

THE RELATIONSHIP BETWEEN FUNCTIONAL ABSENCE OF THE FLEXOR DIGITORUM SUPERFICIALIS TO THE FIFTH DIGIT AND ABSENCE OF THE PALMARIS LONGUS

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ABSTRACT

Background: The Palmaris Longus (PL) and the Flexor Digitorum Superficialis (FDS) to the fifth digit are both highly variable muscles and there has been controversy as to whether there is a link in their absences.

Objective: To determine if there was a relationship between absence of the FDS to the fifth digit and the PL.

Design: A prospective study.

Setting: Mulago Hospital, Uganda.

Methods: The study was conducted using three clinical tests to determine the presence of the FDS in the fifth digit and ten tests to determine the presence of the PL.

Results: Two participants had absence of both tendons. The prevalence of FDS agenesis in a hand that had PL was 1.8% while the prevalence of FDS agenesis in a hand without PL was 2.3%. This difference was not statistically significant ($p=0.9$).

Conclusion: There is no relationship between the functional absence of PL and FDS to the fifth digit.

INTRODUCTION

The Palmaris Longus (PL) muscle has been described as one of the most variable muscles in humans. There is also a lot of variability in the Flexor Digitorum Superficialis (FDS) tendon to the fifth digit. The PL is used for reconstructive procedures including tendon grafts. Absence of the FDS to the fifth digit has been associated with reduced grip strength (1). Injury to the FDS of the fifth digit may require reconstruction with the PL tendon. There has been controversy as to whether there is a relationship between absence of FDS in the fifth digit and absence of the PL muscle (2).

The study was conducted to determine if there was a relationship between absence of the FDS to the fifth digit and the PL in a large study.

MATERIALS AND METHODS

A prospective study of students of the paramedical and nursing schools and of patients attending the orthopaedic surgical outpatient clinic was conducted. Participants were consecutively selected from these groups and informed of the conduct of the study. The subjects were subjected to 10 tests to detect the presence

of the Palmaris Longus. A negative test on all tests was judged to mean absence of the tendon while a positive result on any test was judged to be positive. These tests have been previously described. In Schaeffer's test, volunteers were made to steady their forearm at 90° before opposing the thumb to the little finger with the wrist partially flexed (3). Mishra's 1st test involved passive hyperextension of the metacarpophalangeal joints along with mild active flexion of the wrist (4). In Thompson's test, a fist was made followed by flexing the wrist against resistance with the thumb flexed over the fingers (5). In Pushpakumar's "two-finger sign" method, the subjects were made to fully extend the index and middle finger while the wrist and other fingers were fully flexed with the thumb opposed and flexed (6). The Gangata test involves the subject resisting both thumb abduction and wrist flexion, with the thumb in an abducted position (7). In Mishra's 2nd test, the subjects were asked to abduct the thumb against resistance with the wrist partially flexed (4). The four finger sign is a combination of forced anteduction and pronation of the thumb at the first metacarpophalangeal joint with full extension of the second to fifth digits (8). The Lotus sign is done by bringing the fingers and

thumb together to form a cone while in the open hand method, the patient is asked to fan out all the fingers and slightly flex the wrist (9). The Bhattacharya test is done wrist flexion against resistance (9).

A further three tests were conducted to detect the presence of the flexor digitorum superficialis on the fifth digit. First the subject's hands were taken through range of motion to detect the maximum joint motion. The standard test involved allowing the fifth digit to flex while preventing flexor digitorum profundus action by preventing flexion of the interphalangeal joints of the other fingers (10). The modified test involves allowing the fifth and the fourth digit to flex together. The flexor digitorum superficialis is considered present if the proximal interphalangeal joint of the fifth digit was able to flex to within 20° of maximum joint motion (11). The new test was conducted by asking the participant to press the pulps of all fingers against the proximal palm. Extension or hyperextension of the distal interphalangeal joint with full flexion of the proximal interphalangeal joint indicates presence of the flexor digitorum superficialis while flexion of the distal interphalangeal joint was taken to indicate absence of the tendon (12).

The tests were conducted by an orthopaedics resident and two paramedical students after a period of training. Patients with obvious hand and wrist deformities, previous hand and wrist injuries and previous surgery to the hand and/or wrist were excluded. All patients meeting the inclusion criteria were evaluated sequentially. Participants provided written informed consent and consent was sought from the next of kin in the case of those aged below 18 years. The study was approved by the Mulago Hospital Ethics Board and permission was granted by the Mulago Paramedical school authorities.

Data was collected by a questionnaire and entered into Epidata program and exported to SPSS v 11.5 (SPSS Inc., Chicago, Illinois) for analysis.

RESULTS

There were a total of 800 participants (1600 hands). The FDS was absent in 20(2.5%) of 800 participants while the PL was absent in 34 (4.4%) of 800 participants (13,14). There were only two participants that had functional absence of both tendons; one patient had unilateral absence of the FDS to the fifth digit and contra-lateral absence of PL. One patient had FDS absent bilaterally and the PL absent on the right side. The probability of a hand having ipsilaterally absent PL and FDS function is 0.000625

The prevalence of FDS agenesis in a hand that had PL function was 1.8% (27/1556 excluding the 44

hands in 34 patients without PL function) while the prevalence of FDS agenesis in a hand without PL function was 2.3% (1/44). This difference was not statistically significant ($p=0.9$ Chi Square test).

DISCUSSION

The probability of a hand having absent function of both the FDS to the fifth digit and the PL is very low and there is no difference in the proportion of FDS absence in hands that have PL function and those that don't. Our findings are in agreement with a study done in the UK by Thompson *et al* (2).

The PL has been shown to be a very variable muscle and there are known racial differences in its prevalence, while some have even suggested that its absence is hereditary (14-16). The FDS to the fifth digit is an equally variable muscle with racial differences (17, 18). These findings may lead one to believe that there may be an association between the absence of one muscle and the other. In a hand with no FDS function, injury to the profundus tendon would mean absent flexion of that finger and decreased grip strength. Such an injury may require a tendon graft that would easily be harvested from the PL of the same hand. It would hence be important for hand surgeons to know if there is any link between the absences of the two muscles.

CONCLUSION

The study has shown in a large population, that there is no relationship between the absences of the two muscles and there is no relationship between the functional absence of PL and FDS to the fifth digit. This information will be relevant to hand and reconstructive surgeons.

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