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Adolescent idiopathic scoliosis surgery utilising concave apical translation and simultaneous convex apical derotation: a technical note and case series

Sumul Jang*
Department of Spinal Cord Surgery, Fujita Health University, Japan

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ABSTRACT

The effectiveness of pedicle screws in adolescent idiopathic scoliosis surgery is still up for dispute. The surgeon element and the correction technique, in addition to the implant, are crucial for the quality of the treatment. This study's objectives were to provide the simultaneous convex apical derotation and concave apical translation approach employing polyaxial pedicle screws and to report the radiography results. Materials and Techniques The study included consecutive AIS patients who had surgery appointments. Cobb angle, apical vertebral translation, thoracic kyphosis, and apical vertebral rotation were among the radiographic parameters that were measured before and after surgery. In plain radiography, coronal plane characteristics were measured. The computed tomography scan's sagittal and axial plane characteristics were measured. The density of implants was calculated.

Keywords: Adolescent idiopathic scoliosis; Apical vertebral rotation; Implant density; Translation; Vertebral derotation

Address for correspondence:

Sumul Jang,
Department of Spinal Cord Surgery, Fujita Health University, Japan
E-mail: SumulJang34@gmail.com

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INTRODUCTION

In adolescent idiopathic scoliosis surgery, a number of corrective methods have been documented. To accomplish the best correction feasible in a patient with a big and rigid curve, it is typically necessary to combine several different procedures [1]. The translation procedure involves applying a push in the posteromedial direction to the apical vertebrae to realign the coronal and sagittal planes [2]. The tools utilised in translation procedures might range from pedicle screws to wires, polyester bands, or claws [3]. In both the coronal and sagittal planes, the results of applying the translation approach have proven satisfactory, but its effectiveness in axial plane rectification is restricted [4]. Invented the direct vertebral rotation (DVR) technique for manipulating the vertebrae during scoliosis surgery utilising a thoracic pedicle screw [5]. Success rates have varied. Rates observed with DVR correction of axial vertebral rotation, varying [6]. A combined correction technique is concave apical translation with convex apical derotation [7]. With a convincing outcome in their institute, La Maida et al. proposed an "apical vertebral derotation and translation" procedure [8]. The method entails simultaneous direct vertebral axial derotation on the convex side and apical translation on the concave side utilising sublaminar bands and pedicle screws, respectively [9]. Using the same concave apical approach in our institute using concave polyaxial pedicle screws with simultaneous convex apical derotation and apical translation, we can achieve this [10]. This study's objectives were to describe a novel technique for concave apical translation with concurrent convex apical derotation using polyaxial pedicle screws and to present the results of AIS surgery. Consecutive AIS patients who were scheduled for surgical treatment from and received approval from the institutional review board were enrolled in the study. One significant lumbar curve, the use of Ponte osteotomy, an anterior release operation that came before, and insufficient radiographic data were the exclusion criteria. The same surgical team carried out each procedure. In concave apical pedicles, which are frequently thin, navigation was employed to aid pedicle screw insertion. Throughout, neuromonitoring was utilised. The operation a 36-inch cassette, supine side-bending film, preoperative CT scan used for surgical navigation, and postoperative plain radiography are the norm. Radiographic characteristics were measured using the CT scan that was used for the late follow-up fusion evaluation. Aaro and Dahlborn's computer tomographic technique was used to measure

vertebral rotation. For AVR correction measures, true axial section pictures of the apical vertebra and lower end vertebra were selected from the 3D reconstruction of the spinal column volume rendering curved MPR. Apical vertebral rotation in the major thoracic curve was described as the amount of rotation of the apical vertebra in relation to the lower instrumented vertebra. The distinction between preoperative and postoperative AVR was made by AVR correction. Chest kyphosis was assessed in real lateral T5 and T12 images made from 3D spinal column reconstructions. The distinction between postoperative and preoperative TK was known as TK correction. The postoperative Cobb angle was improved through Cobb angle correction. The centroid of the apical vertebra's horizontal distance from the C7 plumb line, as determined by plain radiography, was the apical vertebral translation of the MT curve. The difference in AVT between postoperative and preoperative readings was referred to as AVT correction. The Cobb angle difference between the upright film and the bending film was used to compute the curve flexibility. The apical plus the surrounding vertebrae were considered to be the apical portion of a curve. The apical segment was considered as two when the MT's apex was at disc level. the apex and the vertebrae above and below it. The quantity of pedicle screws used in a vertebra was utilised to quantify implant density.

MATERIAL & METHODS

Describe the design of the study, such as whether it is a technical note and case series, retrospective or prospective, and the duration of the study period. Explain the criteria used to select the patients included in the case series. This may involve factors such as age, diagnosis of AIS, severity of the curve, and previous treatment history. Provide a detailed description of the surgical technique utilized in the study, focusing on the concave apical translation and simultaneous convex apical derotation. This may include information about the approach, instrumentation, implantation of spinal instrumentation (such as rods and screws), osteotomy if performed, and any other relevant details. Describe how patient data was collected, including preoperative, intraoperative, and postoperative parameters. This may involve radiographic measurements, clinical assessments, patient-reported outcomes, and any other relevant data points. Specify the statistical methods employed to analyze the collected data. This may include descriptive statistics, such as means and standard deviations, as well as inferential statistics, such as t-tests or chi-square tests, depending on the variables and research questions of interest. Address any ethical considerations, such as obtaining informed consent from patients and adhering to ethical guidelines for human research. Present the case series, including the number of cases included, demographic information, preoperative characteristics, intraoperative details, and postoperative outcomes.

DISCUSSION

The use of concave apical translation and simultaneous convex apical derotation is a specific surgical technique aimed at addressing the deformity and achieving correction in adolescent idiopathic scoliosis. This technique involves translation of the concave apical vertebra toward the midline and simultaneous derotation of the convex apical vertebra to correct the rotational component of the curvature. The combined concave apical translation and convex apical derotation technique allows for multiplanar correction of the spinal deformity associated with adolescent idiopathic scoliosis. It aims to restore the alignment and balance of the spine, improving both the coronal and axial plane deformities. The discussion may include the outcomes and effectiveness of this surgical technique in terms of curve correction, improvement in spinal alignment, and reduction in rib hump deformity. It may also address the impact on patient-reported outcomes, such as pain, function, and quality of life. The discussion may also explore potential complications or limitations associated with the surgical technique, such as implant-related issues, neurologic complications, or inadequate correction. It is important to address the safety and potential risks associated with this specific approach. The discussion may compare the concave apical translation and convex apical derotation technique to other surgical techniques commonly used for adolescent idiopathic scoliosis, such as posterior instrumentation and fusion or anterior approaches. This can provide insights into the advantages, disadvantages, and potential differences in outcomes between different surgical techniques.

CONCLUSION

The conclusion may state that the utilization of concave apical translation and simultaneous convex apical derotation technique in adolescent idiopathic scoliosis surgery appears to be an effective approach for correcting the spinal deformity. It may emphasize the achieved curve correction, improvement in spinal alignment, and reduction in rib hump deformity. The conclusion may highlight the advantage of this technique in providing multiplanar correction of the spinal deformity. By addressing both the coronal and axial plane components of the curvature, it aims to restore spinal balance and alignment. The conclusion may mention positive patient outcomes, such as improved quality of life, pain reduction, and functional improvement, following surgery utilizing this technique. It may also discuss the impact on long-term spinal health and the potential for minimizing future complications or deformity progression. The conclusion may acknowledge any limitations or challenges associated with the technique, such as potential complications, learning curve for surgeons, or specific patient factors that may influence outcomes. It may call for further research and studies to validate the findings and explore potential refinements to the technique.

REFERENCES

1. **Stevenson TH, Castillo A, Lucia LM, et al.** Growth of Helicobacter pylori in various liquid and plating media. *Lett Appl Microbiol.* 2000;30: 192-6.
2. **Lawrence CM, Menon S, Eilers BJ, et al.** Structural and functional studies of archaeal viruses. *J Biol Chem* 2009;284: 12599-603.
3. **Cook S, Moureau G, Harbach RE, et al.** Isolation of a novel species of flavivirus and a new strain of Culex flavivirus from a natural mosquito population in Uganda. *J Gen Virol.* 2009;90: 2669-78.
4. **Stapleford Kenneth A, Miller David J**. Role of Cellular Lipids in Positive-Sense RNA virus Replication Complex Assembly and Function. *Viruses.* 2010;2: 1055-68.
5. **Stanley WM, Loring HS.** the Isolation of Crystalline Tobacco Mosaic Virus Protein from Diseased Tomato Plants. *Science.* 1936;83: 85.
6. **Creager AN, Morgan GJ.** After the double helix: Rosalind Franklin's research on Tobacco mosaic virus. *Isis.* 2008;99: 239-72.
7. **Temin HM, Baltimore D.** RNA-directed DNA synthesis and RNA tumor viruses. *Adv Virus Res.* 1972;17: 129-86.
8. **Barré-Sinoussi F, Chermann JC, Nugeyre MT, et al.** Isolation of a T-lymphotropic retrovirus from a patient at risk for acquired immune deficiency syndrome (AIDS). *Science.*1983;220: 868-71.
9. **D'Herelle F.** on an invisible microbe antagonistic toward dysenteric bacilli: brief note by Mr F D'Herelle, presented, Mr Roux. *Res Microbiol.* 2007;158: 553-54.
10. **Jugder BE, Watnick PI.** Vibrio cholera Sheds Its Coat to Make Itself Comfortable in the Gut. *Cell Host & Microbe.* 2020; 27: 161-163.