

COORDINATION OF INTERPHALANGEAL FLEXION IN THE HUMAN FINGER IN ENTRAPMENT NEUROPATHY

K.J. Van Zwieten¹, P.L. Lippens¹, W. Duyvendak² and C. Thywissen³

¹ *Department of Anatomy, BioMed, Universiteit Hasselt, Diepenbeek, Belgium*

² *Department of Neurosurgery, Virga Jesse Hospital, Hasselt, Belgium*

³ *Department of Radiology, Virga Jesse Hospital, Hasselt, Belgium*

Most analyses of finger interphalangeal coordination do not take into account the shifts of the different fibre bundles within the extensor assembly which occur during interphalangeal motion. This extensor assembly consists of tendon fibers of extrinsic and intrinsic finger extensor muscles. Its respective bundles are often depicted as single lines, although medial bundle and lateral bundles are flattened ribbon-like structures at proximal interphalangeal (PIP) joint level. Beyond the extended joint these bundles maintain dorsal positions. Lateral bundles constitute the terminal extensor tendon of the distal interphalangeal (DIP) joint.

In PIP flexion the lateral bundles shift to more volar and distal positions. The shifts are controlled by the spiral fibre apparatus, which suspends them to the medial bundle. The trajectories of the lateral bundle elements are shorter than that of the median bundle. As a result, the terminal extensor tendon connected to the third phalanx becomes slackened and will shift distally, thus allowing distal interphalangeal flexion simultaneous with proximal interphalangeal flexion. The lateral bundles are now located in sagittal plane.

Proximal interphalangeal flexion and distal interphalangeal flexion are correlated. Plotting of the successive angles of DIP flexion against corresponding angles of PIP flexion results in a S-curve (Fig. 1). In a patient with intrinsic minus fingers due to ulnar nerve compression neuropathy at his elbow, the S-curve is more convex to the left (Fig. 2).

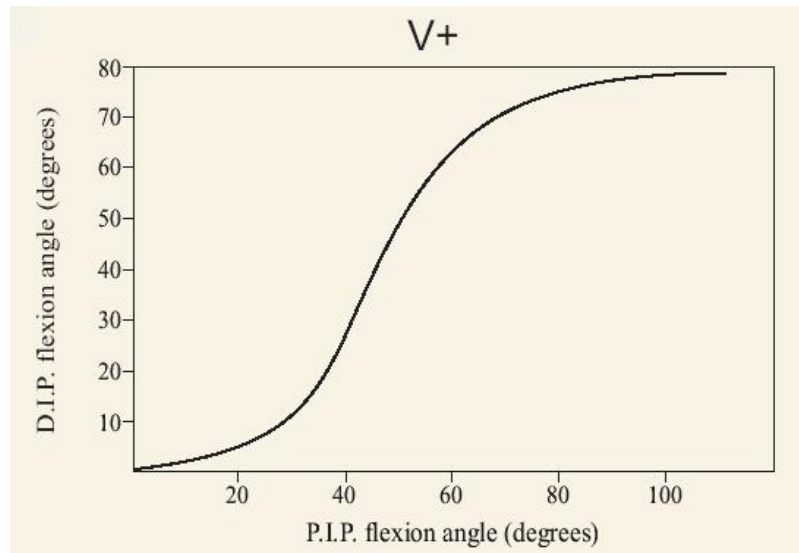


Figure 1. Ratio of interphalangeal flexion in normal intrinsic + finger (V +)

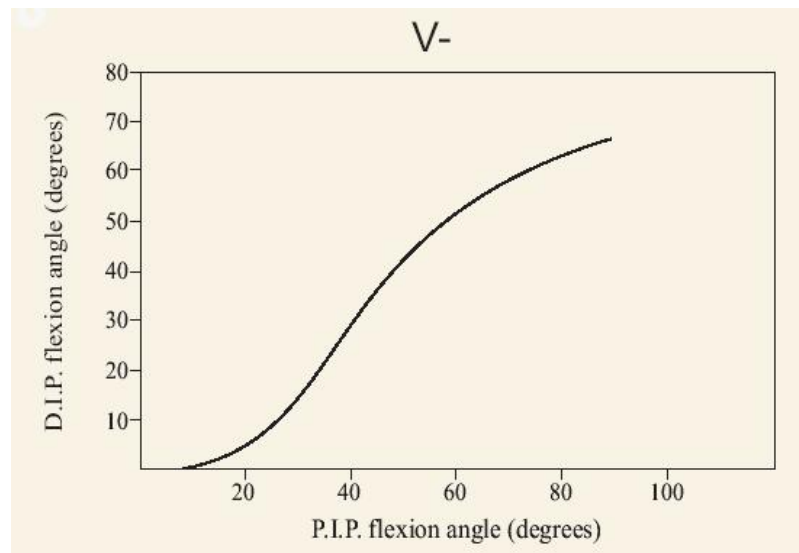


Figure 2. Ratio of interphalangeal flexion in an intrinsic minus finger (V -)

This effect is most pronounced during the early phases of flexion. It is suggested that the slope of the S-curve might be a parameter to evaluate functionality of finger flexion.