

Reducing the pelvis constriction changes the sagittal plane in the brace. A retrospective case-control study of 37 free pelvis vs 336 classical consecutive very-rigid Sforzesco braces.

Stefano Negrini | Fabrizio Tessadri | Francesco Negrini | Marta Tavernaro | Fabio Zaina | Andrea Zonta | Sabrina Donzelli | University of Milan - IRCCS Istituto Ortopedico Galeazzi, Milan | Orthotecnica, Trento | IRCCS Istituto Ortopedico Galeazzi, Milan | ISICO (Italian Scientific Spine Institute), Milan | ISICO (Italian Scientific Spine Institute), Milan | ISICO (Italian Scientific Spine Institute), Milan | ISICO (Italian Scientific Spine Institute), Milan

Background

The sagittal plane preservation is one of the main aims of modern bracing. The Sforzesco brace, ancestor of very-rigid (VRB) group, has a push-up action to decrease brace's adverse sagittal effects. Recently, we introduced the "Free Pelvis" (FP) (semi-rigid ethylene vinyl acetate) in the Sforzesco VRB to improve comfort, sagittal balance (automatic pelvis positioning) and brace adaptability (independent pelvis and trunk diameters).

Objective

We aimed to check if the FP innovation changes the sagittal plane results of VRB for adolescents with idiopathic scoliosis (AIS)?

Methods

We performed a matched Case-Control Study comparing the Sforzesco brace classical version (VRB) versus the Free Pelvis one (FPB). We extracted from our prospective database all FPB and VRB at first consultation in our Institute following these inclusion criteria: AIS, age 10-16, VRB prescribed 20 hours/day, sagittal x-rays available at the start and either at the second consultation or in-brace (at 1-month). We compared in-brace and out-of-brace results to the pre-brace starting x-ray for the following sagittal parameters: thoracic kyphosis (TK), lumbar lordosis (LL), pelvic incidence (PI) and tilt (PT), sacral slope (SS), and lumbosacral angle (LSA). We also checked TK/LL, PT/SS and LSA/LL ratios and PI-LL difference. We used descriptive statistics according to the type of variables and their distribution. We used unpaired and paired t-test to check the differences between and within the groups, respectively.

Results

Out of 4431 VRB and 96 FPB, 336 (8%) and 37 (39%) respected the inclusion criteria. Baseline data showed no differences.

	FPB		VRB		P
Number	33		333		
Males	14%		19%		0,422
Menarche	44%		56%		0,179
Previous brace	22%		27%		0,458
	<i>Av</i>	<i>SD</i>	<i>Av</i>	<i>SD</i>	
Age (years)	13	2	13	2	0,070
Age at menarche (years)	11	1	12	1	0,265
Risser	1	2	2	1	0,098
Weight (kg)	52	25	50	12	0,779
Height (cm)	156	10	159	14	0,212
ATR (°Bunnell)	12	4	12	4	0,868
Aesthetics (TRACE points)	8	2	8	2	0,953
C7 plumbline (mm)	25	20	28	19	0,470
L3 plumbline (mm)	19	20	25	18	0,073
S2 plumbline (mm)	-2	23	4	20	0,145
Brace prescription (hours/day)	23	1	23	1	0,134
Declared brace use (hours/day)	22	1	22	2	0,594

Compared to the baseline, we found similar statistically and clinically significant TK reductions in both groups, and some statistically, but not clinically significant changes of lumbopelvic parameters. Changes prevailed at in-brace radiograph (particularly in the LSA/LL ratio) and in VRB (see Table 2).

Conclusion

Free Pelvis innovation causes less in-brace lumbopelvic strain than classical VRB and slightly changes the short-term out-of-brace results. It is worthwhile exploring possible medium/long term changes.