International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 4, Issue 2, pp: (434-437), Month: October 2016 - March 2017, Available at: www.researchpublish.com

Case series: Staged Posterior Correction for Severe Thoracolumbar Scoliosis Using Temporary Distraction Rod Technique

Fahad Al Mulhim

King Fahad Specialist Hospital, Dammam, Saudi Arabia

Abstract: **The use of temporary distraction rod technique for correction of severe thoracolumbar scoliosis is gaining popularity. It is a good alternative to Halo traction as it is directly applied to the spine, giving more correction force when compared to Halo traction. It also obviates the need for anterior release.**

Temporary distraction rod technique is indicated in severe thoracolumbar deformities, including severe pelvic obliquity.

Once the patient gets to the operating room, assembly of the neuromonitoring pads and hooks for Somato-Sensory Evoked Potential (SSEP) and Motor Evoked Potential (MEP) is done. Cefuroxime and Vancomycin are used as antibiotic prophylaxis to cover staph-aurous, staph-epidermedis as well as gram-negative bacteria. Tranexemic acid is used for bleeding prophylaxis. Infusion starts with anesthesia induction with 100 mg/kg as a loading dose, followed by 10 mg/kg/hour for maintenance during surgery (3).

Case: 1 18 years female with adolescent idiopathic scoliosis (AIS) Lenke type 4 (4). Cobb's angle of the main thoracic curve measures 120 degrees. MRI was negative.

Case: 2 17 years female with adolescent idiopathic scoliosis (AIS), Lenke type 4. Cobb's angle of the main thoracic curve measures 140 degrees. MRI was negative.

Keywords: **Staged Posterior Correction, Somato-Sensory Evoked Potential (SSEP), Motor Evoked Potential (MEP).**

1. INTRODUCTION

The use of temporary distraction rod technique for correction of severe thoracolumbar scoliosis is gaining popularity. It is a good alternative to Halo traction as it is directly applied to the spine, giving more correction force when compared to Halo traction. It also obviates the need for anterior release.

2. INDICATIONS AND CONTRAINDICATIONS

Temporary distraction rod technique is indicated in severe thoracolumbar deformities, including severe pelvic obliquity. It requires reasonable bone strength to anchor the rod near the upper and lower ends of the deformity.

This technique needs continuous monitoring to the spinal cord. It is a contraindication to perform this technique without it. It is relatively contraindicated for patients who can't tolerate staged procedures due to medical comorbidities or poor nutritional status.

The use of temporary distraction rod technique can be used with kyphotic curves with caution, as there is higher risk of neurologic injury from distraction.

3. PREOPERATIVE PLANNING

Patients with severe thoracolumbar scoliosis usually have accompanying medical issues. Pulmonary consultation and pulmonary functions test (PFT) is obtained for any patient with severe deformities. Nutritional assessment is done routinely for these cases to evaluate the need for nutritional supply or gastrostomy tube feeding in severely malnourished patients.

Standing antero-posterior, standing lateral, supine antero-posterior, and supine bending x-rays are taken preoperatively. Bending views and supine AP are helpful in assessing the flexibility of the compensatory curves (2).

Thoracolumbar CT scanning is routinely obtained in all cases to assess pedicle length and diameter. An additional use for those patients is to evaluate the bone at the planned anchor site. We planned to anchor the temporary rod proximally to the ribs and distally to the pedicle screws.

MRI is a routine imaging work up in all scoliosis patients who will undergo surgical correction. It is more indicated in severe curves to rule out any spinal cord abnormalities or tethering.

Preoperative neuromonitoring should be obtained for patients with severe deformities to rule out any neurological deficit and to get a reference base line before surgery.

4. SURGICAL PROCEDURE

Once the patient gets to the operating room, assembly of the neuromonitoring pads and hooks for Somato-Sensory Evoked Potential (SSEP) and Motor Evoked Potential (MEP) is done. Cefuroxime and Vancomycin are used as antibiotic prophylaxis to cover staph-aurous, staph-epidermedis as well as gram-negative bacteria. Tranexemic acid is used for bleeding prophylaxis. Infusion starts with anesthesia induction with 100 mg/kg as a loading dose, followed by 10 mg/kg/hour for maintenance during surgery (3).

After induction of general anesthesia and insertion of central venous line, the patient is placed in prone position on Jackson's table. After draping and preparation of the back, a midline skin incision is made in a standard fashion. Dissection of subcutaneous tissue is carried on until exposure of the spinous processes. Then fascia is incised. Sub periosteal dissection is carried on down to the posterior elements of the spine until exposure of the bony landmarks needed for instrumentation. The main arterial pressure (MAP) is kept between 60-70 mmHg during exposure.

Instrumentation with pedicle screws is performed from Down to up starting with the concave side. Then, posterior column osteotomy (Ponte osteotomy) is performed at the main curve from end to end vertebra. Following that, before starting instrumentation of the contralateral side, placement of the temporary rod is done. Ribs are used for proximal anchoring using standard spinal laminar hooks. The rod is anchored distally to two pedicle screws. After assembling the temporary rod gradual distraction is started and carried on during the reminder time of surgery taking the advantage of the viscoelastic nature of the spine. During distraction, the main arterial pressure (MAP) should be kept more than 80 mmHg. Distraction is carried on until alteration of the neuromonitoring signal takes place. At that moment, distraction is decreased until the neuromonitoring signal gets back to its baseline. The rod is fixed in that situation.

The second stage is performed after one week. After removing the temporary rod, anchoring pedicle screws are checked whether holding well in the bone or not. In both cases they were found to be holding well. The assembly of the permanent rod is done and more correction is performed under continuous spinal neuromonitoring. Then, the procedure is completed by assembling the contralateral side rod and correction from the other side. Finally, decortication and bone grafting are performed.

5. POSTOPERATIVE MANAGEMENT

The one-week interval between the two stages of surgery is a very critical period. Nutrition is a primary concern. Patients are kept NPO for 48 hours. Total parental nutrition is usually ordered immediately post operative and continued until the patients get back to adequate oral intake. Intravenous cefuroxime is given to the patients until drains are out. Mobilization is started next day to avoid pulmonary problems. Incentive spirometer and respiratory therapy starts next day as well.

The same protocol is followed after the second stage. Occupational therapy is involved after the second stage to educate the patient to perform daily tasks completely independent after discharge. Patients discharged six or seven days after surgery.

Case 1:

18 years female with adolescent idiopathic scoliosis (AIS) Lenke type 4 (4). Cobb's angle of the main thoracic curve measures 120 degrees. MRI was negative. In the first stage, five posterior column osteotomies (Ponte osteotomy) were performed at the apical levels. Pedicle screws instrumentation was done. The temporary distraction rod was anchored proximally to the sixth, seventh, and eighth ribs at the concave side, and distally to the pedicle screws of T12 and L1. Partial correction through gradual distraction was performed until alteration of the neuromonitoring signal. Then, distraction was lessened and the fixed in that situation.

One week later, second stage was performed; temporary rod was replaced by the permanent one. More correction under continuous spinal neuromonitoring was added. Surgery was not eventful. Post operatively, the patient was doing well. No neurological deficit. She was discharged one week after surgery.

Case 2:

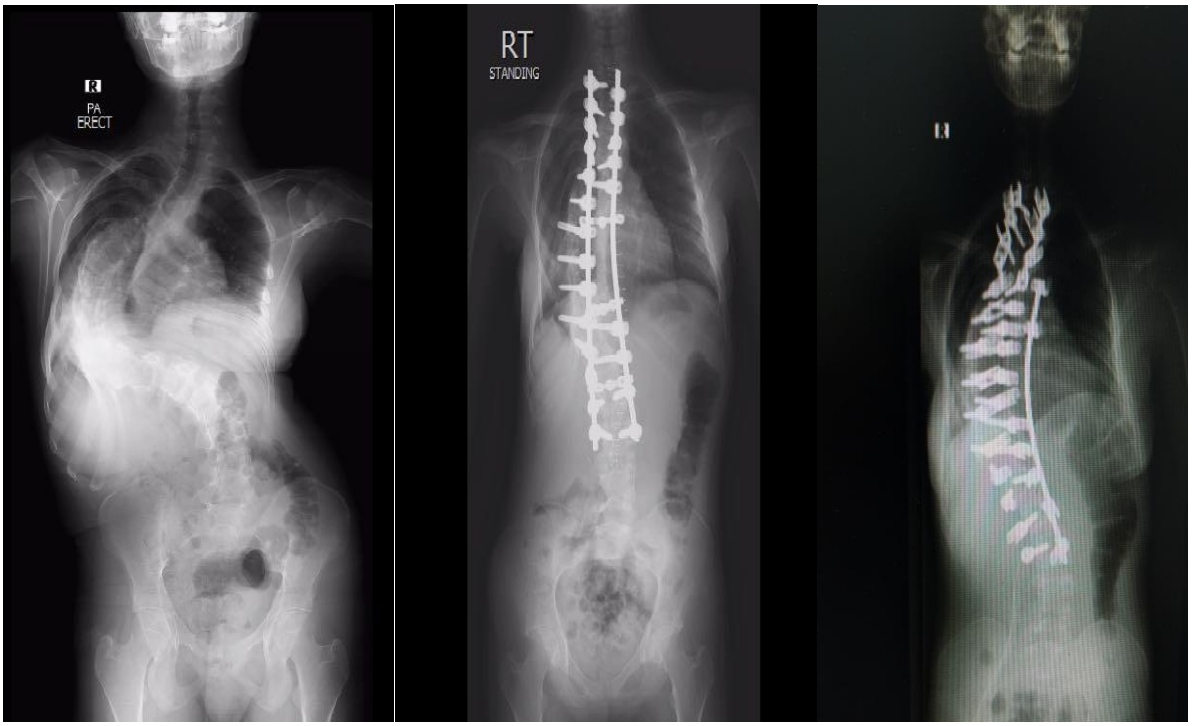
17 years female with adolescent idiopathic scoliosis (AIS), Lenke type 4. Cobb's angle of the main thoracic curve measures 140 degrees. MRI was negative.

In the first stage, posterior column osteotomies (Ponte osteotomy) were performed from end to end vertebra of the main curve. Pedicle screws instrumentation was done. Temporary distraction rod was anchored proximally to the 5th and the seventh ribs and distally to L2 and L3 pedicle screws. Partial correction was performed through gradual distraction under continuous spinal neuromonitoring. After alteration of the neuromonitoring signal, correction was lessened and the rod was fixed in that situation.

During the second stage one week later, after replacing the distraction rod with a permanent rod; more correction was added. However, a signal alteration was noted. Therefor, correction was lessened until neuromonitoring signal went back to baseline. Consequently, fixation and fusion were completed. Postoperatively, the patient was doing fine, no neurological deficits. She was discharged one week after surgery.

Case 1

Case 2



REFERENCES

[1] David L. Skaggs, Jacob M. Buchowski, Paul Sponseller. Master Techniques in Pediatric Orthopaedic Surgery (475-481)

[2] Lenke LG, Betz RR, Bridwell KH, Clements DH, Harms J, Lowe TG, Shufflebarger HL. Intraobserver and interobserver reliability of the classification of thoracic adolescent idiopathic scoliosis. J Bone Joint Surg Am. 1998;80(8):1097–1106.

[3] Sethna NF, Zurakowski D, Brustowicz RM, Bacsik J, Sullivan LJ, Shapiro F. Tranexamic acid reduces intraoperative blood loss in pediatric patients undergoing scoliosis surgery. Anesthesiology. 2005 Apr; 102(4):727-32.

[4] Lenke LG. The Lenke Classification System of Operative Adolescent Idiopathic Scoliosis. Neurosurg Clin N Am 18 (2007) 199–206