

HORIZONTAL PLANE ANALYSIS OF THE IDIOPATHIC SCOLIOTIC CURVES TREATED WITH THE ISOLA SPINAL INSTRUMENTATION *

Hakan ÖMEROĞLU MD. A. Yalçın TABAK MD. Ali BİÇİMOĞLU MD.
Uğur GÜNEL MD. Olcay ÖZEKİN MD.

ABSTRACT :

Seven female and three male patients with idiopathic scoliosis were treated surgically with the Isola Spinal Instrumentation at the 3rd Department of Orthopaedic Surgery and Traumatology of Ankara Numune Hospital, between the dates July 1993 and November 1995. The age at operation ranged from 9 to 24 years with an average of 13.6 years. The type of the curve according to King's classification was type II in 1 curve, type III in 7 curves and type IV in 2 curves.

Preoperative and postoperative horizontal plane analyses of totally 11 curves were made by using the Perdriolle torsio meter. The average measurement values were $25.00^\circ \pm 7.75^\circ$ ($15^\circ - 40^\circ$) preoperatively and $19.55^\circ \pm 8.50^\circ$ ($10^\circ - 35^\circ$) postoperatively. The amount of average correction was 20%. Statistical analysis of the data was made by using student t-test, and it was seen that there was no statistically significant difference ($p = 0.066$) between the preoperative and postoperative measurement values of the curves in the horizontal plane.

It was concluded that, although the frontal plane correction, obtained with the Isola Spinal Instrumentation was very significant ($p < 0.001$), the amount of horizontal plane correction of an idiopathic scoliotic curve, treated with this system was not as notable as the frontal one.

Key words: Idiopathic scoliosis, vertebral derotation, Isola instrumentation.

INTRODUCTION

Scoliosis is a three-dimensional deformity. The ideal system for correction of scoliosis should provide correction in frontal, sagittal and horizontal planes (2).

In the past few years, there has been an important development in the surgical treatment of patients with idiopathic scoliosis. Although the basic surgical procedure, that is a well performed spinal fusion, remains the same and is the key for a successful result, many types of instrumentation are being rapidly introduced to improve correction, fixation and postoperative care.

Isola Spinal System is one of the recent systems, based primarily on the works of Harrington (11), Luque (15) and Steffee (19). The implant is composed of anchors, Longitudinal members, longitudinal member to anchor connectors, longitudinal member to longitudinal member connectors and accessories (4, 5).

The aim of this study is only to investigate the postoperative derotational effect of this new system. A detailed three dimensional analysis or follow-up findings will not be discussed.

MATERIALS AND METHODS

This study included 10 idiopathic scoliotic patients (7 female and 3 male) with an average age of 13.6 years (9-24 years). They were treated surgically with the Isola Spinal Instrumentation at the 3rd Department of Orthopaedic Surgery and Traumatology of Ankara Numune Hospital, between the dates July 1993 and November 1995. The type of the curve according to King's classification (12) was type II in 1 curve, type III in 7 curves and type IV in 2 curves.

Preoperative and postoperative frontal and sagittal (thoracic kyphosis) plane analyses of the curves were made by using the Cobb method (8). Horizontal plane analysis of 11 curves of 10 patients was made by using the Perdriolle torsionmeter (18) that has already been found accurate and reliable (10, 16). All measurements were made at 5° increments as advised by Perdriolle, on the apical vertebra of the curve (17).

Statistical analysis of the data was made by using student "t-test" and level of significance was set at $p < 0.05$.

* Ankara Numune Hospital, 3rd Department of Orthopaedics and Traumatology, Ankara - TURKEY

	Preoperative	Postoperative	Statistics
Frontal plane (n = 11)	53.60 ± 21.36 (36-89)	23.60 ± 14.62 (10-58)	p < 0.001*
Sagittal plane (thoracic kyphosis) (n = 10)	24.38 ± 9.27 (15-42)	18.88 ± 5.17 (10-24)	p = 0.082**
Horizontal plane	25.00 ± 7.75 (15-40)	19.55 ± 8.50 (10-35)	p = 0.066**

* Significant difference

** Not significant

RESULTS

A remarkable correction (56%) was achieved in the frontal plane. In 7 of the patients thoracic kyphosis was normokyphotic, in 2 hypokyphotic and in 1 hyperkyphotic. So, an important average sagittal plane change was not observed. In horizontal plane the amount of correction obtained with this system was 20%, but this was not found to be statistically significant.

DISCUSSION

One of the most important purposes of correction and fusion of idiopathic thoracic scoliosis is the preservation of pulmonary function, so greater attention to the pulmonary problems is necessary (20). Obtaining a normal thoracic contour is the best way to improve lung volumes and flows (1). Rib hump and vertebral rotation appear directly related, so, horizontal plane correction, that can be achieved by derotation of the vertebral column, has an important potential influence on rib hump deformity, thoracic cage dimensions and pulmonary function (9, 13, 14). In derotation systems like CDI, the derotation maneuver may be more of a translational maneuver (14).

The posterior systems with rod and sublaminar wires provide correction of the deformity in frontal and sagittal planes. Corrective effect of these systems in horizontal plane is questionable. Stability and technical ease are known to be the other advantages of these systems. On the other hand the risk of cord injury is higher with respect to other posterior spinal systems (2).

We observed that, more derotation was obtained in more flexible curves, by using the Isola instrumentation. It is well known that the degree of frontal plane deformity correlates well with the degree of horizontal plane deformity. As the number of King type II and IV

curves included in this study, was insufficient to make an statistical analysis, we could not investigate the correlation between the type of the curve and the amount of derotation.

Both Asher (3) and Boachie-Adjei (7) reported a significant correction in the frontal plane, a normal alignment in the sagittal plane and some correction in the horizontal plane of the idiopathic scoliotic spines. Yazar and associates (22) stated that in scoliosis management Isola system was an effective device for the correction of frontal and sagittal plane deformities, but not of horizontal plane deformity. In the literature, there are few reports comparing Isola system or similar systems with other systems. Yazar and associates (23) found no significant difference between Isola and CD in the correction of sagittal plane alignment of the patients with idiopathic scoliosis. Wojcik and associates (21) reported that, Cotrel-Dubousset (CD) was not significantly different from Harrington-Luque (HL) with respect to frontal Cobb angle, kyphosis, lordosis and apical vertebral rotation, but CD was significantly better than HL with respect to correction of vertebral rotation mainly above the apex. While comparing CD and HL Bilsel and associates (6) concluded that, CD group had a greater correction degree especially in flexible curves. Kolavo and associates (13) reported that, CD offered significantly better frontal and axial plane correction of idiopathic curves than did the Luque technique with a lower incidence of neurologic injury and implant failure.

Our findings show that, the amount of correction in horizontal plane, obtained with the Isola system is not notable as the frontal plane. But, in the horizontal plane 20% correction is known to be satisfactory.

In conclusion, the amount of correction, obtained by the Isola system in horizontal plane 20% correction is known to be satisfactory.

In conclusion, the amount of correction, obtained by the Isola system in horizontal plane of the idiopathic scoliotic curves is not as high as derotation systems. If rib hump deformity is not acceptable, thoracoplasty should be performed during the procedure. It should be remembered that, the surgeon who performs scoliosis surgery should select the procedure that he or she has adequate experience.

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