Prevention is an integral part of the occupational therapist’s role (West, 1969) and has been incorporated into the Essentials for Occupational Therapy Education (AOTA, 1984). This report illustrates an occupational therapy program designed to prevent the progression of positional scoliosis in a newborn infant.

Although infantile scoliosis has a spontaneous remission in 85% to 90% of occurrences (Lovell & Winter, 1978; McMaster, 1985), it can be progressive (Winter & Moe, 1982; Tachdjian, 1972; Rothman & Simeone, 1975); therefore, it should be treated vigorously (Lovell & Winter; Rothman & Simeone). Among the treatment methods suggested are casts applied at the age of 6 months (Rothman & Simeone), instaform molds for constructing body splints (Drummond, Breed, Hoffman, & Engel, 1982), and thermoplastic body splints that incorporate the lower extremities (Tachdjian). Passive stretching exercises, such as lateral bending, and head and neck traction have been suggested for treating neonatal scoliosis (Tachdjian).

Case Description

Conjoined twin girls, joined at the abdomen, were surgically separated the day of their birth. Both had marked scoliosis and lordosis. An orthopedic evaluation showed that Twin A had several hemivertebrae and a structural abnormality of the spine. Twin B had no structural abnormality of the spine. She did have a minimal thoracic lumbar scoliosis with convexity to the left. Her scoliosis and lordosis were described as primarily positional. The twins were cared for in the Infant Special Care Unit (ISCU) of the Child Health Center of the University of Texas Medical Branch.

When Twin B was 11 days old and breathing independently in an open crib, the neonatologist requested the ISCU occupational therapist to evaluate the infant for positioning. At that time the infant lay hyperextended in her crib and was developmentally unable to change her position. There was some trunk muscle imbalance, a convex curve to the left, and a concave curve to the right with asymmetry of the chest (see Figure 1). The goal for positioning was to decrease the curvature of the trunk, prevent the progression of the scoliosis, and promote the alignment of the head and body to allow adequate ventilation.

Foam rubber was selected for positioning because it does not produce pressure sores yet provides good positioning with continuous gentle pressure and its use with an infant had been reported (Macdonald, Covey, & Marvin, 1985). The hyperextended posture was corrected with a 7.5 cm (3 inch) foam rubber rectangle (see Figure 2), which was curved into a shape resembling a custom-made recliner chair and then placed inside a heavy cardboard shell to maintain...
its shape. The size of the shell was determined by the dimensions of the standard plastic bassinet used in the ISCU, because the shell was to be placed inside the bassinet.

A heavy cardboard box was cut down in height and angled slightly from the head end to the foot end (see Figure 2). The size of the foam rubber rectangle was approximately two times the length of the box and 1 in. less than the width of the box. The foam rubber slab was curved under at each end and the shape was adjusted by varying the placement of the curved ends of the foam against the end of the box until the recliner curve was adequate for positioning the infant so that her head and neck and her hips and knees were slightly flexed. The foam rubber was not attached to the box but held securely in place by the pressure of the compressed length against the ends of the box (see Figure 2) so that changes in position could be made readily. The foam rubber was covered with a knit fabric (polyester/cotton blend), which provided the necessary flexibility for curving and compressing the pieces as described. The use of this adaptation for the bassinet decreased the lordosis, particularly when inhibition/relaxation techniques were used to position the infant (Bobath & Bobath, 1972).

Three foam rubber blocks, covered with orthopedic stockinette, were placed between the infant's body and the sides of the bassinet to exert three-point pressure to correct the scoliosis (Sharrard, 1971). The three-point pressure system of bracing refers to two stabilizing points at the end of a lever arm, in this case the trunk, and the active force is placed at the joint to be moved, in this instance the lateral curve on the infant's left side (von Werssowit, 1955). (Two blocks measured 3 in. X 3 in. X 5 in.; and one, 3 in. X 4 in. X 4 in.; their size was determined by the length of foam required to achieve good alignment of the trunk when the blocks were compressed for placement.) They were placed between the infant and the cardboard shell as follows: Block 1 was fitted at the right shoulder; Block 2, at the right hip; and Block 3, at the lateral curve of the reverse “C” shape on the infant's left side. The foam blocks were placed in position by compressing them lengthwise with the hand. When correctly placed, the compressed foam blocks were released and gave continuous gentle pressure at the three points to align the body in a
better position. The intent was to prevent a further stretch of the trunk muscles on the convex left side, which has potential for increased deformity even without structural abnormality (White & Panjabi, 1978).

Twin B outgrew the initial flexion positioner, and before discharge a modification was made to be used in the ISCU nursery and her cradle at home. A foam rubber wedge was sculpted with an area for her head, to position her neck in slight flexion. A second wedge was placed with the narrow edge under her hips to flex the hip, knees and lower trunk and reduce the lordosis. The three-point pressure blocks were placed as previously described. The positioning could also be done with the infant in prone although the lordosis was not totally corrected in that position. The foam blocks did keep the infant in good alignment by passive stretching, a recommended treatment for infantile scoliosis (Tachdjian, 1972). Twin B's disposition was always better when she was positioned in correct body alignment in supine (see Figure 3). This observation is in agreement with another report on infant positioning that described a decrease in irritability when the infant was in postural alignment (Anderson & Anderson, 1986). The positioning arrangement of wedges and blocks was used for 5 weeks during hospitalization.

Before discharge a flexion sling was made for Twin B to enable the mother to carry the infant and maintain her in the appropriate position. The sling was made from a rectangle of polyester/cotton knit material, approximately 1½ times the length and two times the width of the infant. The rectangle was stitched with three deep pleats at each end and then attached to 2-in.-wide webbing with double "D" rings to allow for adjustment. The webbing served as a shoulder strap for the mother who wore it across her right shoulder. The infant was placed supine in the sling with her head on the mother's right arm. This positioned the infant's left convex side of the trunk curve against the mother's body, which provided one point of pressure while the mother's hands provided the other two points of pressure at the right shoulder and right hip, a comfortable and natural position. The sling provided slight trunk flexion at the same time, reducing the lordosis as described for the foam recliner positioner and foam wedges. The mother was pleased with the sling; she felt it helped her position the infant correctly while she fed or carried her and did not interfere with close cuddling (see Figure 4).

At discharge, when Twin B was nearly 8 weeks old, the mother was instructed in the use of the sling and of the wedge pillow and foam blocks for the cradle. The mother was also encouraged to rock the infant slowly to help her relax, talk to her, and position toys and bright objects so that the infant's flexion of the trunk and neck was emphasized in the supine position. In addition, prone and side-lying positions were recommended to allow normal developmental progression. These activities were also carried out by the occupational therapist and nursing staff during the infant's hospitalization.

At follow-up, 4 weeks after discharge, the infant,
at 12 weeks of age, was able to achieve good body alignment independently and no longer lay in a hyperextended position. The mother reported that the infant's spontaneous active movement had begun to dislodge the foam positioning blocks more frequently, and the staff decided to discontinue their use. The mother continued to use the sling. At 7 months after discharge Twin B's body was straight, and the mother reported that she had gradually stopped using the sling. The child will continue to be followed.

Twin A, who had several hemivertebrae, which is a more difficult problem to correct (Tachdjian, 1972; Mehta, 1972; Salter, 1983), had many medical problems in addition to the scoliosis. Positioning methods similar to those used for Twin B were attempted, but the medical equipment required to maintain life interfered with achieving good positioning. Unfortunately, Twin A did not survive her complex medical problems.

Summary

Infantile scoliosis has a potential for progression. This paper discusses the use of a soft material to correct scoliosis in a medically stable, at-risk infant. It illustrates that early intervention is desirable in preventing the progression of the lateral curve of the trunk. It also illustrates that the three-point positioning principle can be effective with soft materials with an infant. Foam rubber blocks were used to apply pressure at three strategic points, the shoulder, the hip, and the convex curve on an infant's trunk. At the age of 7 months the infant was able to move herself into a normal position with good head and body alignment.

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References

Bobath, K., & Bobath, B. (1972). In P. H. Pearson & C. E. Williams (Eds.), The neurodevelopmental approach to treatment in physical services in the developmental disabilities. Springfield, Ill.: Charles C. Thomas.