

ANTERIOR-POSTERIOR CONVEX HEMIEPIPHYSIODESIS IN THE SURGICAL TREATMENT OF CONGENITAL SCOLIOSIS

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This article reviews the results of anterior-posterior convex hemiepiphyseodesis applied to 7 cases of congenital scoliosis between 1990 and 1993.

Criteria for patient selection include bone age below 5 years, Cobb angle in the frontal plane less than 70° and number of vertebrae involved less than 8. For each patient, the growth potential on the side of the concavity was evaluated with conventional tomography. No anomalies with the potential to prevent growth on the concave side were detected, except for one case with an unsegmented bar. The procedure was performed in one session in all cases but one. External immobilization with Risser type cast application was used postoperatively for six months, followed by Milwaukee braces for another 6 months.

Mean age of the patient group was 2.9 (1-5 years) years and mean follow-up period 21.6 months (12-34 months).

The mean Cobb angle decreased from 46° (28°+62°) postoperatively. The patient with unsegmented bar on the side of the concavity did not present any change.

Our results show that spontaneous correction can be achieved with anterior-posterior convex hemiepiphyseodesis in patients with congenital scoliosis.

Keywords: *Congenital scoliosis, anterior-posterior konveks hemiepiphyseodesis.*

Spinal deformity in congenital is mainly due to a comparatively higher higher growth potential of the vertebral body on the convexity side. Arrest of growth on the convexity would prevent progression.

Anterior and posterior convex hemiepiphyseodesis was first performed by Roaf (4) in 188 scoliosis cases (35 cases being congenital), using costotransversectomy. In 1981, Winter reported his results with anterior and posterior convex hemiepiphyseodesis via thoracotomy in a series of 10 patients with progressive congenital scoliosis (5). Later in 1985, Andrew and Piggott published a study their study performed on 13 patients (1).

This article reviews the results of anterior and posterior convex hemiepiphyseodesis in 7 patients with congenital scoliosis, operated between 1990 and 1993.

PATIENTS AND METHOD

Patients were selected according to the criteria: (1) Bone age was under 5 years; (2) Cobb angle less than 70°; and (3) Number of involved vertebrae less than 8. For each patient, the growth potential on the site of the concavity was evaluated with conventional tomography was used to detect any growth abnormalities on the concavity side. Of the 7 patients, only one case presented with an unsegmented bar, having the poten-

tial to prevent growth.

There were one male and six female patients. The average age at the time of the operation was 2.9 years (range 1-5 years) and they were followed-up for a period of 21.6 months (range 12-34 months).

The patients were operated in one session, except for one. Postoperative management included external immobilization with Risser type casts, which was worn for 6 months. Following this period, these were replaced by Milwaukee braces for an additional 6 months.

RESULTS

The mean Cobb angle decreased from 46° (28°-60°) to 28° (13°-55°) postoperatively. The patient with an unsegmented bar on the side of the concavity did not present any change (Table 1).

The only complication observed was atelectasis is one case.

DISCUSSION

In 1950s, the first applications of anterior and posterior convex hemiepiphyseodesis in scoliosis has ended up in discouraging results due to insufficient anterior epiphysiodesis via costotransversectomy, excessive rib extraction, epiphysiodesis of some of the vertebrae involved and the patients being congenital scoliosis cases.

Winter (5, 6) and later on Andrew and Piggott (1)

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Table 1: Clinical data of patients

Case	Age	Anomali	Cobb Angle		Fusion levels	Foolow-up (Month)
			Preop.	Follow-up		
1	1F	Hemiver.+unseg.bar	43	42	T5-T11	24
2	5F	Hemivert.	58	42	T2-T8	12
3	2F	Hemivert.	60	43	T2-T9	24
4	1.5F	Hemivert.	28	13	T11-L2	18
5	4M	Hemivert.	38	19	T4-T11	18
6	4	Hemivert.	62	50	T3-T11	34
7	3	Hemivert.	41	23	T5-T9	20

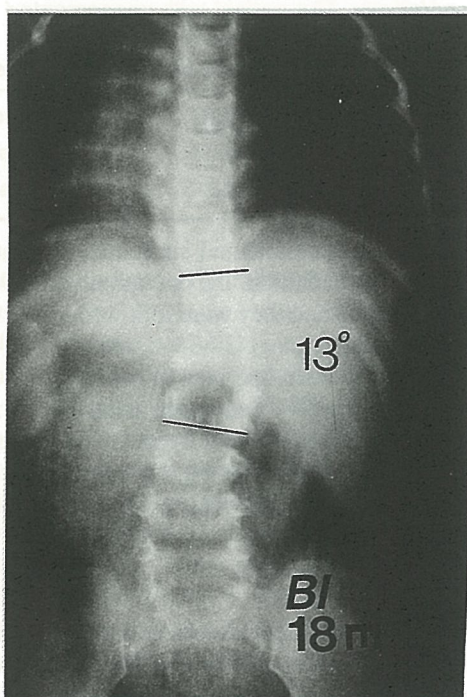
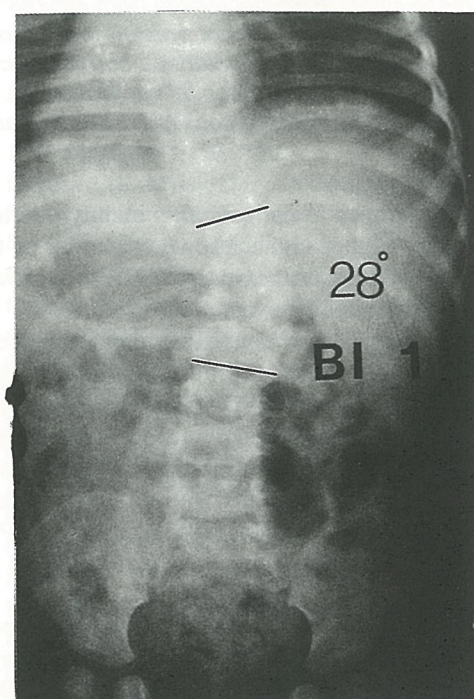
**Figure 1a****Figure 1b**

Figure 1: In this case 15° of correction was achieved

have given the results of Anterior and posterior convex hemiepiphysodesis applied via a true anterior approach (thoracotomy, thoracoabdominal or retroperitoneal) in congenital scoliosis. Winter (5, 6) chose pure congenital cases of scoliosis (like hemivertebra) not having a kyphotic or a lordotic component, for performing the

operation. His patient group was selected according to some criteria involving (1) progressive scoliosis under 70°, (2) scoliosis including at most 5-6 segments, (3) cervical spine not within the spinal curve, (4) age 5 years or under. Winter emphasizes that pelvic obliquity is not a contrindication for epiphysodesis (5, 6). Even

though they do not present any statistical data, Andrew and Pignott stress it out that, in accordance to Winter, the operation can be performed in young patients in whom scoliosis is due to a hemivertebra and who do not present excessive kyphotic deformity, using a very carefully planned approach. The average age of our study group was 2.9 years (ranging from 1 to 5 years). Their average preoperative deformity angle was 46° and the number of involved vertebrae 6.6.

Anterior and posterior convex hemiepiphysodesis has a dual effect; epiphysiodesis and fusion. The effect of epiphysiodesis can be observed especially in scoliosis cases due to hemivertebra or mixed deformities and exhibiting growth potential on the concave side. In order to talk about the effect of epiphysiodesis, deformity angle should show a correction of 5° or more compared to the angle in the early postoperative period when cast immobilization is applied. The fusion effect is seen specifically in scoliosis cases due to an unsegmented bar when anterior and posterior convex hemiepiphysodesis is performed. The deformity does not progress and correction is not observed since a growth potential does not exist on the concave side.

In six of our seven cases, the scoliosis was due to the presence of hemivertebra or mixed type of deformity and an average of 15° of correction was achieved in these patients via the epiphysiodesis effect. Scoliosis in the other patient was the results of an unsegmented bar, in whom the deformity did not show either correction or progression as a results of the fusion effect.

For correct selection of fusion levels, intraoperative X-rays are essential (1, 2). Another important point is to take care not to over- or underexcise the growth plates, resulting in fusion of the concave side and development of pseudoarthrosis and continuation of growth on the convex side, respectively.

Bradford suggests transient placement of a subcutaneous rod to the concave side in order to achieve better

correction (2). We believe that such an application would be suitable to correct lordosis in patients presenting with a prominent lordotic deformity in the sagittal plane.

Our results are in accordance with those of Winter, Piggott and Dubousset (1, 3, 5, 6). Anterior and posterior convex hemiepiphysodesis is the choice of treatment for progressive congenital scoliosis cases under 5 years of age with an angle of deformity under 70° , involving 6-8 segments and excluding the cervical spine. Correction can be achieved through the fusion effect when a growth potential is inexistant on the concave side (presence of an unsegmented bar) and through the epiphysiodesis effects when the growth potential is still existing on the concave side.

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