RADIOLOGIC FEATURES OF ACHONDROPLASIA

Frederic N. Silverman

Professor of Radiology and Pediatrics (Clinical) Emeritus
Stanford Univ. Medical Center, Stanford, CA (USA)

It would be appropriate to begin with a photograph of a miniature bronze statue of an ancient Roman who is believed to represent one of the dwarfed gladiators assembled by the emperor Domitian almost two thousand years ago. The skill of the unknown artist clearly defined the clinical features of an achondroplastic dwarf as they have been presented by Professor Maroteaux. Had we an opportunity to examine this individual radiographically, we should have found him to have short and relatively thick tubular bones in all limbs. The femur would not be much longer than the tibia. This feature and similar proportions in the bones of the upper limb (Fig. 1) are responsible for the diagnostically important rhizomelic limb shortening that characterizes achondroplasia. The tuberosities to which muscles are attached are unusually prominent, and together with relatively large articulating ends of the bones exaggerate the discrepancy between length and width of the shafts. In 1900, Pierre Marie described a clinical finding characterized by deviation of the three middle fingers away from each other at the proximal interphalangeal joints when the hand was pressed flat. He called this the "trident hand", likening it to Neptune's trident because the fingers tended to be of the same length in contradistinction to the different lengths in normal individuals.

The gladiator's pelvis would demonstrate a diminution in vertical height (Fig. 2) due in large part to shortening of the body of the ilium which is indicated by the brevity of its medial border, the iliopectineal line. Some of this shortening may be due to projection and foreshortening and probably results from a marked lumbar lordosis related to flexion contractures at the hips that will be remarked on by other authors. The interpediculate distance of the lower lumbar and the first sacral vertebrae that are normally the widest in the spinal column, are markedly reduced in the achondroplastic individual and, together with diminished length of pedicles, combine to produce a stenosis of the spinal canal. In fact (Fig. 3), the lumbar interpediculate distances that normally increase from above downward are decreased. Vertebral bodies (Fig. 4) are short in antero-posterior dimensions and relatively tall; their posterior borders are often concave. These features are obvious in horizontal beam, lateral