Apical Vertebrae Manipulation in Dual Growing Rod Technique

--A New Method to Improve and Maintain Major Curve Correction

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Conflict of interest: NONE

Introduction

Apical vertebrae manipulation (AVM) technique, by inserting an additional pedicle screw in the convex side of the apical vertebra and without placing locking cap, may increase the correction rate of the major curve. The aim of this study was to evaluate the efficacy of AVM technique on major curve correction in early onset scoliotic patients treated with dual growing rods (GR).

Methods

From May 2010 to March 2014, patients treated with dual GR and AVM technique were reviewed. Medical records were reviewed, including age at initial surgery and the final follow-up, number and frequency of lengthening, and complications. Radiographic evaluation included Cobb's angle, thoracic kyphosis, lumbar lordosis, apical vertebral translation (AVT), and the length of T1-S1.

Results: part I

Table 1. Demographic characteristics of patients

Variables	Value
No. of patients	9
Gender (male/female) (*no.*)	3/6
Age at Initial Surgery (*yr*)	8.8±3.5
Duration of Follow-up (*mo*)	40.7±13.2
Average Lengthening No.	4.0
Annual Growth of T1-S1 (*cm/y*)	1.70±0.75

Results: part II

Table 2. Results of radiographic measurement

Variables	Pre-operation	Post-initial operation	Final follow-up
Cobb's angle (º)	60.1±9.6	22.1±10.0*	24.6±11.8*
Thoracic kyphosis (º)	31.1±18.2	20.3±10.1	21.4±12.2
Lumbar lordosis (º)	-46.4±10.3	-41.8±11.2	-42.5±13.6
AVT (mm)	45.9±4.6	20.0±6.5*	19.2±11.5*
Trunk Shift (mm)	26.9±13.7	13.3±8.4*	14.1±7.5*

*Compared with pre-operation, P<0.05

Results: part III

Table 3. Complications occurred during follow-up

Patient No.	Complications	Treatment
#3	Dual rod breakage	Both rods were changed during next lengthening procedure
#7	Rod slippage from the apical pedicle screw	Rod re-insertion was performed in a scheduled lengthening procedure

No infection and nervous system complications occurred.

Results: part IV

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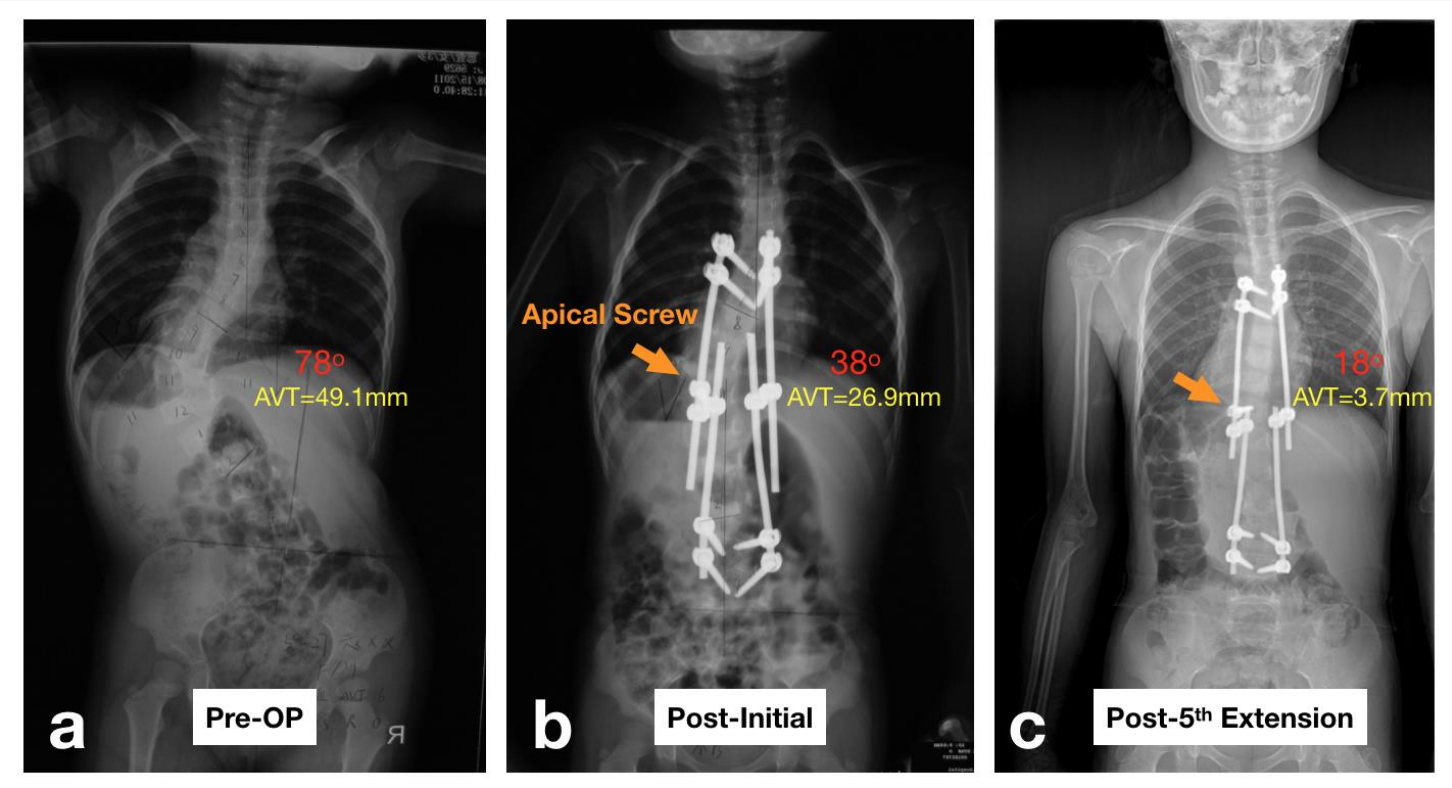
Figure 1. A 3-year old girl treated with dual GR and AVM technique



Conclusions

By using AVM technique in patients with large AVT, good correction rate of major curve was achieved and maintained very well, which may be helpful to reduce complications and reach better correction in the final fusion procedure.

Thank you!