and the derotation effect of the vertebrae was achieved. The supporting elements were stabilized on the rod. After that, the rod was installed on the opposite side, derotation of the vertebrae was achieved by direct pressure in the thoracic spine, segmental contraction of the supporting elements along the rod was given. The rods are connected by 2 connectors. The awakening test was positive. The system is finally stabilized. Posterior fusion. Was left drainage to the postoperative bed. Layered suture of the wound. Aseptic bandage.

On fig. 2 shows a photo and x-ray images of the same patient after surgery using the above technology. After awakening, movements in the lower extremities were preserved

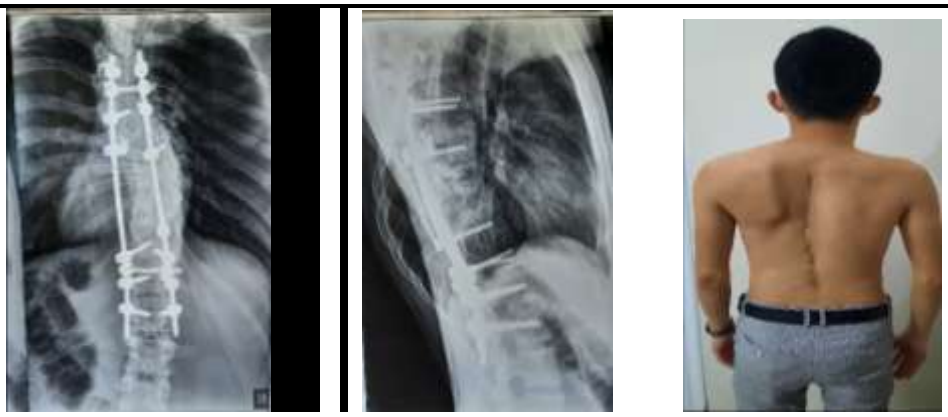


Fig. 2. Photo and radiograph of patient A., after 6 months.

**Conclusion:** In a number of cases, posterior fusion surgery alone has been found to treat severe thoracic ICP. Luhmann and Lenke compared combined treatment (anterior and posterior fusion) with posterior fusion only for severe HAI. They concluded that patients who received only pedicle screws had similar outcomes to those who presented to the combination person (60.7 vs 58.5%).

A similar study by Dobbs et al. evaluated fusion outcomes for ISI curves >90 degrees. They found non-statistically significant differences between groups (combined anterior/posterior fusion or posterior fusion alone) by sex, age, number of fused levels, preoperative coronary/sagittal Cobb measurements, flexibility coronary arch or volume of postoperative coronary Cobb correction.

Improvement in lung function has been reported in patients with PJI treated with a brace or surgery, and this improvement was maintained in most patients up to 25 years after treatment.

**References:**


1. Корж, Н.А. Хирургическое лечение ювенильного идиопатического сколиоза.// Хирургия позвоночника. 2009. - № 3. - С.30-37.
2. Прудникова, О.Г. Хирургия деформаций позвоночника у взрослых:актуальные проблемы и подходы к лечению// Гений ортопедии. 2015. - № 4. - С. 94 - 102.
3. Anastassios C. Koumbourlis. Scoliosis and the respiratory system. PAEDIATRIC RESPIRATORY REVIEWS (2006) 7, 152–160;
4. Cilli K, Tezeren G, Taş T, et al. School screening for scoliosis in Sivas, Turkey. Acta Orthop Traumatol Turc 2009; 43: 426-30;
5. Cotrel Y., Dubousset J., Guillaumat M. New universal instrumentation in spinal surgery. Clin. Orthop. 1988; (227): 10-29.
6. DAGMAR REICHEL and JULIANE SCHANZ Developmental psychological aspects of scoliosis treatment PEDIATRIC REHABILITATION, 2003, VOL. 6, NO. 3–4, 221–225
7. Jack C. Cheng, René M. Castelein, Winnie C. Chu Adolescent idiopathic scoliosis.//PRIMER,2015 VOL 1, 1-20.
8. Muhammad Naghman Choudhry, Zafar Ahmad and Rajat Verma Adolescent Idiopathic Scoliosis// The Open Orthopaedics Journal, 2016, 10, 143-154.
9. Firoz Miyanji Adolescent idiopathic scoliosis: current perspectives //Orthopedic Research and Reviews 2014:6 17–26
10. Kholov Z. S., Saliev M. M. and *Kadirov S. S SURGICAL TREATMENT OF IDIOPATHIC SCOLIOSIS IN ADOLESCENTS// EUROPEAN JOURNAL OF PHARMACEUTICALAND MEDICAL RESEARCH 2021, 8(6), 23-26