

## COMBINED ANTERIOR AND POSTERIOR SURGERY FOR THE TREATMENT OF RIGID IDIOPATHIC SCOLIOSIS

Şükrü SOLAK \*  
Mahmut KIŞ \*

İ. Teoman BENLİ \*  
Mert TÜZÜNER \*

Erbil AYDIN \*  
Serdar AKALIN \*

### ABSTRACT:

Posterior instrumentation is not sufficient generally for the correction of rigid idiopathic thoracal or lumbar curves; over correction invites the neurological complications, anterior release is generally necessary for this reason. Twenty-one rigid idiopathic scoliosis cases have been treated by combined anterior and posterior surgery. With Texas Scottish Rite Hospital (TSRH) Instrumentation from November 1991 to May 1994 with a mean of 12.4 months. Twelve patients underwent combined surgery in two stages in the same operative time. Preoperatively mean frontal plane Cobb angle of the curves was  $74^\circ$  and mean postoperative Cobb angle correction was 49.7 %. Physiological thoracal kyphosis has been obtained on 16 cases. There was no early or late postoperative complications except one patient. This patient had incomplet paraplegia postoperatively and had been improved completely during follow-up period. We concluded that anterior release for idiopathic scoliosis curves could be performed in the same operative time with posterior instrumentation and fusion an protection of segmental vertebral vessels reduce neurological deficit risk during anterior surgical procedure.

### INTRODUCTION

Correction of scoliotic deformity by anterior fusion and instrumentation is an established treatment since Dwyer's introduction of the technique in 1964 (5, 6). The combination of anterior and posterior spinal fusion is indicated for severe and rigid deformities or when fusion is necessary in patients under 10 years old to avoid the crankshaft phenomenon (4).

Initial reports on combined surgery recommend a 1-2 week period between two stages (4). However, advances in surgical and anesthetic techniques and theoretical advantages in pulmonary function and nutrition with decreased hospitals costs have led to increasing use of combined anterior and posterior spinal fusion under one anesthetic (3).

### MATERIALS AND METHODS

Twentyone rigid idiopathic scoliosis cases have been treated from November 1991 to May 1994 with a mean follow up 12.4 months. Twelve patients underwent combined surgery in two stages while 9 other patients have been operated for two stages in one anesthetic. 14 patients were males, 7 others were females. Average ages of patients was 14.5 years (range 10-17 years).

For all delayed surgery patients between two stages, we used halochair traction. During the anterior sur-

gery we always tried to keep as possible as the segmental spinal vessels.

### RESULTS

#### Average curve correction :

Preoperatif frontal Cobb angle was  $74^\circ \pm 30^\circ$  for all patients; for staged surgery patients this values was  $73^\circ \pm 30^\circ$  and far sameday surgery patients was  $75^\circ \pm 35^\circ$ . Average correction was  $36^\circ \pm 9^\circ$  or 49.7 % far all patients. Far staged surgery patients this value was  $35^\circ \pm 12^\circ$  or 49.2 % and for sameday surgery patients and  $38^\circ \pm 11^\circ$  or 50.6 % far staged surgery patients.

Finally, we found some loss of correction probably hot meaningful. In first group the loss of correction was  $3.0^\circ \pm 6.0^\circ$  and in the second group was  $3.0^\circ \pm 4.5^\circ$ .

Even there is no big differences between two groups, we obtained slightly better correction on sameday sequential surgery patients againts the staged surgery patients.

#### Sagittal Plane:

Preoperative mean thoracal kyphosis was  $27.5^\circ \pm 25.9^\circ$  and lumbar lordosis was  $23.3^\circ \pm 13.7^\circ$  in all patients. They increased postoperatively to  $33.7^\circ \pm 15.7^\circ$  and to  $29.1^\circ \pm 14.2^\circ$ . In staged surgery patient, the preoperative sagittal contours were respectively  $27.3^\circ$   $14.2^\circ$  in the thoracal region and  $23.1^\circ \pm 13.6^\circ$  in the lumbar region and postoperatively was increased to  $33.3^\circ \pm 10.0^\circ$  and  $28.9^\circ \pm 13.9^\circ$  respectively. In same

\* 1st and 2nd Departments of Orthopaedic and Traumatology, Ankara Social Security Hospital, Ankara, TÜRKIYE

day surgery patients, the preoperative mean thoracic kyphosis angle was  $27.8^\circ \pm 23.0^\circ$  and preoperative mean lumbar lordosis was  $23.3^\circ \pm 12.9^\circ$ . Postoperatively, they became  $33.9^\circ \pm 14.2^\circ$  and  $29.3^\circ \pm 11.1^\circ$  respectively in this group.

#### Operative time:

Staged surgery patients averaged  $7.1 \pm 1.2$  hours and same day surgery patients averaged  $6.9 \pm 1.1$  hours. There was no significant difference between two groups.

#### Blood Loss:

Staged surgery patients, estimated blood loss was  $800 \pm 400$  ml, whereas same day surgery patients averaged  $650 \pm 300$  ml. Estimated blood loss of first group was more than second group's and this difference was statistically significant ( $p < 0.05$ ).

#### Hospital Stay:

The average hospitalization time for staged surgery patients was  $27.6 \pm 5$  days and  $15 \pm 7$  days for same day surgery patients. Patients who underwent delayed two stage surgery had significantly greater hospital stay than the patients who underwent same day sequential surgery.

#### Complications:

Even our follow-up period isn't sufficiently long for all patients we had not early or late complication on same day surgery patients. In staged surgery patients we had two complications. In one patient we had an incomplete paraplegia after the second stage. This patient had been improved completely during the follow-up period.

Another patient had serious late infection who needed removal of the hardware 1 year postoperatively. He had a fistula despite the serious surgical debilitation. Another patient after two years of follow-up had severe spinal imbalance.

#### DISCUSSION

Combined anterior and posterior spinal fusion has been recommended for the patient with severe deformities or scoliosis that is rigid, spondylolisthesis with high slip angle and kyphosis of more than  $50^\circ$  (1, 2).

The combined approach also has been advocated when fusion is necessary for very young patients because of the possibility of crankshaft phenomenon or creating lordotic deformity with growth after posterior fusion alone (4).

The standard approach in the past has been for the patients to recover 1-2 weeks after anterior surgery and then have the posterior surgery performed.

In the past few years, the importance of nutrition and early mobilization in the recovery of patients from injury or surgery has been recognized (8). In addition there has been a major effort to control hospital costs and hospitalization time. Concomitantly there has been an attempt to perform anterior and posterior spinal surgery on the same day in some centers (7).

In our hospital, our major goal to perform same day combined anterior and posterior spinal surgery is to reduce hospital stay of the patients.

We have no meaningful difference of operative time between two groups as explained in the literature (3, 7, 8). But same day sequential surgery patients had considerably shorter hospital stay ( $15 \pm 7$  days against  $27.6 \pm 5$  days in the other group).

The diminished blood loss in the same day group is difficult to explain as stated in the literature (7, 9, 10).

Correction of the deformity did not appear to differ significantly between the groups.

There is no big complications on the same day surgery group. Although we routinely recorded Somatosensory Evoked Potentials (SEP) + Transcranial Magnetic Motor Evoked Potentials (TkMMEP) during surgery, we always tried to protect segmental spinal vessels during anterior surgery in order to diminish neurological risk.

#### CONCLUSION

After some experiences obtained in our clinics we concluded that anterior release of the rigid idiopathic scoliotic curves could be performed in the same operative time with posterior instrumentation and fusion and protection of the segmental vessels reduce neurological deficit risk during anterior surgery.

#### REFERENCES:

1. Bonnett C., Charles Brown J.C., Grow T.: Thoracolumbar scoliosis in cerebral palsy. *J Bone Joint Surg (Am.)* 58 : 328-335, 1976.
2. Byrd J.A., Scoles P.V., Winter R.B. et al.: Adult idiopathic scoliosis treated by anterior and posterior spinal fusion. *J Bone Joint Surg (Am.)* 69 : 843-850, 1987.
3. Dick J., Boachie-Adjai O., Wilson M.: One stage versus two stage anterior and posterior spinal reconstruction in adults: comparison of outcomes. AAOS, Annual meeting, Washington D.C. February 20-25, 1992.

4. Dubousset J., Herring J.A., Shufflebarger H.: The crankshaft phenomenon. *J Pediatr Orthop* 9 : 541-550, 1989.
5. Dwyer A.F., Schafer M.F.: Anterior approach to scoliosis: A preliminary report. *Clin Orthop* 62 : 192-202, 1969.
6. Dwyer A.F., Schafer M.F.: Anterior approach to scoliosis: Results of treatment of 51 cases. *J Bone Joint Surg* 56 B : 218-224, 1984.
7. Emlisha T., Powell I.V., Walter F., et al.: Comparison of same day sequential anterior and posterior spinal fusion with delayed two stage anterior and posterior spinal fusion. *Spine* 11 : 1256-1259, 1994.
8. Mandelbaub B., Tolo V.T., McAfee P.C., Buresh P.: Nutritional deficiencies after staged anterior and posterior spinal reconstructive surgery. *Clin Orthop* 234: 5-11, 1988.
9. Saer E., McCarty R., McCullough F.: Anterior/posterior spine surgery done as one stage versus two stage procedures. AAOS, Annual Meeting, Washington DC, February, 20 - 25, 1992.
10. Shufflebarger H.L., Grimm J.O., Bui V.: Anterior and posterior spinal fusion : staged versus same day surgery. SRS, Annual Meeting, Amsterdam, The Netherlands, September 17-22, 1989.