The Anatomy and Mechanics of the Human Hand

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It is obvious to all that the human hand represents a mechanism of the most intricate fashioning and one of great complexity and utility. But beyond this it is intimately correlated with the brain, both in the evolution of the species and in the development of the individual. Hence, to a degree we "think" and "feel" with our hands, and, in turn, our hands contribute to the mental processes of thought and feeling.

In any mechanism, animate or inanimate, functional capabilities relate both to structural characteristics and to the nature of the control system available for management of functions singly or in multiple combinations. Just so with the human hand. Analysis of normal hand characteristics therefore requires an understanding of both sensory and mechanical features. Of course whole volumes have been written on hand anatomy, and it is not possible in a short article to describe all elements in detail. It is helpful, however, to review the basic construction of bones and joints and of the neuromuscular apparatus for governing motions and forces. Twenty-four muscle groups, controlled by the various motor and sensory nerve pathways, with their rich potentialities for central connection, and acting upon a bone and joint system of great mechanical possibilities, give to the hand its capacity for innumerable patterns of action.

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THE FUNCTIONAL STRUCTURE OE THE HAND

THE BONES

The bones of the hand, shown in Figure 1, naturally group themselves into the carpus, comprising eight bones which make up the wrist and root of the hand, and the digits, each composed of its metacarpal and phalangeal segments (Table 1). The carpal bones are

Table 1

BONES AND JOINTS OF THE HAND AND WRIST

- Carpal bones
  - GM, Greater multangular
  - N, Navicular
  - L, Lunate
  - T, Triquetrum
  - P, Pisiform
  - LM, Lesser multangular
  - C, Capitate
  - H, Hamate
- Metacarpal bones
  - M-I, II, III, IV, V
- First phalangeal series
  - FP-I, II, **III,** IV, V
- Second phalangeal series
  - SP-II, III, IV, V
- Third phalangeal series
  - TP-I, II, **III,** IV, V
- Joints
  - RC, Radiocarpal
  - IC, Intercarpal
  - CM, Carpometacarpal
  - MP, Metacarpophalangeal
  - PIP, Proximal interphalangeal
  - DIP, Distal interphalangeal