



What Affects the Lives of Patients with Adolescent Idiopathic Scoliosis More, Brace or Surgery?

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Abstract

Aim: Scoliosis is a deformity characterized by lateral curvature and rotation of the spine. Scoliosis treatment modalities include observation, exercise, bracing, and surgery. This study aimed to compare the effects of bracing and surgery with posterior spinal instrumentation and posterior fusion (PSIPF) on pain, activities of daily living, and depression in individuals with scoliosis.

Material and Method: In this prospectively planned study, 105 patients who met the criteria were included among 184 scoliosis patients who were diagnosed with adolescent idiopathic scoliosis (AIS) and followed up regularly in our clinic between January 2023 and December 2024. The patients who met the inclusion criteria were randomly divided into two groups Brace and Surgery Group. Visual Analog Scale (VAS), Beck Depression Scale (BDS), and Scoliosis Research Society 22 (SRS-22) questionnaire were administered to both groups by the same researchers and the data were compared statistically. A p-value <0.05 was considered statistically significant.

Results: There was no significant difference between the two groups in terms of descriptive characteristics of the participants ($p>0.05$). VAS and BDS data were significantly decreased in the Surgery Group compared to the Brace Group ($p<0.05$). Among the sub-parameters of SRS-22, function, pain, and satisfaction data were significantly improved in the surgery group compared to the brace group ($p<0.05$).

Conclusion: In the treatment of scoliosis, surgical treatment with the PSIPF method seems to be more effective in physical and psychological recovery compared to brace treatment.

Keywords: Adolescent idiopathic scoliosis, instrumentation, braces, spine, deformity

INTRODUCTION

Scoliosis is a deformity characterised by lateral curvature and rotation of the spine with a major curvature angle of at least 10° in the coronal plane (1). Treatment modalities for scoliosis include observation, exercise, bracing and surgery. The criteria taken into account when deciding on the appropriate treatment are the age of the patient, the degree of curvature, and the maturation of the skeletal bones (2). Brace, which is one of the conservative treatment methods of scoliosis, aims to stop the progressive curve and reduce the degree of scoliosis (3). The brace should be used as long as growth continues and is recommended if the patient has progressed 5-10 degrees in the last six months and should be used for an average of 2-4 years (4). Spinal correction surgery is considered in scoliosis patients with complete skeletal ossification and curves with a major curvature angle greater than 45° . The main aims of surgical treatment are to terminate the progression of idiopathic scoliosis, to minimise the risk of progression, to eliminate pulmonary dysfunction, to

relieve uncontrollable low back and back pain, to provide psychological relief by achieving a proper posture and to reduce the rate of short and long-term complications that may occur (5,6). Many techniques have been defined for the correction of curvature in scoliosis surgery, and the most common surgical treatment applied today is posterior spinal instrumentation and posterior fusion (PSIPF) (7,8). Scoliosis surgery is a procedure that requires a great deal of difficulty and patience for the patient and the patient's relatives in terms of operation time, incision size and postoperative follow-up. Therefore, some patients may prefer brace as an alternative to surgical treatment (9). However, the effectiveness of brace and its psychosocial effects on the patient are still a matter of debate (10). In addition, the long-term effects of both treatment methods on patients need to be compared in terms of factors such as pain level, activities of daily living and mental status.

The aim of this study was to compare and evaluate the effects of brace treatment and surgery with PSIPF method on pain, quality of life and depression in individuals with

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adolescent idiopathic scoliosis (AIS). It is aimed that the findings to be obtained will be a guide for patients and physicians in the scoliosis treatment process.

MATERIAL AND METHOD

In this prospective study, 105 patients who met the criteria were included among 184 scoliosis patients who were diagnosed with AIS and followed up regularly in our Orthopaedics and Traumatology Clinic between January 2023 and December 2024. Patients whose informed consent was obtained were included in the study. Ethical approval numbered 03.01.2023/775 was received from the Kayseri City Hospital Ethics Committee for the study. The principles of the Declaration of Helsinki were adhered to at all stages of the study.

Inclusion criteria: (I) diagnosis of adolescent idiopathic scoliosis in our clinic, (II) age between 12-18 years, (III) Patients who have been using a brace for 23 hours a day for at least 1 year and whose Cobb angle is between 20°-45° or who have had PSIPF surgery in our clinic and whose Cobb angle is over 45° with at least 1 year of follow-up, (IV) complete data.

Exclusion criteria: (I) incomplete follow-up and records, (II) the patient had undergone another surgical treatment other than scoliosis during the follow-up period, (III) unwillingness to participate in the study.

The patients who met the inclusion criteria were divided into two groups. Patients who underwent conservative treatment with bracing were included in the Brace Group. Patients who underwent PSIPF were included in the Surgical Group. Each patient included in the study was assigned a patient follow-up number. For each number, the patient's name, surname, gender, age, file number, and date of surgery were recorded. In addition, all physicians participating in the study were ensured to follow uniform treatment and assessment guidelines to minimise the effect of individual differences on treatment outcomes. Visual Analogue Scale (VAS), Beck Depression Scale (BDS) and Scoliosis Research Society 22 (SRS-22) questionnaires were administered to all patients by the same investigator.

VAS: A pain rating scale, often used in epidemiologic and clinical research to measure pain intensity or frequency. It categorizes pain as mild, moderate and severe. In the scale, pain intensity is expressed by numbers between

0-10 on the line segment and is evaluated as no pain at 0 and severe pain at 10 (11).

BDS: It was developed to measure behavioral findings related to depression in adolescents or adults. A score between 0-13 on the BDS questionnaire indicates no depression, a score between 14-19 indicates low depression, a score between 20-28 indicates moderate depression, and a score between 29-63 indicates high depression (12).

SRS-22 questionnaire: Function, Pain, Self Image, Mental Health and Satisfaction with Treatment is an easy and practical quality of life questionnaire consisting of 5 sub-parameters and a total of 22 questions, designed specifically for scoliosis to evaluate the current condition of the spine and widely used all over the world. A scoring system was created so that the total score to be obtained from each sub-parameter would be between 1 and 5. 5 points means the highest score and 1 point means the lowest score (13).

Statistical Analysis

Statistical evaluation of the data was performed using SPSS 22 package program. Normality of the data was examined by Kolmogorov-Smirnov test. Since the data were normally distributed, ANOVA analysis was used in the comparison of more than two group averages by using the independent t-test for two group mean comparisons. The level of error was taken as 0.05.

RESULTS

Of the 105 patients included in the study, 74 were female and 31 were male with an average age of 14.58 ± 1.68 years. Of the cases, 57 were Lenke Type-1, 37 were Lenke Type-2 and 11 were Lenke Type-3. The mean age of 54 patients (39 F, 15 M) included in the Brace Group was 13.52 ± 1.69 years and the mean Cobb angle was $31.81^\circ \pm 3.73$, while the mean age of 51 patients (35 F, 16 M) included in the Surgery Group was 15.65 ± 1.68 years and the mean Cobb angle was $60.14^\circ \pm 9.51$. VAS value indicating pain level and BDS data indicating behavioural findings of depression were found to be significantly decreased in the surgery group compared to the brace group ($p < 0.05$). Function, pain and satisfaction data, which are sub-parameters of SRS-22, were significantly improved in the surgery group compared to the brace group ($p < 0.05$), (Table 1).

Table 1. Comparison of brace group and surgery group data of adolescent idiopathic scoliosis patients

	Brace group (n=54) (Mean±SD)	Surgery group (n=51) (Mean±SD)	Sig (p)
VAS	4.7±1.1	3.8±0.9	.005
Beck Depression Scale	18.5±9.4	15.4±6.9	.019
SRS-22			
Function	3.8±0.6	4.2±0.8	.022
Pain	3.6±0.9	4.3±0.3	.002
Self Image	4.0±0.8	4.2±0.7	.059
Mental Health	4.0±0.6	4.1±0.7	.392
Satisfaction	3.9±0.6	4.5±0.8	.016
Mean	3.9±0.7	4.3±0.7	.032

VAS: Visual Analog Scale, SRS-22: Scoliosis Research Society 22, SD: standard deviation, Sig: significant

DISCUSSION

In this study, the effects of surgical and bracing methods on pain, physical function and depression in the treatment of AIS were compared. Our findings show that surgical treatment, especially when applied with the PSIPF method, reduces behavioural symptoms of pain and depression and improves physical function more than bracing treatment. It is also reported in the literature that surgery is recommended in scoliosis patients, especially in cases with a Cobb angle of 40° and above, to protect pulmonary functions, relieve chronic pain and improve psychological well-being (5,7).

On the other hand, although surgical treatment is effective in halting the progression of scoliosis, brace treatment is also considered as an important alternative in certain patient groups. In recent years, brace treatment has gained popularity in the management of scoliosis, especially in infancy, because it involves lower risks compared with surgery (9). However, there are different opinions in the literature regarding the effectiveness of bracing. Some studies have demonstrated that daily brace use for 20-23 hours slows the progression of scoliosis and reduces the necessity for surgery (10,14), whereas some studies have reported that brace treatment has no significant effect on scoliosis (9).

In this context, the findings of our study support that surgery provides more significant functional improvements in the treatment of scoliosis compared to bracing. However, it should be kept in mind that the success of bracing depends on factors such as flexibility of the curve, duration of use and patient compliance (15,16). Considering the findings that bracing and exercise therapy may reduce the need for surgery, especially in patients with a high risk of progression (17), it can be said that patient-based individualised approaches should be adopted in the treatment of scoliosis.

The effects of scoliosis surgery on pain, physical function and psychosocial health have been extensively studied in the literature and most studies have emphasised the positive effects of surgery. In our study, significant improvements were observed in the pain scores, physical function and psychosocial health of scoliosis patients who underwent surgical treatment with the PSIPF method. Especially pain scores were found to decrease significantly after surgery, and this finding was consistent with previous studies (18-21). In addition, factors determining quality of life such as physical functionality and self-confidence have also been found to improve after surgery (22-24).

The main reason for patients to seek treatment is the negative effect of spinal deformity on body image (25). Body image and mental health are affected by the progression of scoliosis (26). Patients are seriously concerned about the negative effect of scoliosis deformity on body image. They also feel a decrease in self-confidence, shame and even a sense of inferiority. Lack of

self-confidence may lead to pessimism and anxiety and may cause impairment in social functioning and isolation (22). Surgical correction of the deformity in scoliosis does not only correct the curvature. It significantly improves the quality of life of the person. Moreover, it provides significant psychological improvements (23).

Bunge et al. reported a significant improvement in the functional/activity scores of the operated patients. They also found that a slight improvement was observed in mental health scores (24). In contrast, Carreon et al. (27) did not find any significant change in mental health scores. Mariconda et al (22) showed that patients who underwent scoliosis surgery continued to show poorer physical conditions and role limitations compared to scoliosis-free individuals with similar or superior mental health characteristics (28-30). Mens et al reported a significant decrease in functioning, self-image and pain and very few adverse events at two-year follow-up after PSIPF (31).

In the present study, it was observed that scoliosis patients who underwent surgical treatment with the PSIPF method showed significant improvement in physical function and behavioral findings of depression. In line with these findings, it can be said that scoliosis surgery not only corrects the spinal curvature but also plays an important role in improving the overall quality of life of the individual. The good results seen after surgical treatment, especially in scoliosis patients with a Cobb angle of 45° and above, may be due to the patients being in a more painful and distressed state before surgery.

However, our study has some limitations. These include the relatively small size of the study group and the lack of long-term follow-up of the patients. Future long-term follow-up studies with larger patient groups will help to better evaluate the long-term efficacy of the PSIPF method in scoliosis surgery. In addition, the fact that scoliosis curvatures are not of similar types is another limitation of the study.

CONCLUSION

This study demonstrates that surgical treatment with posterior spinal instrumentation and fusion is more effective than bracing in the treatment of scoliosis. Surgical intervention provides significant advantages not only in the correction of spinal curvature but also in the improvement of physical function and quality of life of patients. In addition, the positive effects of surgery on mental well-being have also been found to be remarkable. In conclusion, in appropriate patient selection, PSIPF method can be considered as a treatment option with the potential to provide a more comprehensive and permanent improvement in the treatment of scoliosis.

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Conflict of interest: The authors have no conflicts of interest to declare.

Ethical approval: The Kayseri City Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (03.01.2023/number: 775).

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