

Case Report 116

Dean S. Louis, M.D., Robert H. Hartwig, M.D., and Andrew K. Poznanski, M.D.*

Section of Orthopedic Surgery and the Division of Pediatric Radiology (C.S. Mott Children's Hospital), The University of Michigan Medical Center, Ann Arbor, Michigan, USA



Fig. 1A and B. In the roentgenograms of the right hand and wrist (posteroanterior and oblique projections), flexion deformities of all the digits are observed. The capitate and lunate are solidly fused. The hamate and triquetrum are also incorporated into this fused bony mass. Soft tissue atrophy is noted and considerable osteopenia (osteoporosis) is present

History

This 18-year-old female fell from a tree for a distance of approximately six feet at the age of 10 years, sus-

taining fractures of both bones of her dominant right forearm. In the ensuing eight years after the fall multiple operative procedures, including nerve grafting and tendon transfers, were carried out in an effort to improve sensibility and mobility of the hand. The reconstructive procedures had not involved the intercarpal joints.

Radiological examination of the right hand and wrist was performed (Fig. 1A and B).

* Presented by Dr. Andrew K. Poznanski at the 5th Annual Meeting of the International Skeletal Society in Boston, Massachusetts, September 4-6, 1978

Address reprint requests to: A.K. Poznanski, M.D., Department of Radiology, The Children's Memorial Hospital, 2300 Children's Plaza, Chicago, IL 60614, USA

Diagnosis: Carpal Fusion Following Ischemic Contracture of the Forearm

The differential diagnosis must include a congenital fusion anomaly, the residua of the reflex dystrophy syndrome, the results of operative procedure, the residua of infective arthritis and rheumatoid arthritis.

Discussion

At the time of the presentation of this patient for reconstructive procedures diffuse osteopenia involving the limb was present. The reconstructive surgery did not involve the intercarpal joints and the intercarpal relationships at the time of the initial presentation were normal. When the girl was examined again at the age of eighteen years (eight years after the fall), intercarpal bony fusions were now evident in the wrist of the affected limb (Fig. 1 A and B).

Ischemic contracture involving an upper extremity after trauma is a well recognized and dreaded event. The skeletal abnormalities which follow ischemic contracture of the forearm are usually the result of deformity at the site of fracture or are secondary to disuse osteoporosis. When reconstruction is delayed, static joint deformities may also become evident. In children, the dynamic process of epiphyseal growth will usually ensue. If contracted ischemic musculotendinous units cross the wrist flexion axis, progressive wrist and digital flexion deformities may develop.

The intercarpal fusions which have developed in this case may be the result of compressive forces generated by continued distal radial and ulnar epiphyseal

growth in the face of tethered flexor tendons and volar scar tissue. The timing and effectiveness of tendon transfers may then help to bring about the phenomenon observed in this case. The authors have followed two other girls for a similar growth period until skeletal maturity developed and have not observed carpal fusion.

Although extensive carpal and tarsal fusions have been reported following recovery from reflex sympathetic dystrophies, the authors have not found a previous report with such changes following ischemic contracture of the forearm.

In summary, a highly unusual (and heretofore unreported) cause of intercarpal bony fusion is reported, associated with ischemic contracture after an injury. The differential diagnosis is considered and the possible mechanism is discussed.

Reference

1. Hermann, L.G., Reineke, H.G., Caldwell, J.A.: Post traumatic painful osteoporosis. *Am. J. Roentgenol.* **47**, 363 (1942)