Long term radiological assessment of achondroplastic patients who have undergone lower limb lengthening using the Ilizarov method

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Background: Many studies describe the use of the Ilizarov ring fixator for lower limb lengthening and deformity correction in achondroplasia, and most confirm the efficacy of this technique. However, long term follow up of these achondroplastic patients is lacking.

Aim: Radiographic evaluation of lower limb deformity correction, using the Ilizarov method, in achondroplastic patients and comparison with normal population standards.

Material & Methods: Nineteen (19) achondroplastic patients, 12 males and 7 females, aged 19-38 years (mean 27.3 y) who have undergone tibia and femur lengthening, using the Ilizarov method, at the age of 9-19 years (mean 12.6 y), were evaluated 5-19 years (mean 10.1 y) after their last surgery, using standardized long lower limb anteroposterior and lateral standing radiographs. Tibial and femoral lengthening gain was measured. A comparison was made between the achondroplastic patients at follow up and healthy population standards concerning– at the frontal plane- LPFA (lateral proximal femoral angle), LDFA (lateral distal femoral angle), MPTA (medial proximal tibial angle), LDTA (lateral distal tibial angle) and MAD (mechanical axis deviation) and – at the sagittal plane- PDFA (posterior distal femoral angle), PPTA (posterior proximal tibial angle) and ADTA (anterior distal tibial angle). The TraumaCad™ 2.4 (Voyant Health, Brainlab) software was used to accurately measure the above mentioned lengths, angles and axes. Statistical comparison of deformity parameters between achondroplastic patients and normal population was done using the student t-test. A level of p < 0.05 was considered statistically significant.

Results: Tibial lengthening gain was 14.1 ± 1.1 cm with a 80.64 ± 10.5% length increase and femoral lengthening gain was 9.8 ± 2 cm with a 40.3 ± 11.2% length increase. Mean angle values at follow up were: LPFA 118° ± 8.2, LDFA 95.5° ± 7.1, MPTA 87.8° ± 5.7, LDTA 93° ± 7.4, PDFA 85.1° ± 6.8, PPTA 84° ± 7, ADTA 88.3° ± 6 while MAD mean value was 28 mm ± 13 (0-11). LPFA, LDFA, LDTA, PPTA, ADTA as well as MAD were statistically significant different (p <0.05) between achondroplastic patients and normal population.

Conclusion and clinical implication: The use of the Ilizarov method for lower limb deformity correction, in achondroplastic patients, provides a functional length gain, it is substantially correcting the three-dimensional deformities of the disease but, it does not restore the radiological image into the normal range. Radiological assessment of lower limb deformity correction, using the Ilizarov method, in achondroplastic patients, allows for an improvement in system application.