

The Limb Lengthening and Reconstruction Society: ASAMI-North America

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Abstract

Category: Limb Lengthening; Research

Title: The Effect of Electrical Stimulation on Bone Lengthening

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What was the question?

What is the effect of electrical stimulation (capacitive coupling) on bone healing during limb lengthening and deformity correction using the Ilizarov Method?

How did you answer the question?

A consecutive group of 33 limbs in 29 patients undergoing limb lengthening and deformity correction with adjuvant use of capacitive coupling electrical stimulation were prospectively followed. Bone healing index (BHI)(months per cm distraction) was measured. Bone healing was considered to have occurred at frame removal. The group was subdivided by age, distraction gap size and location of osteotomy. The electrical stimulation was started during the distraction phase and was used an average of 18 hours per day. Data was compared to historical controls.

What are the results?

The average patient age was 37.9 years (range,14-64). There were 28 tibial and 5 femoral osteotomies. Tibial osteotomies were proximal in 17, distal in 7, and double level in 4. Indications for surgery included post-traumatic, congenital,

growth arrest, and neuromuscular etiologies. The average distraction gap was 2.7 cm (range,1-10). The average time in frame which was considered time to bone healing was 5.3 months (range,3-16). There were no refractures. Minor loss of correction occurred in 5 patients. The average BHI was 2.4 (range, 0.8-4.9). In 13 limbs with distraction gap <1cm, the BHI was 3.2 (range,2.8-4.9). In 5 patients with distraction gap 1.1-2.0 cm, the BHI was 2.9 (range, 2.0-3.8). In 15 limbs with distraction gap >2cm, the BHI was 1.6 (range, 0.8-2.9). One patient under age 20 had a BHI of 1.2. In 5 patients aged 21-30 years, the BHI was 2.0 (range, 1.3-3.0). In 16 patients aged 31-40 years, the average BHI was 2.7 (range, 1.3-4.9). In 11 patients aged >40 years, the average BHI was 2.3 (range, 0.8-3.8). In 18 proximal tibia osteotomies, the average BHI was 2.3 (range, 0.8-3.5). In 7 distal tibia osteotomies, the average BHI was 3.5 (range, 3.0-4.9). In 4 double level tibial osteotomies, the average BHI was 1.7 (range, 0.8-2.9). In 4 distal femur osteotomies, the average BHI was 1.5 (range, 1.3-3.2).

What are your conclusions?

BHI seemed to decrease as distraction gap increased. BHI was lowest in the distal femur osteotomies and highest in the distal tibia. Bone healing relationships to distraction gap and patient age were similar to historical controls. Bone healing compared favorably to historical controls. Additional study with comparison to a control group would be helpful.