Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page:www.jamdsr.com doi:10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Assessment of spine-to-rib-cage distraction in the treatment of early onset scoliosis

R Urender Kumar Vats

Assistant Professor, Department of Orthopaedics, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

ABSTRACT:

Background: Early onset scoliosis (EOS) refers to scoliosis that is diagnosed before the age of 10. This condition is characterized by a sideways curvature of the spine that can progress as the child grows. The present study was conducted to evaluate spine-to-rib-cage distraction in the treatment of early onset scoliosis. **Materials & Methods:** 34 patients with early onset scoliosis (EOS) of both gendersunderwent surgical treatment trial using a growing spine profiler (GSP), which involved a single spine-to-rib growing rod instrumentation. A GSP rod was inserted posteriorly after a staged anterior annulotomy and fusion was performed to treat curves >60° Cobb in the frontal plane or bending <50%. **Results:** Out of 34 patients, males were 20 and females were 14. Pretreatment PA (degree)Cobb's angle was 57.2, follow-up PACobb's angle (degree) was 45.1 and total rod distraction (mm) was 17.4. Lat. Cobb's angle pretreatment PA (degree) was 47.3, follow-up PA Cobb's angle (degree) was 41.2 and pretreatment sitting height (cm) was 66.2, follow-up sitting height (cm) was 68.5 and spinal growth (cm) was 1.7. The difference was significant (P< 0.05). **Conclusion:** In order to treat EOS with a single spine-to-rib growth rod (GSP) in its current form, the implant's design and use must be revised, and a new clinical study must be conducted to ensure its efficacy and safety.

Keywords: Cobb's angle, Early onset scoliosis, rod distraction

Corresponding author: R Urender Kumar Vats, Assistant Professor, Department of Orthopaedics, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India

This article may be cited as: Vats RUK. Assessment of spine-to-rib-cage distraction in the treatment of early onset scoliosis. J Adv Med Dent Scie Res 2016;4(2):269-271.

INTRODUCTION

Early onset scoliosis (EOS) refers to scoliosis that is diagnosed before the age of 10. This condition is characterized by a sideways curvature of the spine that can progress as the child grows. EOS can be associated with various underlying conditions, including congenital vertebral anomalies, neuromuscular disorders, or syndromic conditions, although it can also occur idiopathically (without a known cause).[1]

The words refer to a variety of posterior spinal instrumentation procedures, including expandable ribs and single or dual growing rods, that share the same objective of correcting progressive deformities without stopping the growth of the spine and lungs.[2,3] Rod breakage and deep infection in conventional single-growing rods have been reported to occur at rates of 42% and 9%, respectively.[4] There is a reported 22% implant failure rate and 9% deep infection incidence for dual growing rods that are placed subfascially. The potential to cure complex congenital abnormalities as well as EOS has sparked renewed enthusiasm with the advent of rib instrumentation.via affecting the chest wall as opposed to the spine directly.[5]Therefore, it was thought that a spinal instrumentation that combined the benefits of spinal and rib distraction would benefit from both approaches by preventing the majority of the growing spine from being violated when treating endodontia serous fractures (EOS).[6]The present study was conducted to evaluate spine-to-rib-cage distraction in the treatment of early onset scoliosis.

MATERIALS & METHODS

The present study was conducted on 34 patients with early onset scoliosis (EOS) of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. All patients with progressing EOS underwent surgical treatment trial using a growing spine profiler (GSP), which involved a single spine-to-rib growing rod instrumentation. A GSP rod was inserted posteriorly after a staged anterior annulotomy and fusion was

performed to treat curves >60° Cobb in the frontal plane or bending <50%. The sole method used to address curves that were less severe and stiff was posterior GSP implantation. The planning of GSP elongation took spinal growth into account. In between elongations, patients were maintained in a brace.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 34		
Gender	**Males**	**Females**
Number	20	14

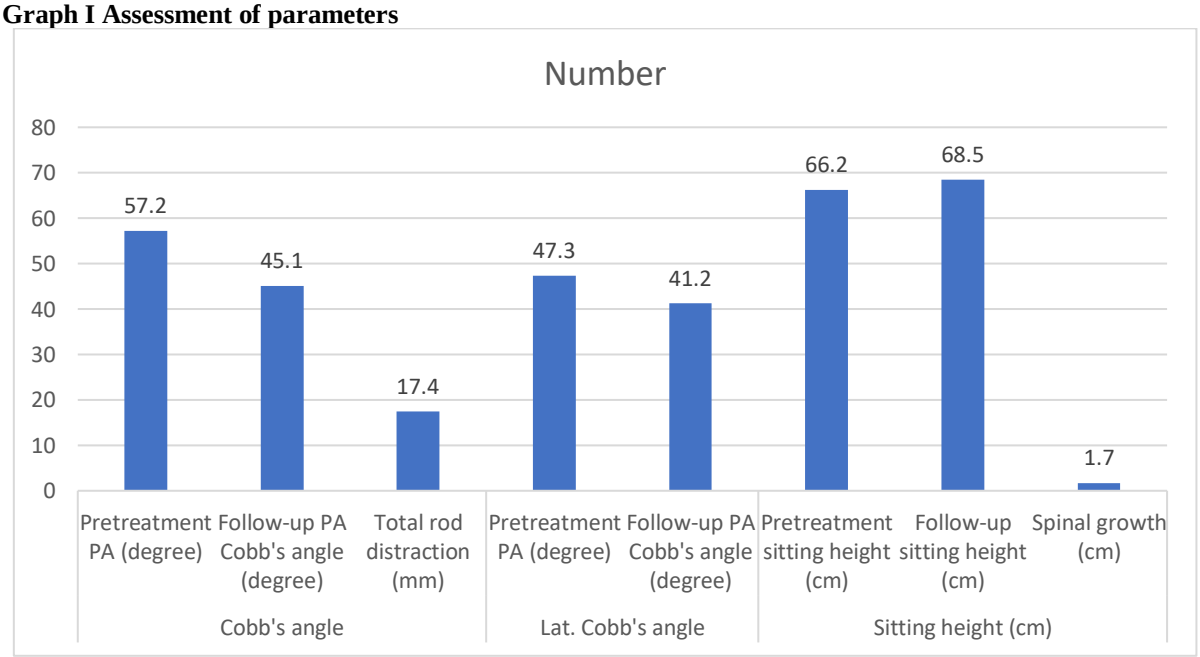
Table I shows that out of 34 patients, males were 20 and females were 14.

Table II Assessment of parameters

Parameters	Variables	Number	P value
Cobb's angle	Pretreatment PA (degree)	57.2	0.02
	Follow-up PA Cobb'sangle(degree)	45.1	
	Total rod distraction(mm)	17.4	
Lat.Cobb's angle	Pretreatment PA (degree)	47.3	0.05
	Follow-up PA Cobb'sangle (degree)	41.2	
Sitting height (cm)	Pretreatmentsitting height (cm)	66.2	0.05
	Follow-upsitting height (cm)	68.5	
	Spinalgrowth (cm)	1.7	

Table II shows that pretreatment PA (degree) Cobb's angle was 57.2, follow-up PACobb's angle (degree) was 45.1 and total rod distraction (mm) was 17.4. Lat. Cobb's angle pretreatment PA (degree) was 47.3, follow-up PA Cobb's angle (degree) was 41.2 and pretreatment sitting height (cm) was 66.2, follow-up sitting height (cm) was 68.5 and spinal growth (cm) was 1.7.
The difference was significant (P< 0.05).

Graph I Assessment of parameters



DISCUSSION

In early onset scoliosis (EOS), accurate measurement of the spinal curvature is critical for diagnosis, monitoring progression, and guiding treatment decisions.[7,8] The standard method for measuring the curvature in EOS is the Cobb angle, which is determined using radiographic imaging (X-rays).[9]On an anteroposterior (AP) spinal X-ray, the end vertebrae of the curve are identified. These are the vertebrae at the top and bottom of the curve that are most tilted towards the concavity of the curve.[10,11]Draw a line parallel to the superior endplate of the upper end vertebra and another line parallel to the inferior endplate of the lower end vertebra.Draw perpendicular lines from each of the two lines drawn.The Cobb angle is the angle where the two perpendicular lines intersect. This angle quantifies the degree of spinal curvature.[12]

We found that out of 34 patients, males were 20 and females were 14. Teli et al[13] in their study a total of 22 patients affected by progressive EOS resistant to cast and/or brace treatment were enrolledinto a trial of surgical treatment with a single spine-to-rib growing rod instrumentationgrowing spine profiler (GSP). Curves >60° Cobb in the frontal plane or bending <50% were addressed with staged anteriorannulotomy and fusion and posterior implantation of a GSP rod. Less severe and rigid curves were treated with posterior implantationof GSP only. The elongation of GSP was planned according to spinal growth. Patients were kept in a brace between elongations.A total of 20 patients were available to follow-up with complete data. The mean follow up is 4.1 years. Mean age at timeof initial surgery was 5 years (3–8). Nine patients had staged antero-posterior surgeries, 11 posterior only surgeries. Mean spinalgrowth was 1.9 cm (1.5–2.3) or 0.5 cm per year. Mean coronal Cobb's angle correction was from 56° to 45°. Major complicationsaffected 40% of patients and included rod failure in 6/20 and crankshaft in 5/20 (all in the anteroposterior surgery group).

We observed that pretreatment PA (degree)Cobb's anglewas 57.2, follow-up PACobb's angle (degree) was 45.1 and total rod distraction (mm) was 17.4. Lat. Cobb's angle pretreatment PA (degree) was 47.3, follow-up PA Cobb's angle (degree) was 41.2 and pretreatment sitting height (cm) was 66.2, follow-up sitting height (cm) was 68.5 and spinal growth (cm) was 1.7.Akbarnia et al[14]determined the safety and effectiveness of the previously described dual growing rod technique in achieving and maintaining scoliosis correction while allowing spinal growth.The mean scoliosis improved from 82 degrees (range, 50 degrees-130 degrees) to 38 degrees (range, 13 degrees-66 degrees) after initial surgery and was 36 degrees (range, 4 degrees-53 degrees) at the last follow-up or post-final fusion. T1-S1 length increased from 23.01 (range, 13.80-31.20) to 28.00 cm (range, 19.50-35.50) after initial surgery and to 32.65 cm (range, 25.60-41.00) at last follow-up or post-final fusion with an average T1-S1 length increase of 1.21 cm per year (range, 0.13-2.59). Seven patients reached final fusion. The space available for lung ratio in patients with thoracic curves improved from 0.87 (range, 0.7-1.1) to 1.0 (range, 0.79-1.23, P = 0.01). During the treatment period, complications occurred in 11 of the 23 patients (48%), and they had a total of 13 complications. Four of these patients (17%) had unplanned procedures. Following final fusion, 2 patients required extensions of their fusions because of curve progression and lumbosacral pain.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that in order to treat EOS with a single spine-to-rib growth rod (GSP) in its current form, the implant's design and use must be revised, and a new clinical study must be conducted to ensure its efficacy and safety.

REFERENCES

1. Dunn HK, Daniels AU, McBride GG. Intraoperative force measurement during correction of scoliosis. Spine 1982;7:448-55.
2. Waugh TR. The intravital measurement during instrumental correction of idiopathic scoliosis. Acta Orthop Scand 1966;93S:35-85.
3. Harrington P. Correction and internal fixation by spine instrumentation. J Bone Joint Surg Am 1962;44:591-610.
4. Takaso M, Moriya H, Kitahara H, Minami S, Takahashi K, Isobe K, et al. New remote-controlled growing-rod spinal instrumentation possibly applicable for scoliosis in young children. J Orthop Sci 1998;3:336-40.
5. Moe J, Kharrat K, Winter RB, Cummine JL. Harrington instrumentation without fusion plus external orthotic support for the treatment of difficult curvature problems in young children. Clin OrthopRelat Res 1984;185:35-45.
6. Marchetti P, Faldini A. 'End fusions' in the treatment of some progressive scoliosis in childhood or early adolescence. Orthop Trans 1978;2:271.
7. Mardjetko SM, Hammerberg KW, Lubicky JP, et al. The Luque trolley revisited: review of nine cases requiring revision. Spine 1992;17:582–9.
8. Rinsky LA, Gamble JG, Bleck EE. Segmental instrumentation without fusion in children with progressive scoliosis. J PediatrOrthop1985;5:687–90.
9. Klemme WR, Denis F, Winter RB, Lonstein JW, Koop SE. Spinal instrumentation without fusion for progressive scoliosis in young children. J PediatrOrthop1997;17:734-42.
10. Thompson GH, Akbarnia BA, Campbell RM Jr. Growing rod techniques in early-onset scoliosis. J PediatrOrthop2007;27:354-61.
11. Mineiro J, Weinstein SL. Subcutaneous rodding for progressive spinal curvatures: Early results. J PediatrOrthop 2002:22:290-5.
12. Emans JB, Caubet JF, Ordonez CL, Lee EY, Ciarlo M. The treatment of spine and chest wall deformities with fused ribs byexpansion thoracostomy and insertion of vertical expandable prosthetic titanium ribs. Spine 2005;30:S58-68.
13. Teli M, Lovi A, Brayda-Bruno M. Results of the spine-to-rib-cage distraction in the treatment of early onset scoliosis. Indian Journal of Orthopaedics. 2010 Feb;44:23-7.
14. Akbarnia BA, Marks DS, Boachie-Adjei O, Thompson AG, Asher MA. Dual growing rod technique for the treatment of progressive early onset scoliosis: A multicenter study. Spine 2005;30:S46-57.