ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2017;98:187-90

BRIEF REPORT

Effects of Bracing in Adult With Scoliosis: A Retrospective Study

Clémence Palazzo, MD, PhD,[a,b] Jean-Paul Montigny, MD,[c] Frédéric Barbot, MD,[d] Bernard Bussel, MD, PhD,[a] Isabelle Vaugier, MD,[d] Didier Fort, MD,[e] Isabelle Courtois, MD,[f] Catherine Marty-Poumarat, MD[a]

From the [a]Department of Spinal Rehabilitation, Raymond Poincaré Hospital, Garches; [b]INSERM U1153, Faculty of Medicine Paris-Descartes, Department of Physical Medicine and Rehabilitation, Cochin Hospital, Paris; [c]Department of Physical Medicine and Rehabilitation, Foch Hospital, Suresnes; [d]INSERM CIC 1429, Raymond Poincaré Hospital, Garches; [e]Institute of Physical Medicine and Rehabilitation, Nancy; and [f]Department of Spinal Rehabilitation, Saint Etienne Hospital, Saint-Etienne, France.

Abstract

Objective: To assess the effectiveness of bracing in adult with scoliosis.

Design: Retrospective cohort study.

Setting: Outpatients followed in 2 tertiary care hospitals.

Participants: Adults (N=38) with nonoperated progressive idiopathic or degenerative scoliosis treated by custom-molded lumbar-sacral orthoses, with a minimum follow-up time of 10 years before bracing and 5 years after bracing. Progression was defined as a variation in Cobb angle $\geq 10°$ between the first and the last radiograph before bracing. The brace was prescribed to be worn for a minimum of 6h/d.

Interventions: Not applicable.

Main Outcome Measure: Rate of progression of the Cobb angle before and after bracing measured on upright 3-ft full-spine radiographs.

Results: At the moment of bracing, the mean age was 61.3±8.2 years, and the mean Cobb angle was 49.6°±17.7°. The mean follow-up time was 22.0±11.1 years before bracing and 8.7±3.3 years after bracing. For both types of scoliosis, the rate of progression decreased from 1.28°±.79°/y before to .21°±.43°/y after bracing ($P<.0001$). For degenerative and idiopathic scoliosis, it dropped from 1.47°±.83°/y before to .24°±.43°/y after bracing ($P<.0001$) and .70°±.06°/y before to .24°±.43°/y after bracing ($P=.03$), respectively.

Conclusions: For the first time, to our knowledge, this study suggests that underarm bracing may be effective in slowing down the rate of progression in adult scoliosis. Further prospective studies are needed to confirm these results.

Archives of Physical Medicine and Rehabilitation 2017;98:187-90

Adult scoliosis is a prevalent disease,[1] which can be painful, and negatively affects quality of life.[2] With the growing age of the population,[3] it is fast becoming a public health concern. There are 2 types of adult scoliosis: (1) idiopathic scoliosis, which is an adolescent scoliosis which continues to progress regularly during adulthood (mean progression rate, .82°/y); and (2) degenerative scoliosis, which typically appears or lately progresses during adulthood, mainly around menopause (mean progression rate, 1.64°/y).[4] The current treatment of adult scoliosis is not well codified. First-line treatment is usually conservative, including rehabilitation and bracing, with the main objectives to reduce symptoms[3] and slow down disease progression to avoid surgery.[5,6] However, the evidence of the effectiveness of conservative treatments is very low.[6] Two open studies have assessed the effectiveness of braces on pain with encouraging results,[7,8] but its effects on progression rates have never been studied. The present study aimed to assess the effectiveness of an underarm plastic brace on progression rates in adult scoliosis.

Disclosures: none.

0003-9993/16/$36 - see front matter © 2016 by the American Congress of Rehabilitation Medicine
http://dx.doi.org/10.1016/j.apmr.2016.05.019

Methods

Participants

We retrospectively reviewed the medical records of patients ≥18 years of age with a progressive nonoperated idiopathic or degenerative lumbar scoliosis, or with an S curve with a progressive lumbar curve, followed in 2 French tertiary care hospitals, and who had at least 1 prescription of custom-molded lumbar-sacral orthosis between 2004 and 2014. Progression was defined as a variation in Cobb angle ≥10° between the first and last radiograph before bracing.[9] Bracing started as soon as the progression of scoliosis was confirmed. It could be at the first medical visit when the patient had prior radiographs or during the follow-up when the patient had no previous radiographs. We included patients with a minimum follow-up time of 10 years before and 5 years after bracing, with at least 3 radiographs before and 3 radiographs after bracing. The last radiograph corresponds to the last medical visit (patients are still followed). We excluded patients who had undergone a spine surgery, scoliosis associated with a camptocormia, and scoliosis secondary to another disease (fracture or neurologic or rheumatologic disorder). The brace was made according to the Vesinet method (fig 1). It was prescribed to be worn for a minimum of 6h/d. The Cobb angle was measured manually on upright 3-ft full-spine radiographs by the same trained senior physician in each center. The limits of the curve were characterized by the point at which the angle no longer increased.

Definition of scoliosis

The type of scoliosis was deduced from a graph representing Cobb angles (*y* axis) against age (*x* axis) that was plotted for each patient (fig 2).[4] The scoliosis was considered as idiopathic if the Cobb angle regularly increased from the end of skeletal maturity until bracing and as degenerative if the Cobb angle quickly worsened later (around the age of the menopause).

Outcome criteria

The main outcome was the comparison of the curve progression before and after bracing. The rate of progression was estimated based on the graph that we used to define the type of scoliosis, representing Cobb angles (*y* axis) against age (*x* axis) for each patient.

Statistical analysis

The characteristics of the population were summarized as mean ± SD because they were continuous variables. A segmented linear-mixed effects regression model with random intercept and random slopes was used to analyze changes over time in the Cobb angle. The time variable was partitioned at the date of bracing into 2 intervals, and a separated line segment was fit to each interval. Pre- and postbracing values were estimated with their 95% confidence intervals, and the paired *t* test was chosen to compare pre- and postbracing slopes. The level of significance was set at 5%.

This study was approved by the National Commission for Data Protection and Liberties (no. DR-2014-594).

Results

The medical records of 271 patients were retrospectively reviewed, but only 38 patients (29 with degenerative and 9 with idiopathic scoliosis) were included in the study. Their characteristics are reported in table 1. All of the participants were women. The reasons of exclusion were as follows: follow-up time too short and/or an insufficient amount of radiographs (83%), previous surgery (7%), and scoliosis secondary to another disease (10%). The selected patients consulted either for pain, sagittal or coronal imbalance, aesthetic reasons, or for the follow-up of a known scoliosis. The most frequently reported brace-related side effect was discomfort; this was unusual and improved by brace adjustment.

Figure 3 illustrates the individual progression of scoliosis before and after bracing. For the 38 patients we observed a breakpoint of the progression rate at the time of bracing. Considering all types of scoliosis, the mean rate of progression was significantly higher before bracing (1.28°±.79°/y) than after bracing (.21°±.43°/y, $P<.0001$). For degenerative scoliosis, the progression rate decreased from 1.47°±.83°/y before to

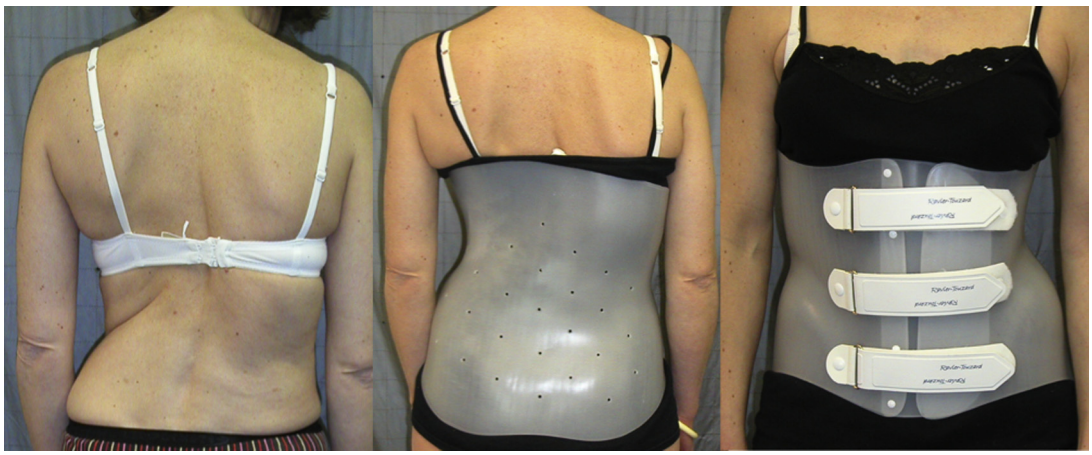

Fig 1 Underarm plastic brace made according to the Vesinet method: the brace was prepared from a plaster cast in the upright position, correcting sagittal and coronal imbalance, supporting the gibbosity, and underlying the waistline. The quality of bracing was controlled by a trained senior physician during its confection, after 3 months, and each year.