

ASSESSMENT OF SKELETAL MATURITY: A NEW CLASSIFICATION SCHEME USING DISTAL RADIUS AND ULNA RADIOGRAPHS

Keith D. Luk, MD; Lim Beng Saw, MS Orth; Samuel Grozman, MD; Kenneth M. Cheung, MBBS(UK), FRCS(England), FHKCOS, FHKAM(Orth); Dino Samartzis, DSc, PhD (C), MSc China

SUMMARY: Our study describes a new classification scheme to assess skeletal maturity by utilizing the distal radius and ulna radiographs. This classification demonstrates a relationship with adolescent growth spurt and cessation of growth. **Introduction:** The progression of the curve in adolescent idiopathic scoliosis has always been associated with pubertal growth spurt. The commonly used clinical or radiological methods are still deficient in predicting this growth peak among adolescents and bone age is too complicated to apply. To address these concerns, we describe a new classification scheme using the distal radius and ulna radiographs to assess skeletal maturity.

METHODS: We retrospectively analyzed 145 series of hand radiographs from a scoliosis cohort. We identified various stages of radius and ulna epiphysis maturity, which were regarded as R1-R11 for the radius and U1-U9 for the ulna. The bone age, sexual character development, standing height, sitting height, arm span, radius length and tibia length were studied at the each stage of these epiphysis changes.

RESULTS: The standing height, sitting height and arm span growth were at their peak during stage R7 (mean, 11.4 years old) and U5 (mean, 11±1.4 years old). The long bone growths also demonstrated a common peak at R7 and U5. The growth in height and arm span stopped completely after stage R10 (mean, 15.6 years old) and one year after U9 (mean, 17.3 years old).

CONCLUSION: The new distal radius and ulna classification can provide the maturation status from juvenile age to completion of maturity. The classification scheme provides close relationship with adolescent growth spurt and cessation of growth.