

Special Report: Seminar and Workshop on Limb Lengthening, May 23-24, 1988, San Francisco, California

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This seminar was held to provide information to North American pediatric orthopedists on the remarkable new techniques that have been developed in Russia and Italy for lengthening of limbs. One section was devoted specifically to the lengthening of limbs in persons with disproportionate short stature. The history of leg lengthening and the techniques that have been used were reviewed. Professor Wagner from Germany discussed the Wagner technique, Professor Ilizarov from Russia described the Ilizarov

technique, and Professor De-Bastiani from Italy described "calotaxis" using the orthofix fixator.

A number of technical changes and improvements in leg lengthening in the past 5 years have led to lower complication rates and dramatically better results. The essence of the new lengthening procedure involves fixing a long bone (femur, humerus, tibia, fibula) at both ends by percutaneous pins or wires. An osteotomy is made midshaft. As the callus begins to form at the site of the osteotomy, the two ends of the bone are distracted from each other by the pins at the rate of about 1 mm/day. The newest research indicates that if that millimeter is divided into

fourths (ie, four smaller distractions a day) there is less pain and more rapid healing. The distraction process takes place over a 3- to 4-month period, after which the long bone is held in place to allow full strength and healing of the newly formed bone for another 4-month period (total, 8 months per limb segment). Patients are permitted to walk during the lengthening procedure. Most patients require only 5 or 6 days of hospitalization for the initial phase of the procedure, although weekly appointments for adjustments are required.

Leg-lengthening procedures should not be performed by those without experience or by those

who intend to do it on a one-time basis, since it is quite clear that many adjustments are required during the entire lengthening process. However, in the hands of experienced surgeons, patients can anticipate as much as 25 cm of increased length in a limb with two procedures (ie, femur and tibia). Use of the Ilizarov technique permits two osteotomies to be performed in the same limb segment, with two areas of lengthening.

Complications include stiffness of the joints, nerve palsy, skin infections, and very rarely, nonunion or fractures to the area of lengthening. Although minor adjustments and complications are frequent, the incidence of major complications appears to be less than 3% in experienced hands. Much higher complication rates

and much less lengthening were reported in earlier studies.

Limb lengthening is used not only for lengthening, but for non-unions and pseudoarthroses as well. Although the technique was primarily developed for unilateral lengthening and for the treatment of amputations, it seems appropriate as a treatment for disproportionate short stature. It has been used in patients with hypochondroplasia and achondroplasia, but the results are much less promising in those with spondyloepiphyseal dysplasia. There are no reports of its use in those with other chondrodysplasias, although a few individuals with Turner syndrome and familial short stature have been treated in Europe.

Limb lengthening holds great

promise as symptomatic therapy for those with disproportionate short stature. At the same time lengthening is accomplished, bowing and other abnormalities can be treated. The ideal time for this treatment is adolescence so that the teenager with disproportionate short stature can have a growth spurt along with his or her peers. Moreover, by waiting until adolescence, the affected individual can participate in making the decision to undergo the procedure.

There is a great need for collaborative research to study carefully the outcomes of limb-lengthening procedures in different types of chondrodysplasias. Information about the long-term outcomes and complication rates of these procedures is simply not available at this time.