

METACARPOPHALANGEAL AND INTERPHALANGEAL FLEXION OF THE THUMB : INFLUENCE OF SEX AND AGE, RELATION TO LIGAMENTOUS INJURY

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The flexion of the metacarpophalangeal and interphalangeal joints of both thumbs of 101 normal controls and of 10 patients with ligamentous injuries was measured. There is a close correlation between dominant and nondominant thumbs. With advancing age mobility of both joints decreases significantly. Stiffer joints are more vulnerable to ligamentous injuries.

Keywords : thumb ; motion ; ligament injuries ; metacarpophalangeal joint ; interphalangeal joint.

Mots-clés : pouce ; mobilité ; lésions ligamentaires ; articulation métacarpophalangienne ; articulation interphalangienne.

INTRODUCTION

The mobility of thumb articulations can differ widely between individuals. According to Harris and Joseph (1) the morphology of the metacarpal head determines the range of motion of the metacarpophalangeal joint. Later Joseph (2) modified the observation by claiming that not only flat-headed metacarpals could have a poor motion. Van Wetter (5) confirmed the relationship between metacarpal morphology and motion. He also suggested a compensation mechanism between interphalangeal (IP) and metacarpophalangeal (MCP) joints to achieve a more or less constant combined flexion arc (5). Recently Shaw and Morris (4) demonstrated an association between stiffer MCP joints and an increased incidence of ligamentous injuries.

The purpose of this paper is to verify these statements and to relate motion of the thumb with sex and age.

MATERIAL AND METHODS

We measured the flexion of MCP and IP joints with a goniometer applied at the dorsal side of the phalanges according to the recommendations of Van Wetter (5). We measured right and left thumbs in 101 normal individuals, 43 males, 58 females with a mean age of 41.16 years ranging from 16 to 83 years. Hand dominance was also recorded.

For 2 months 10 patients attended the outpatient clinic with obvious ligamentous injuries of the MCP joints requiring operative repair or reconstruction. The flexion of the IP and MCP joint of the opposite thumb was measured.

RESULTS

The mean flexion of the MCP joint was 54.8 (± 13.55) and for the IP joint was 79.89° (± 10.2). There was no significant difference between males and females (table I).

Table I. — Difference in mean flexion of MCP and IP between males and females

	females	males	total
N	58	43	101
age	41.12 \pm 20.3	41.21 \pm 19.9	41.16 \pm 10.1
MCP	54.3° \pm 13.2	53.6° \pm 14.2	54.0° \pm 13.7
IP	80.6° \pm 9.5	79.0° \pm 10.8	78.9° \pm 10.2

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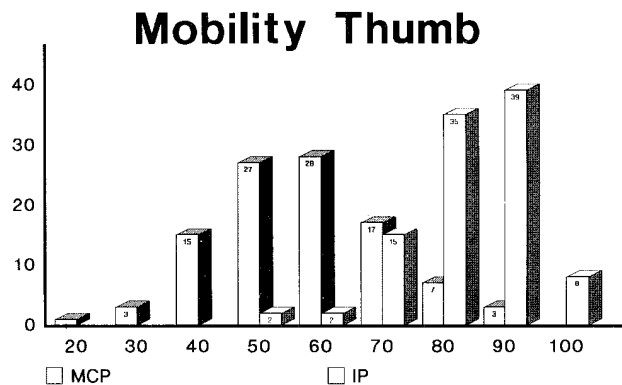


Fig. 1. — Repartition of flexion of the metacarpophalangeal (MCP) and interphalangeal (IP) joint.

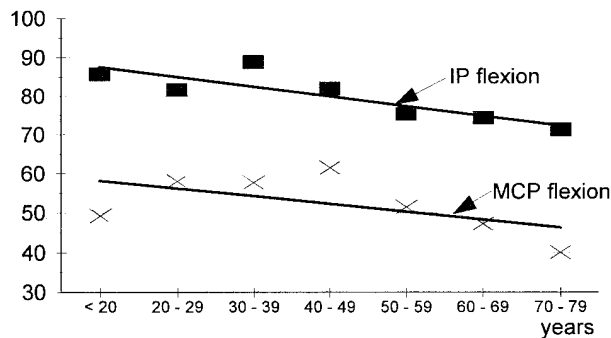


Fig. 2. — Relation between age and flexion of the MCP and IP joint. (MCP flexion = $65.07 - 0.27 \times \text{age}$) (IP flexion = $88.89 - 0.219 \times \text{age}$).

In the dominant hand the flexion of the MCP was not significantly different from the nondominant side (resp. 53.96 ± 13.52 and 55.68 ± 13.63 , $p > 0.1$). A good correlation exists between the flexion at the dominant and nondominant side ($r = 0.78$, $p < 0.001$).

No significant difference was seen in the flexion of the IP joints (resp. 79.89 ± 10.9 and 79.46 ± 10.6 , $p > 0.1$) between the dominant and the nondominant side.

The flexion of the MCP joint as well as the IP joint was significantly correlated with age: with advancing age flexion decreases. For the MCP the correlation coefficient is 0.398 ($p < 0.001$) with an equation being: $\text{MCP-flexion} = 65.07 - 0.27 \times (\text{age})$. A similar correlation is seen in the

IP joint ($r = 0.43$, $p < 0.001$, $\text{IP flexion} = 88.86 - 0.218 \times (\text{age})$).

There was no correlation at all between MCP and IP flexion ($r = 0.125$, $p > 0.1$). Poor MCP flexion was not compensated with an increased IP flexion.

In the patients with ligamentous injuries of the MCP joint (4 females, 6 males, mean age 37, ranging from 19 to 59) the flexion was 39.1 ± 10.4 . This is significantly different from the normal controls ($p < 0.001$).

DISCUSSION

The great variability of mobility of the thumb joints is an important complicating factor for the evaluation of impairment after an "injury". Swanson *et al.* in 1983 (4) declared that the thumb accounts for 40% of the global hand function. MCP and IP joint motions (flexion and extension) contribute 20% to the total motion of the thumb.

Several authors (3, 5) found good correlation between flexion of the left and right thumb. On the contrary Van Wetter (5) found an asymmetry in the extension of the MCP joint, related to hand dominance. For flexion hand dominance seems not to be important (2, 3, 5). To our knowledge no previous papers report a correlation between age and MCP and IP joint motion. This was significant in our survey.

We also could confirm the vulnerability of stiffer MCP joints to ligamentous injury. This is not only of interest in a retrospective manner, but can play an important role in the choice between reconstructive surgery or arthrodesis. Complicated surgical procedures, with a potentially uncertain outcome, are of no use in those joints predestined to have a limited range of motion (i.e. in those with less than 30° of flexion an arthrodesis is preferred). In the interpretation of outcomes after surgery of the thumb one also has to keep these considerations in mind.

Due to the good correlation between left and right, independent of hand dominance, the contralateral thumb can be used as a standard in the determination of impairment.

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SAMENVATTING

L. DE SMET, M. URLUS, A. SPRIET, G. FABRY.
Metacarpophalangeale en interphalangeale flexie van de duim : invloed van leeftijd, geslacht en relatie met ligamentaire letsels.

De flexie van het metacarpophalangeale en interphalangeale gewricht van de duim bij 101 normale controle-

patiënten en 10 patiënten met ligamentair letsel werd nagemeten. Bij de normale populatie is er een goede correlatie tussen de dominante en niet-dominante zijde. Met toename van de leeftijd is er wel een significante afname van deze flexie. Stramme gewrichten zijn ook meer vatbaar voor ligamentaire letsels.

RÉSUMÉ

L. DE SMET, M. URLUS, A. SPRIET, G. FABRY.
L'amplitude de flexion des articulations métacarpophalangiennne et interphalangiennne du pouce : influence de l'âge et du sexe, relation avec les traumatismes ligamentaires.

La flexion de l'articulation métacarpophalangiennne et interphalangiennne du pouce chez 101 sujets normaux et chez 10 patients présentant des lésions ligamentaires fut mesurée. Il existe une corrélation nette entre le côté dominant et le côté non dominant. Avec l'âge une diminution de cette flexion apparaît. Des articulations rigides sont plus vulnérables et plus susceptibles de présenter des atteintes ligamentaires.