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Comparing Two Fixation Techniques for Non-Ambulatory Patients with Neuromuscular Scoliosis

Phan Wren*

Department of Spine Surgery, Albany Medical College, Albany, USA

Introduction

Neuromuscular scoliosis refers to spinal deformities in patients with underlying neurological or muscular conditions that affect posture and mobility, such as cerebral palsy, muscular dystrophy, or spinal cord injury. This condition often leads to progressive spinal deformities, including scoliosis and kyphosis, which, if left untreated, can result in significant health complications, including pain, respiratory issues, and impaired functionality. Non-ambulatory patients, those who are unable to walk, are particularly susceptible to rapid progression of scoliosis due to the lack of active motor control and postural adjustments. For many years, the treatment of severe NMS involved spinal fusion, but this approach has limitations, particularly for growing children. Early fusion restricts future spinal growth and increases the risk of complications, including pulmonary insufficiency and hardware failure. This article will compare two fixation techniques for non-ambulatory patients with neuromuscular scoliosis treated with MCGRs over a 4-year period. Specifically, it will evaluate the advantages, drawbacks, and clinical outcomes associated with these fixation techniques, aiming to provide a deeper understanding of which approach offers the best long-term benefits for this vulnerable patient group [1,2].

Description

Magnetically controlled growing rods are an advanced treatment option for Paediatric patients with scoliosis, particularly in cases where conventional surgical techniques like spinal fusion are not appropriate due to the patient's age, growth potential, or the severity of the scoliosis. Unlike traditional growing rods that require multiple lengthening surgeries to accommodate growth, MCGRs allow for non-invasive lengthening through an external magnetic mechanism. The rods are typically placed in the spine and connected to the vertebrae via screws or hooks. The device is controlled externally using a magnetic controller, which activates the magnet in the rods to lengthen them gradually. This technique eliminates the need for repeated surgeries for spinal lengthening, thus reducing the associated risks of anesthesia, infection, and scar tissue formation. This non-invasive method has been shown to offer improvements in spinal alignment and deformity correction without impeding growth. The success of MCGR treatment in non-ambulatory patients with neuromuscular scoliosis is not only influenced by the technology of the rods themselves but also by the fixation techniques used to anchor the rods to the spine. In this technique, pedicle screws are inserted into the pedicles of the vertebrae, and the MCGR is anchored to these screws using rods or connectors. Pedicle screw fixation is widely used in both adult and pediatric scoliosis surgeries due to its stability and strength.

Conclusion

The treatment of non-ambulatory patients with neuromuscular scoliosis using magnetically controlled growing rods is a complex and evolving field. Both Pedicle Screw Fixation and Hook/Screw Hybrid Fixation offer distinct advantages and challenges. Pedicle screw fixation provides superior stability and deformity correction, making it ideal for more severe scoliosis curves, but it carries a higher risk of complications, including screw misplacement and hardware failure. On the other hand, hook/screw hybrid fixation offers a less invasive and potentially safer surgical approach, with a lower risk of screw-related complications but may not achieve the same level of deformity correction or long-term stability. Ultimately, the choice of fixation technique depends on the severity of the scoliosis, the patient's age, and bone quality, as well as the surgical team's experience

References

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***Address for Correspondence:** Phan Wren, Department of Spine Surgery, Albany Medical College, Albany, USA, E-mail: wrenp@gmail.com*

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