

# CONTROLLED RELEASE WITH DYNAMIC EXTERNAL FIXATOR BEFORE FUSION IN SEVERE-RIGID (KYPHO) SCOLIOSIS NEW METHOD\*

M. CANIKLIOĞLU MD  
N. KUTLU MD

C. MİRZANLI MD  
H. KARAMEHMETOĞLU MD

C. AZAR MD

## ABSTRACT :

*In severe rigid scoliosis the basic choice of the treatment is combined anterior and posterior approaches. After anterior instrumentation and fusion and before posterior fusion in order to correct the curve halo-pelvic and halo-femoral traction are currently used methods.*

*In our clinic nine patients were treated by this method between September 1992-June 1995. In this study to both ends of the curves, after with or without anterior release short posterior instrumentations were applied. CAF type external fixator was connected to the proximal and distal instrumentation by means of special connectors. After controlled distraction of the deformity at mean 8.9 days post. Fusion was done. In our series 5 male, 4 female patients with the mean age of 17.8 y (10-25) are present and mean follow up is 1.6 m (6-38). In frontal plane mean angle of deformity was 103.8 degrees before operations, mean corrections was 26.2 degrees after distraction and 35.7 degrees after post. instrumentation. As a result in this method in contrast to halo-pelvic and halo-femoral, halo-gravity distraction, only the deformity is distracted instead of whole vertebral column, easy even for the surgeon and the patients and it also reduces the risk of paraplegia.*

**Key words:** Severe idiopathic scoliosis, controlled distraction, dynamic external fixation.

## INTRODUCTION

In the treatment of severe both sagittal and plain deformities of thoracolumbar vertebrae combined anterior and posterior approaches is recommended (9).

In the light of the current literature's we can classify the treatment of the method in three parts:

- Posterior instrumentation and fusion following anterior release (13).
- Two rod to concave curvature technique by Cotrel Dubousset (3).
- Halopelvic and halofemoral distraction and posterior instrumentation and fusion following anterior release (2, 4).

The first attemption to correct scoliotic deformities by longitudinal traction in the literature's is by Glisson in 1660, Verel in 1788, Sayre in 1874 (9).

After the reporting of the halo-device by Perry-Nickel in 1959 different versions of the device have been applicated in vertemral surgery. These are halo-pelvic, halo-femoral and halo-gravity traction methods. At the top of the indications of the vertebral

traction high angle severe scoliotic deformities is present (4). In this study we planned to describe the new traction method and our clinical experience.

## PATIENT AND METHOD

We applied this method to 9 patient in SSK İstanbul Graduate Hospital 2nd Ortho. and Trau. Clinic between September 1992-June 1995. 5 male, 4 female of 9 patients with the mean age of 17.8y (14-25). Preoperative plain deformity was 103.8 (90-122) degree. In terms of ethyology all the patients are idiopathic adolescent one. 5 of them have single thoracic, 4 of them have double thoracolumbar curve. In 4 cases previous anterior release was done before distraction, in 5 cases only distraction was done before posterior fusion.

## METHOD

With small posterior long. Incision both the at proximal and distal end of the curve were made, vertebral column were exposed proximally and distally, small posterior instrumentation were done with pedicular hooks and screws, threaded rod was

applied subcutaneously to both end of the curve. After the closure of the wounds dynamic external fixator was connected. We used CAF (MFF-multifunctional fixator) type external fixator. Dynamic distraction was applied with the mean period of the time which was 8.9 days (7-14). After removal of the previous instrumentation posterior instrumentation and posterior fusion was done.

## RESULT

In the 4 cases with anterior release before dynamic distraction the mean correction angle was 28.3 degrees (25-36.3), in the 5 cases without anterior release it was 25.3 degrees (22.3-30.8).

After the posterior instrumentation and the fusion the overall mean correction was 36.3 degrees (28.2-38.3) in the first group, 30.2 degrees (26.7-35.2) in the second group. We can not compare the result because in the first group the patients were more severe than the others.

As complication in 2 patients pin-tract infection which were treated by suitable antibiotic, in one cases deep infection started postoperatively and continued, we have removed the instrumentation at the end of the 18 months and we have seen that fusion was completed preoperatively, and the infections was improved completely. Neurologic deficit was never seen during distraction, 2 malposition of the pedicular screws due to severe rotation of the vertebrae; in these cases no neurologic deficient and irritation was seen and we completed the procedure normally.

## DISCUSSION

Few reports we could found about the application of the external fixator in the treatment of vertebral pathology. All these reports were about the stabilization of the lumbar vertebrae in different pathologies Esses, Magerl, (7, 8, 10).

Vertebral lengthening by external fixators was firstly reported by Stefko and his friends (12). As in our study external fixator application to vertebrae in order to dynamic distraction of the vertebral deformities was not found.

Since we don't know the ethyology of idiopathic adolescent scoliosis we can treat the patient symptomatically which is posterior fusion to prevent or correct the deformity. In some neglected cases the patient admits with severe and rigid deformity.

Nowadays after the tridimensional evaluation of the scoliosis each patient has been started to treat differently (3).

In severe and rigid deformities both anterior and posterior combined approaches are basic choice of the treatment (9, 13).

Halo-pelvic and halo-femoral traction after the anterior release both correct the deformities and make easier the posterior instrumentation and the fusion.

In these methods whole vertebral column are distracted, additionally complications in these methods are commonly in cervical region. These are chronic cervical pain, spontaneous cervical fusion, degenerative joint changes in cervical vertebrae, dens osteonecrosis, cranial nerve pathologies (1, 5, 6, 11, 14, 15). Other complications are deep vein thrombosis, contractures in the hips, psychologic problems, and in cases of congenital kyphosis in 4 cases paraplegia was reported after the distraction Winter and the friends (9, 16).

In our method traction is applied only to the pathologic region instead of whole vertebrae. Cervical, pelvic, and the femoral region are not involved in the traction so the complications about these regions are not seen. In our study the only complication was infections; two are pintract, the other one is deep infection which are treated completely. No more complication about the method was seen including neurologic one.

We thought that our method uses the principles of tension-stress of Ilizarov. Other than severe deformities of adolescent with high curve angle especially in younger age group modifications of this method can be used to infantile and juvenile scoliosis and perhaps avoidance of the fusion in these group can be achieved. Of course animal, models and the clinical studies must be done on this subject.

As a result since in this method application of the traction is only to the pathologic region and so avoidance of the related complications can be achieved, and easier both for the surgeons and the patients.

## REFERENCES

1. Boum, J. A., Henley, E. N., Pulliekines, J. Comparisons of halo complications in adults and children. *Spine*: 3, 251-2, 1989.
2. Bradford, D.S. Treatment of severe spondylolysis. A combined approaches for reduction and stabilization. *Spine* 4: 423, 1979.

3. Cotrel, Y. Debousset, J. CD Enstrumentation in Spine surgery Principles, Technicals, Mistakes and Traps, Montpellier, Sauramps Medical. 1992.
4. De Wald, RL, Ray, R.D. Skeletal traction for the treatment of severe scoliosis. The University of Illinois halo-loop apparatus. *J. Bone and Joint Surgery* 52-A: 233, 1970.
5. Dove, J. Hsu, L.C. You, A.C. The cervical spine after halo-pelvic tractions. An analysis of the complications of 83 patients. *J. Bone and Joint Surg.* 62-B: 158-161, 1980.
6. El Shaker, M., Watts, H.G. Acute brachial plexus neuropathy secondary to halo-gravity traction in a patient with Ehlers-Danlos Syndrome *Spine* 3: 385-6, 1991.
7. Esscs, SL., Bradford, D.J., Kostuik, J.P. The role of external skeletal spinal fixation in the assessment of low-back disorders. *Spine* 14: 594-601, 1989.
8. Magerl, F. Stabilization of the lower thoracic and lumbar spine with external skeletal fixation. *Clin. Orthop*, 189, 1215-141, 1984.
9. Moel, S. Textbook of scoliosis and other spinal deformities. 3rd. Edition, Philadelphia, W.B., Saunders Company. 107-115, 1995.
10. Olerid, S. Sjostrom, L. Karlstrom, G. Howberg, M. Spontaneous effect of increased stability of the lower lumbar spine in cases of severe chronic back pain; the answer of an external transpedicular fixation test. *Clin. Orthop.* 203: 67-74, 1986.
11. Perry, J. Nickel, VL. Total cervical spine Fusion for neck paralysis. *J. Bone and Joint Surg.* 41-A, 37, 1959.
12. Stefko, MR., Coin, J.E. Louerman, W.C. Bronn, C. Platenberg, R.C. Pyko, R. Vertebrodiastasis experimental lengthening of the juvenile spine. *Spine* 12: 1616-20, 1993.
13. Shank, S., Lonstein, L.E., Moe, J.H. Surgical treatment of adult scoliosis. *J. Bone and Joint Surg.* 63-A, 268, 1981.
14. Tredwel, S.J., Olbrein, J.P.: Avascular necrosis of the proximal end of the dens. A complication of halo-pelvic distraction. J.P.: Avascular necrosis of the proximal end of the dens. A complication of halo-pelvic distraction. *J. Bone and Joint Surg.* 57-A: 332-336, 1975.
15. Wilkins, C. McEven, G.D.; Halo-traction effecting cranial nerves. *J. Bone and Joint Surg.* 56-A: 1540, 1974.
16. Winter R.D., Moe, J.H., Lonstein, J.E.; The surgical treatment of congenital kyphosis: A review of 94 patients age five or older. Proceedings of scoliosis. Research Society, Orlando, FL, Sept. 1989.