Application of the SPINECOR dynamic corrective brace in treating idiopathic scoliosis

Zastosowanie gorsetu dynamicznego Spine Cor w leczeniu idiopatycznego skrzywienia kręgosłupa

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Abstract

Introduction. The indication for using an orthopedic corset is idiopathic scoliosis in children and adolescents with undeveloped osteoarticular system with a Cobb angle within 20-45°. For over 10 years, apart from the TLSO corset, the Spinecord dynamic brace has also been used. Observations and reports in literature from this period prove that their effectiveness in the treatment of scoliosis is comparable or even higher than the existing methods of conservative treatment. The aim of the study is to evaluate the effectiveness of correction of scoliosis using SpineCor dynamic brace.

Materials and method. The study included 84 patients who used a dynamic corset to treat idiopathic scoliosis. The average age at the start of treatment was 12 years and 4 months. The treatment was continued for a minimum of 12 months, assessing the angle of scoliosis before treatment, when using the brace and 6 months after its discontinuation. The correction of the angle of scoliosis by more than 5° was considered to be a positive treatment outcome, as was the stabilization of scoliosis, i.e. scoliosis maintained at the same angle as before treatment (Cobb angle change less than 5°). Progression of scoliosis by an angle exceeding 5° was considered a negative treatment outcome.

Results. In the study group satisfactory results of Spinecor brace treatment were obtained in 68 patients (81%), 40 patients out of those 68 (48%) achieved scoliosis stabilization, and 28 patients achieved scoliosis correction (33%). In 16 patients (19%) treatment outcome was unsatisfactory. Three patients in the group with unsatisfactory treatment required surgical correction of scoliosis.

Conclusions. 1. In the group of 84 patients, a good outcome, correction or stabilization of scoliosis was obtained in 81% of patients receiving treatment. 2. Nearly 90% of patients accepted and followed the recommendations of dynamic brace treatment.

Key words: scoliosis, dynamic brace, spinecor

Streszczenie

Wstęp. Wskazaniem do zastosowania gorsetu ortopedycznego jest idiopatyczne skrzywienie kręgosłupa u dzieci i młodzieży z niedojrzałym układem kostno-stawowym o kącie skrzywienia mierzonym metodą Cobba w granicach 20-45°. Od ponad 10 lat poza sztywnymi gorsetami korekcyjnymi typu TLSO stosowane są gorsety dynamiczne Spinecor. Obserwacje i doniesienia piśmiennictwa z tego okresu dowodzą że ich skuteczność w leczeniu skolioz jest porównywalna lub nawet wyższa od dotychczasowych metod leczenia zachowawczego. Celem pracy jest ocena skuteczności korekcji skrzywienia kręgosłupa z użyciem gorsetów dynamicznych SpineCor.

Materiał i metoda. Badaniem objęto 84 pacjentów u których stosowano dynamiczny gorset w leczeniu idiopatycznego skrzywienia kręgosłupa. Średni wiek w momencie rozpoczęcia leczenia wyniósł 12 lat i 4 miesiące. Leczenie kontynuowano przez minimum 12 miesięcy, oceniając kąt skrzywienia przed rozpoczęciem leczenia, w trakcie stosowania gorsetu i 6 miesięcy po jego odstawieniu. Za pozytywny wynik leczenia uznano korekcję kąta skrzywienia kręgosłupa o ponad 5°, oraz stabilizację skrzywienia czyli utrzymywanie się skrzywienia na poziomie przed rozpoczęciem leczenia (zmiana kąta Cobba o mniej niż 5°). Za negatywny wynik leczenia uznano progresję skrzywienia kręgosłupa o kąt przekraczający 5°.

 Wyniki. W grupie badanej zadawalających wynik leczenia gorsetem Spinecor uzyskano u 68 pacjentów (81%). Z czego u 40 pacjentów (48%) uzyskano stabilizację skrzywienia kręgosłupa, a u 28 pacjentów uzyskano korekcję skrzywienia (33%). U 16 pacjentów (19%) uzyskano niezadowalający wynik leczenia. Trzech pacjentów w grupie z niezadowalającym wynikiem leczenia wymagało operacyjnej korekcji skrzywienia.

Wnioski. 1. W badanej grupie 84 pacjentów dobyły wynik leczenia korekcje lub stabilizacje skrzywienia kręgosłupa uzyskano u 81% leczonych pacjentów. 2. Blisko 90% pacjentów zaakceptowało i stosowało wg zaleceń leczenie gorsetem dynamicznym.

Słowa kluczowe: skolioza, gorset dynamiczny, SpineCor

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Introduction

The use of an orthopedic brace is the method of choice in the treatment of idiopathic scoliosis in children and adolescents. An indication for its use is scoliosis with the Cobb angle in the range from 25° to 40° in growing patients (bone age test according to Risser 0-3 +). In the conservative treatment of idiopathic scoliosis, various types of rehabilitation and corrective programs are applied, regular observations with evaluation of scoliosis progression, electrostimulations of the musculoskeletal system and corset treatment. Until now, only with the use of a corset, the effectiveness of this method in preventing the progression of scoliosis has been proven [1-4].

Two types of corsets are used as a treatment – rigid TLSO (thoraco-lumbar-sacral) corsets and dynamic brace (Spinecor). Reports on the effectiveness of bracing in the conservative treatment of scoliosis are contradictory as regard the assessment of the possibility of effective inhibition of scoliosis progression. The younger age at the start of treatment, the significant angle of scoliosis, double-curve scoliosis are undoubtedly factors that negatively affect prognosis [5-7].

Recently more attention is focused on the possibility of genetic predisposition to scoliosis progression, but the nature of such predisposition is likely to be very complex and involving multiple genes [8].

Patients’ acceptance of the proposed method of treatment remains a problem Stigmatization due to the orthopedic brace, restrictions on mobility and discomfort associated with its use as well as the lack of acceptance among peers may be a significant problem in accepting the treatment and, as a result, in its effectiveness [9].

Material

In 2009-2015, the SpineCor dynamic brace was used to treat idiopathic scoliosis in 92 patients. 84 patients were enrolled in the study, the remaining 8 children decided not to get treatment. There were 71 girls and 13 boys in the treatment group. The average age at the start of treatment was 12 years and 4 months. At the start of treatment, the girls eligible for the corset treatment were before the onset of the first menstrual period or up to a year after its first occurrence. The maturity index of the osteoarticular system was assessed by the Risser method and ranged from 0 to 3+. The Cobb angle of scoliosis was between 20 and 45° at the start of treatment. In the group treated with the most common type of scoliosis, the most common scoliosis type was single right-curved thoracic scoliosis, which was found in 41 patients, the second most frequent scoliosis was double-curved thoracic-lumbar scoliosis in 22 patients, 19 patients had a single-curved scoliosis in the lumbar region or lumbar and in 2 patients, a double-curved thoracic deformity was noted. The Spinecor brace was used in patients diagnosed with idiopathic scoliosis, but abandoned in patients with congenital scoliosis, neurogenic and neuro-muscular scoliosis.

Method

Patients were eligible for treatment with the dynamic brace based on a clinical examination and x-ray in the posterior anterior and posterior projection when standing. The x-ray helps in the evaluation of the Cobb angle, the angle of thoracic kyphosis and lumbar lordosis, the size of the transposition of the scoliosis in relation to the midline. Each patient was evaluated for the so-called corrective movement – a derotation maneuver obtained by means of and using the voltage and individual course of the correction tapes. After putting on the brace, patients underwent x-ray examination to assess the degree of scoliosis correction. Subsequent controls were performed every 6 months. The brace was kept in patients until they reached skeletal maturity – the Risser index ≥4. In girls, the occurrence of the first menstrual period was taken into account and the brace treatment was discontinued 2 years after its occurrence. The brace as used for a minimum of 12 months, at least 20 hours a day, during its use, patients were encouraged to lead a normal lifestyle, engage in physical activity, participate in physical education classes and undertake additional sports activities. Clinical and radiological assessments were made 6 months after the end of treatment. Treatment was discontinued if scoliosis progressed more than 10° or there was scoliosis progression to an angle qualifying for surgical treatment – an angle exceeding 45-50°. The correction of the scoliosis angle by more than 5° was considered to be a positive treatment outcome, as was the stabilization of scoliosis, i.e. the curvature maintained the angle as before the treatment (Cobb angle change less than 5°). Progression of scoliosis by an angle exceeding 5° was considered a negative treatment outcome.

Results

In the study group satisfactory results of Spinecor brace treatment were obtained in 68 patients (81%), of those, 40 patients (48%) achieved scoliosis stabilization, and in 28 patients scoliosis was corrected (33%). In 16 patients (19%) the treatment outcome was unsatisfactory. Three patients in the group with unsatisfactory treatment required surgical correction of the curvature. The results for the whole group are shown in Table 1. The mean scoliosis angle in the group with a good outcome was 27.8° (range 20 to 41°) before treatment, and 23° (range 18 to 41°) after treatment. In the group with unsatisfactory treatment outcomes, the average angle before...
the brace application was 28.2° (range from 24 to 37°) and 41° (from 33 to 50°) after its completion. The mean age in the group with good treatment outcome was 12 years and 9 months and was significantly higher than the average age of children in the group with unsatisfactory treatment outcomes – 11 years and 5 months. In the group with unsatisfactory treatment outcomes there were 15 girls and 1 boy. In the group of scolioses that progressed, there were 8 single-curved thoracic scolioses, 4 double-curved scolioses of the thoracolumbar and lumbar section, and 4 thoracic-lumbar scolioses. Table 2 shows the results of treatment factor in the scoliosis morphology. In the group of the youngest children (Risser test 0), in 11 children, which made up 40%, scoliosis correction was achieved, on the other hand, in this group there was the highest percentage, that is 30% of patients with scoliosis progression, in addition, all three children requiring surgical treatment were also in this group. In contrast, in the group of the oldest children (Risser 3+ test), scoliosis stabilization was most frequently observed. Table 3 presents the treatment outcomes factoring in the skeletal maturity index by Risser’s test.

Discussion

Although orthopedic brace treatment is a widely accepted method of treating scoliosis in children and adolescents, there is still controversy regarding the effectiveness of this method. Most authors agree on the possibility of stopping scoliosis progression using brace treatment. The effectiveness of such treatment depends on the assessment criteria and the nature of the test group and fluctuates within 70-95% of satisfactory outcomes. There are many types of corrective corsets available, starting with corsets used during rest or corsets worn at night through rigid TLSO corsets and ending with Spinecor dynamic brace. In most reports, the effectiveness of their use in the treatment of scoliosis is comparable [10-13].

The presented study included 84 patients treated with a dynamic brace. The spinecor dynamic brace seems, in the authors’ opinion, to be highly acceptable by patients. In the study, only 8 patients, i.e. less than 10% of the treated group, gave up or refused treatment with the dynamic brace. A large percentage of patients accepting and using the proposed treatment, the ability to undertake physical activity when in the corset, maintaining full mobility of the trunk and spine when wearing the brace are undoubtedly advantages of this method of treatment.

Coillard’s studies on a large group of patients demonstrate a high percentage (92%) of satisfactory treatment outcomes. The author reports that only 4.3% of patients needed surgery due to rapid scoliosis progression [14].

In the presented study, the effectiveness of the treatment was estimated at 81%. However, the outcome of poor treatment, that is rapid scoliosis progression with the need for surgical treatment occurred only in 3 patients, which constituted 4% of the treated group. In 13 patients (15%) treated with the brace, scoliosis progression was observed, while until the bones reached maturity scoliosis did not exceed 45° and was not an indication for surgical treatment. As a result, it can be presumed that in some cases the use of the brace,
although it did not stop the progression of scoliosis, at least it slowed it down and ultimately prevented surgical treatment. As in Coillard’s study, the best outcomes were obtained in patients with a single-curved lumbar scoliosis. In this group, none of the patients required surgical treatment due to rapid scoliosis progression.

Considering the treatment outcomes, factoring in the skeletal maturity of patients, it was noted that in the group of patients with the Risser test 0 the highest percentage of scoliosis correction was achieved, this group also included the three children requiring surgery. This allows us to conclude that the group of the youngest patients is the least predictable in anticipating the effect of brace treatment – on the one hand, they can achieve a considerable scoliosis correction, but on the other hand, it is the group with the highest risk of rapid scoliosis progression. In contrast, the group in which scoliosis stabilizations were most often achieved and scoliosis progression was very rarely observed included children exhibiting most advanced osteo-skeletal maturity (Risser 3+ test).

Conclusions

1. In the group of 84 patients, a positive treatment outcome, corrections or stabilization of scoliosis stabilized were achieved in 81% of treated patients.
2. Children with immature osteo-skeletal system (Risser’s test 0) were the group with the least predictable treatment effect – the highest percentage of children with scoliosis correction but also the highest number of children with rapid progression of scoliosis.
3. Nearly 90% of patients accepted and followed the recommendations regarding the treatment with the Spinecor dynamic brace.

References