Paper #44: Staged Insertion of Growing Rods in Severe Scoliosis, Does it Prevent Fixation Failure?

Sebastiaan Schelfaut, MD; Jennifer Dermott, PT; Reinhard Zeller, MD, ScD, FRCSC


Background Context: Despite the successful clinical outcomes, the modern dual growing rod (GR) technique is still associated with a high complication rate. Hook dislodgement or screw pullout are two of the most common.

Purpose: To demonstrate the preliminary results of the concept of the staged “end fusion technique” as presented by Marchetti and Faldini in 1977, to enhance the stability of the implants at the anchor sites in our modern dual GR technique.

Patient sample: All fifteen children (mean 7.8 years) with a progressive severe, early onset scoliosis (EOS) treated with the modern dual GR technique between October 2010 and April 2014, performed by the senior author at a single centre were included. Etiology of the scoliosis included 8 syndromic, 4 idiopathic, 2 congenital, and 1 neuromuscular curve. Six patients underwent one-stage (Group A) and 9 patients underwent two-stage intervention (Group B).

Methods: All 15 patients received a 6-mm dual GR system with at least 4 hooks proximal and 4 screws (or hooks in one case) distal. In 9 non-randomized patients the insertion of the GR system was performed in 2 stages. During the first stage, pairs of end vertebra were exposed in a subperiosteal fashion, instrumented, grafted, and fused. Four months later, the fused foundations were connected with two growing rods under skull-femoral traction. Statistical analyses were performed to evaluate change in scoliosis, kyphosis, space available for lungs (SAL), and instrumentation length, and to compare the two groups.

Results: The mean follow-up (FU) was 24.7 months. The average number of lengthening procedures was 3.43 per patient. 4 patients had undergone final posterior spinal fusion (without anchor change). The improvement at final FU in scoliosis (87° to 50.7°), kyphosis (67° to 43°) and SAL (0.80 to 0.91) was similar for both surgical groups. The average instrumentation length increase per month was 0.95 mm for Group B, and 0.59 mm for Group A, a difference that failed to reach significance (p=0.2). Two unplanned surgeries (2/58 procedures) were required (1 from each surgical group) for irrigation and debridement secondary to a deep wound infection. Implant-related complications included 3 rod breakages (2 in Group A (same patient), 1 in Group B), and proximal anchor migration (1 in Group A). These were all corrected during planned procedures.

Conclusions: The staged insertion of dual-GR system seems to be a safe technique with encouraging results, especially concerning stability of the implants at the anchor sites, without losing correction ability due to a few months of time delay between the 2 stages.
Fig. 1: Serial XRs in a nonambulatory 7-year-old girl with quadriplegic infantile diplegia with a Cobb angle improvement from 109° to 14° to 50° to 37°, and a kyphosis improvement from 10° to 29° after the 2nd lengthening procedure.