

TREATMENT OF SCOLIOSIS WITH BOSTON BRACE

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Between 1989 and 1994 55 patients with idiopathic scoliosis and 5 patients with congenital scoliosis were treated by Boston Brace. We evaluated curve progression during treatment and after completion of treatment. 32 of patients were female and 28 of them were male. The average age was 11.75 years. The scoliosis angles were measured by Cobb technique. Pretreatment curves ranged from 16 degrees to 57 degrees (33.2 degrees average). The curve patterns were thoracal for 28, thoracolumbar for 30 and lumbar for 2 of the patients. The average Cobb angle with brace was 24.6 degrees (from 8 to 41). After application of brace, the curves were within the 30% of the pretreatment Cobb angle. We found that Boston Brace treatment for idiopathic scoliosis during adolescence, prevents curve progression. The most advantages of Boston Brace are patient tolerance and its cosmetic appearance. Initial curve and flexibility are the most important factors for curve prognosis.

Key Words: Scoliosis, Boston Brace.

Patients with untreated adolescent idiopathic scoliosis have the risk of curve progression. Previous reports have indicated that, bracing may favorably alter curve progression in immature patients with idiopathic curves. In a study, (Carr et al.) (2) Milwaukee brace treatment for adolescent scoliosis with a minimum follow-up of 5 years was reported. Continued loss of correction was noted in 80% subsequent to weaning from the brace. In another study Emans et al. (3) reported results of treatment with Boston Brace with a minimum follow-up of 1 year. The pretreatment curve magnitudes measured from 20Z to 59°, initial Risser sign ranged from 0 to 4, average age was 13.2 years (ranged 4-18 years). This review demonstrated a 19% of failure rate. 12% of their patients required fusion and the curves in 7% progressed 5° or more.

There is a general agreement that, the initial curve magnitude and skeletal maturity are prognostic factors in relation to progression. Surgery is often used as a measure of failed conservative treatment. However, the indications for surgery have been altered during past two decades and there are many factors effecting the decision whether or not to operate. The purpose of this study is to study the preventing effect of Boston Brace to curve progression in patients with idiopathic scoliosis during adolescence.

MATERIALS AND METHODS

Between 1989 and 1994, 60 patients with idiopathic scoliosis were treated by Boston Brace in Orthopaedic Surgery Department of Ege University Hospital.

55 of them were idiopathic and 5 of them were congenital scoliosis. 32 patients were female and 28 of them were male.

The average age was 11.75 years. Before the treatment, PA thoracolumbar radiograms were taken in standing position and in right and left lateral flexion positions. Flexion radiograms were taken to determine the curve was flexible or not. The indications for brace treatment were:

- (a) a curve of 20° or more
- (b) age of less than 16 years
- (c) Risser sign below 4

(b) and (c) were related to flexibility. Failure of a conservative treatment was considered to occur when the curve exceeded 45°. Six months of daily brace wearing was a minimum requirement to be accepted as treatment and patients were followed by three months intervals. During follow-up, PA thoracolumbar radiograms were taken with and without brace in standing position. Full-time (more than 22 hours) brace-wearing was recommended. The time of bracing averaged 20 months ± 8 months. Weaning from the brace was initiated when the age exceeded 16 years or when Risser sign was 4 or above. Pretreatment curves ranged from 16° to 57°. (There was only one patient with curve below 20° and there were three patients above 45°. Their curves were 48°, 53° and 57° and two of them were congenital scoliosis). Except these four patients, all of the curves were between 20° to 45° (33.2° average). The curve patterns were low thoracal for 28, thoracolumbar for 30 and lumbar for 2 of the patients.

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The measure of braces were taken by physicians at the Risser table in the hospital, and during measuring, longitudinal traction was applied to the patients. The braces were manufactured at the orthotic and prosthetic unit of the Orthopaedic Surgery Department by two experienced orthotists.

RESULTS

For all of the patients, the average Cobb angle with brace was 24.6° (from 8° to 41°). The average angle for 28 low thoracal scoliosis before treatment was 33.2° (from 16° to 57°) and with brace was 24.7° (from 10° to 41°). The angle for 30 thoracolumbar scoliosis was 35.65° pretreatment (from 19 to 53) and 25.75° (from 12 to 46) with brace. One of the two lumbar curves was 20° before treatment and 18° with brace.

For the other one, pretreatment curve was 24° and with brace the curve was 20°.

During follow-up, PA radiograms without brace were taken and 9 of 55 idiopathic scoliosis patients (16.3%) showed improvement of mean 4.7°. The other 46 of patients showed no change more than 5° in curvature and none of them required surgery. Three of the five congenital scoliosis showed progression at follow-up and required surgery. Two of them have been still at follow-up.

No statistically significant difference between low thoracal and thoracolumbar curves at response to the treatment was determined.

The brace was a well-tolerated orthosis and patient compliance with brace-wearing was good. None of the patients was known to be noncompliant, and no important complication related to brace-wearing was seen. The brace was cosmetic and was easily camouflaged with clothes.

DISCUSSION

The progression of idiopathic scoliosis occurs during growth especially at the time of the most rapid adolescent skeletal growth. Although the exact incidence of progression has varied greatly in different reported series (8), the risk of curve progression in mild or moderate scoliosis may be favorably altered by bracing (5, 11). In recent decades new type of scoliosis braces have been developed (4). The primary correction of the scoliosis by brace has been about 30 percent. This correction was slightly less than the literature. The forces acting as a correction on the scoliosis when using these types of braces are distractor and

lateral forces. Furthermore, it has been assumed that, the efficiency of these forces is increased by the flexion of the lumbar lordosis. The distraction forces has little influence in cases suitable for conservative treatment. The most effective force is thus the lateral push on the trunk aiming to correct the lateral deviation as well as the rotation.

The purpose of the present paper was to study the initial correction of the curves by custom made Boston Brace. The brace is used for the both thoracic and lumbar scoliosis. We preferred the Boston brace in all scoliotic patients below the thoracal 7 vertebrae. Boston brace has more tolerance than the Milwaukee brace beside the effectiveness.

The patient casted while in the supine position on Risser casting table using radiographs as a blueprint. With this technique the maximum delordolosition obtained which is important especially for lumbar scoliosis.

The time for bracing is still controversial. Price et Green emphasizes the effectiveness of part-time bracing. Many authors use full-time bracing (>22 hours in a day). Studies have documented the effectiveness of full-time regimen. In arresting the progression of idiopathic scoliosis, we applied the braces at least 21 hours in a day and allowed out of brace to swim and for physical exercises.

CONCLUSION

These preliminary results of Boston brace application revealed the initial corrections of the curves and encouraged and justified continued treatment. Gradually weaning of brace was started after skeletal maturity which requires averagely 2 years. In spite of some long term follow-up studies reveal a slight progress after weaning, we believe that, this curve progressions are in the limit of brace treatment and do not necessitates surgical intervention (9).

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