P-91

Effectiveness of the Spinamic® brace for adolescent idiopathic scoliosis

Min-Chul Paek[1], Sanghyun Jee[1], Chang Woong Jang[2], Sanghoon Shin[1], Jung Hyun Park[1,3,4*]

[1]Department of Rehabilitation Medicine, Gangnam Severance Hospital, Rehabilitation Institute of Neuromuscular Disease, Yonsei University College of Medicine, Seoul, Republic of Korea.
[2]Department of Physical Medicine and Rehabilitation, Hallym University Sacred Heart Hospital, Hallym University College of Medicine, Anyang, Republic of Korea.
[3]Department of Medical Device Engineering and Management, The Graduate School, Yonsei University College of Medicine, Seoul, Republic of Korea.
[4]Department of Integrative Medicine, The Graduate School, Yonsei University College of Medicine, Seoul, Republic of Korea.

Introduction

The Spinamic® brace (VNTC, Seoul, Republic of Korea) is a newly developed spinal brace designed to slow the progression of curves in adolescent idiopathic scoliosis (AIS) (Figure 1). However, its efficacy is not extensively studied. This research aims to investigate if the Spinamic® brace effectively corrects spinal curvature and impedes progression in skeletally immature adolescents with idiopathic scoliosis, especially those with curves exceeding 20°.

Method

This retrospective observational study collected data from outpatient rehabilitation clinics at Gangnam Severance Hospital from August 2021 to January 2024. Participants, aged 10 to 18 years with AIS and no significant spinal malformations, were included. Skeletal immaturity was confirmed using the Risser sign and chronological age at brace delivery. The treatment protocol involved the Spinamic® brace.

The initial assessment, conducted brace-free, used the EOS imaging system (Biospace Med, Paris, France) for the standing position and conventional whole spine anteroposterior radiographs for the supine position within a maximum of 2 weeks before brace fitting (Figure 2). Control radiographs, taken on the fitting day, employed the conventional whole spine anteroposterior radiograph with the Spinamic® brace in an erect position. After 6 months, standing anteroposterior radiographs were captured without the Spinamic® brace.

Cobb angles were measured in all radiographs, with the difference between standing and supine positions indicating flexible scoliosis. The immediate correction effect of the Spinamic® brace was confirmed by the difference in Cobb angle before and after wearing the brace in the initial assessment. Long-term correction effects were evaluated over the 6-month follow-up by comparing the initial Cobb angle with the observation without the brace.

Results

Forty-two patients (32 girls and 10 boys) were prescribed the Spinamic® brace, with 14 wearing it for a minimum of 6 months (Table 1). The mean age at brace delivery was 14.02 (2.09), and the mean Risser sign was 2.19 (1.27). The mean primary curve in the supine position was 24.77 (8.03), and in the standing position, it was 34.36 (9.27), with flexible scoliosis averaging 9.59 (6.46), corresponding to 27.89 (15.10) percent of the scoliosis angle in the standing position (Table 2).

Following the initial brace assessment, it immediately corrected flexible scoliosis by an average of 89.91 (63.61) percent. For thoracic or thoracolumbar primary curves, the brace showed an excellent effect of over 95%. Overall, 76.19% of patients demonstrated a correction effect of 50% or more. In the 6-month follow-up of 14 patients, 10 showed positive outcomes.

Table 1. Basic characteristics of included patients (n = 42)

Characteristics	
Sex, boy : girl	10 : 32
Age, mean (SD)	14.02 (2.09)
Type of primary curve, number (%)	
Thoracic	23 (54.76)
Thoracolumbar	11 (26.19)
Lumbar	8 (19.05)
Initial Cobb angle, degrees, mean (SD)	
Supine position	24.77 (8.03)
Standing position	34.36 (9.27)
Flexible range of scoliosis[a]	9.59 (6.46)
Initial Risser sign, mean (SD)	2.19 (1.27)
Initial Risser sign, number (%)	
Stage 1	19 (45.24)
Stage 2	7 (16.67)
Stage 3	5 (11.90)
Stage 4	11 (26.19)

[a]This refers to the difference in Cobb angle between the standing and supine positions.

Table 2. Results for included patients treated using the Spinamic® brace

	Type of primary curve			
	Total	Thoracic	Thoracolumbar	Lumbar
Initial assessment (n = 42)				
Percent flexible range of scoliosis, mean (SD)	27.89 (15.10)	25.19 (13.12)	29.29 (15.03)	33.73 (20.13)
Percent correction of flexible range of scoliosis in brace, mean (SD)	89.91 (63.61)	95.14 (67.55)	95.50 (66.60)	67.19 (47.90)
Excellent correction[a], n (%)	17 (40.48)	10 (43.48)	5 (45.45)	2 (25.00)
Good correction[b], n (%)	15 (35.71)	9 (39.13)	3 (27.28)	3 (37.50)
Fair correction[c], n (%)	9 (21.43)	4 (17.39)	3 (27.28)	2 (25.00)
Poor correction[d], n (%)	1 (2.38)	0	0	1 (12.50)
At 6-month follow-up (n = 14)				
Progression, degrees, mean (SD)	-1.25 (5.89)	-5.83 (17.76)	-2.91 (21.15)	0
Positive outcome[e], n (%)	10 (71.43)	6 (66.67)	3 (75.00)	1 (100.00)
Negative outcome[f], n (%)	4 (28.57)	3 (33.33)	1 (25.00)	0

[a]correction degree is more than 75% of the flexible range of scoliosis degree.
[b]correction degree is 50% or more but less than 75% of the flexible range of scoliosis degree.
[c]correction degree is 25% or more but less than 50% of the flexible range of scoliosis degree.
[d]correction degree is less than 25% of the flexible range of scoliosis degree.
[e]improvement of more than 5 degrees or stabilization of ± 5 degrees of the standing scoliosis curvature.
[f]aggravation of the standing scoliosis curvature of more than 5 degrees.

Figure 1. The Spinamic® brace

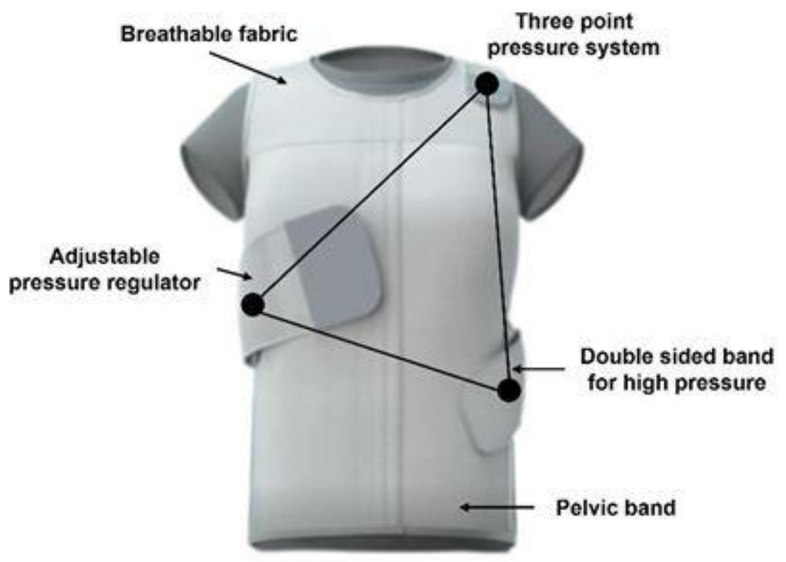
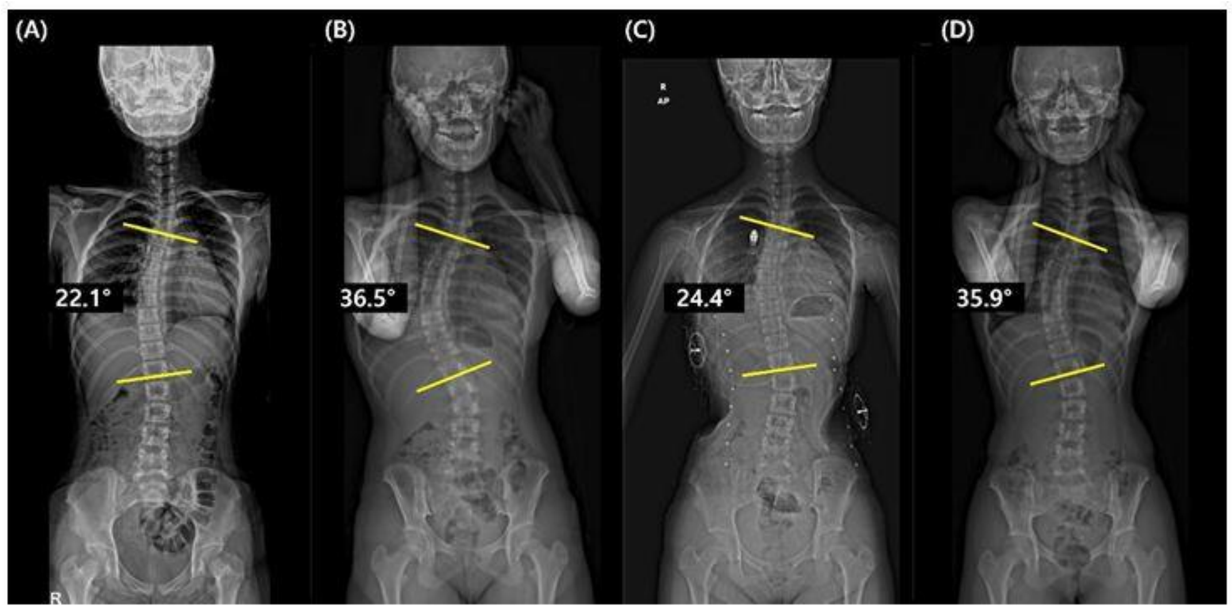


Figure 2. Examples of posteroanterior X-rays for the right thoracic curve: (A) Supine position, (B) standing position, (C) standing position with the Spinamic® brace, and (D) standing position at 6-month follow-up.



Conclusion

These findings confirm the Spinamic® brace's effectiveness in correcting spinal curvatures related to AIS, especially in cases of flexible scoliosis. Furthermore, sustained treatment effects were noted even after six months of brace wear.