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Published in:
Dupuytren Disease and Related Diseases

DOI:
10.1007/978-3-319-32199-8_28

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Contents

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28.1 Introduction

Treatment of Dupuytren Disease is primarily aimed at decreasing the flexion deformities of the fingers. Although there are various treatment options (van Rijssen and Werker 2009), the majority of the patients are treated using partial fasciectomy (Au-Yong et al. 2005). The recurrence rates of Dupuytren Disease are high, ranging from 21 to 85 %, depending on the type of treatment (van Rijssen et al. 2012; Peimer et al. 2013).

Clinicians often decide to treat a patient based on the amount of extension deficit of the fingers (Au-Yong et al. 2005). However, the reliability of these goniometry measurements is unclear. Only one paper reported the reliability of goniometry of the fingers of Dupuytren patients (Engstrand et al. 2012). Unfortunately, this was only reported for active extension deficit, while the passive extension deficit is often a decisive factor in the choice of treatment (Hurst 2011).

The passive extension deficit is often classified using the Tubiana classification (Tubiana 1986). However, in the general population, the majority of the patients have only mild disease (stage N) without flexion deformities (Gudmundsson et al. 2000; Degreef and De Smet 2010; Lanting et al. 2013). Disease progression cannot be measured using goniometry in this group. Two previous studies report an alternative

P.M.N. Werker et al. (eds.), *Dupuytren Disease and Related Diseases – The Cutting Edge*,
DOI 10.1007/978-3-319-32199-8_28

measurement method, where the nodules and cords are encircled and registered using a photocopy of the hands (Herbst and Regler 1986; Seegenschmiedt et al. 2001). However, it is unclear how the disease extent was quantified in these studies. Therefore, we used a tumorimeter to determine the size of nodules and cords. If this new measurement is reliable, it can be used to determine progression of disease in cases without flexion deformities.

This study was aimed to determine the intra- and interobserver agreement of four different measurement variables for diagnosing DD, determining severity of flexion contracture and disease extent, namely, (1) the diagnosis itself, (2) Tubiana stage, (3) total passive extension deficit measured with a goniometer, and (4) the area of nodules and cords measured with a tumorimeter.

28.2 Methods and Materials

28.2.1 Participants

Seventy-seven adults with primary DD in at least one hand were asked for participation (Zou 2012). Those who were willing to participate gave written informed consent. Approval of the medical ethics committee of the University Medical Center Groningen was obtained before starting the study.

28.2.2 Outcome Measures and Instruments

Dupuytren Disease was diagnosed by physical examination of the hands. The diagnosis was recorded binary for each finger separately.

Total passive extension deficit (TPED) was measured in degrees using a Rolyan flexion-hyperextension finger goniometer (Smith & Nephew, Hull, UK). TPED was obtained by adding the passive extension deficits of the metacarpophalangeal, proximal interphalangeal, and distal interphalangeal joints together. Passive extension deficits were measured following the procedure described in Broekstra et al. (Broekstra et al. 2015).

TPED was transformed into a stage, using the classification system of Tubiana (Tubiana 1986).

A tumorimeter (Pfizer Oncology, Pharma-Design Inc., China, Fig. 28.1) was used to determine the surface area of round-shaped nodules in square centimeters. To determine the area of other shaped nodules or cords, the length and width were measured using the caliper on the tumorimeter.

28.2.3 Procedure

All measurements were done by two observers. One of the observers was a medical doctor with extensive experience in diagnosing Dupuytren Disease. The other was a human movement scientist, who was trained to recognize Dupuytren Disease (Broekstra et al. 2015).

First, measurements were taken only by the first observer. To determine the intra-observer agreement, the participants returned 2–4 weeks later for the second measurement by the first observer. To determine the interobserver agreement, the participants were measured by the second observer immediately after the measurements of the first observer. The same procedure and measurement instrument were used in all measurements.

28.2.4 Statistical Analyses

To determine the agreement on the continuous variables (TPED, area of nodules and cords), using a one-way random effect model was used, whereafter the ICC was calculated. Only fingers with agreed positive diagnosis were used in these analyses.

The agreement on diagnosis and Tubiana stage was determined by calculating the ICC,

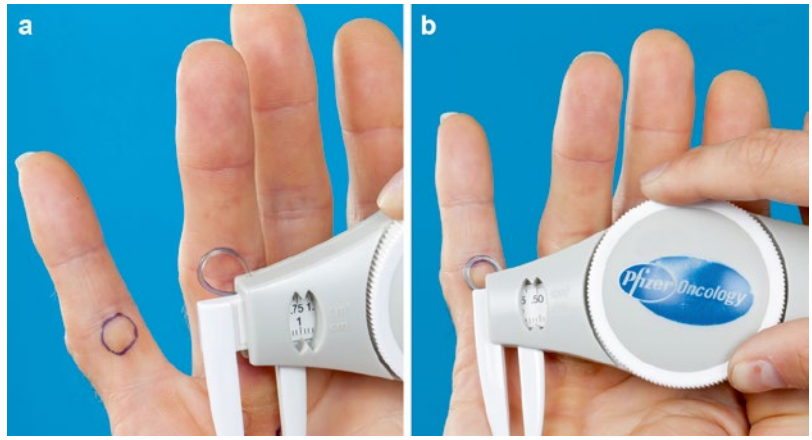

Fig. 28.1 Use of the tumorimeter. (**a**) The nodule is encircled, (**b**) the loop is placed over the nodule, whereafter the surface area can be read off

using a latent variable underneath the binary or ordinal outcome. Detailed information on the statistical analyses is found in Broekstra et al. (Broekstra et al. 2015)

28.3 Results

A number of 54 patients (33 men and 21 women) agreed to participate, having 78 primary affected hands. Their mean age was 65.8 ± 9.2 years. Agreed positive diagnosis of Dupuytren Disease was found in 194 fingers, while in 8 fingers there was no consensus between the observers about the presence of Dupuytren Disease.

The agreement for diagnosis was very good (Altman 1991), ranging from 95.5 to 99.9 % for the intra- and interobserver agreement.

The agreement on Tubiana stage ranged from 73.5 to 98.9 %. Specified results are reported elsewhere (Broekstra et al. 2015).

For the other outcome measures, the agreements were good overall (Table 28.1). Measurements of TPED in the left middle fingers were lower than average. This was also the case for measurements of area of nodules and cords in the left middle finger. The intra-observer agreement was higher on average than the interobserver agreement.

28.4 Discussion

The results of this study show that overall, diagnosing Dupuytren Disease, measuring the severity of contracture (TPED and Tubiana), and disease extent (area of nodules and cords) have a high intra- and interobserver agreement.

The agreement in diagnosis was not 100 %. This indicates that there are always cases in which there is uncertainty about the presence of Dupuytren Disease, despite experience of the observer.

With respect to TPED, the intra- and interobserver agreement was very good (Altman 1991), indicating that reliable values can be obtained when consecutive measurements are taken by the same or another physician in clinical practice. Although both agreements of TPED were good overall, the agreements in the left middle fingers were lower than in the other fingers. Right-handedness of the observers or dynamism (Rodrigues et al. 2015) might form an explanation for this finding.

Intra- and interobserver agreement for the measurements of area of nodules and cords were good to very good in all fingers, except for the left middle finger and right thumb. The lower agreement in the thumb might be explained by the anatomy of the thumb and first web space: the distal and proximal transversal commissural

Table 28.1 Intraclass correlations and 95 % CI for each outcome variable, presented for each hand and finger separately

	Intra-observer agreement		Interobserver agreement	
	Left	Right	Left	Right
TPED				
Thumb	NA[a]	NA[a]	NA[a]	NA[a]
Index finger	96.0 [84.6; 99.9]	99.5 [98.4; 100.0]	92.3 [71.1; 99.9]	92.3 [74.3; 99.7]
Middle finger	47.9 [15.8; 81.1]	92.2 [84.9; 97.2]	45.0 [12.9; 79.9]	85.2 [72.5; 94.5]
Ring finger	99.8 [99.6; 99.9]	91.0 [84.6; 95.8]	96.1 [92.9; 98.3]	92.8 [87.7; 96.6]
Little finger	97.4 [94.6; 99.2]	94.8 [90.2; 98.0]	98.5 [96.8; 99.5]	96.8 [93.7; 98.9]
Area of nodules and cords				
Thumb	82.2 [65.0; 94.4]	50.8 [17.4; 83.8]	72.9 [49.4; 90.9]	63.3 [32.4; 89.0]
Index finger	98.6 [94.5; 100.0]	95.2 [83.8; 99.8]	96.7 [87.0; 100.0]	95.9 [85.8; 99.9]
Middle finger	82.9 [65.6; 94.9]	88.0 [77.1; 95.6]	48.4 [16.3; 81.3]	69.3 [47.1; 87.5]
Ring finger	97.1 [94.8; 98.8]	95.8 [92.7; 98.1]	90.6 [83.4; 95.9]	93.0 [88.0; 96.7]
Little finger	93.8 [87.3; 98.0]	91.9 [84.8; 96.8]	87.6 [75.7; 95.9]	93.6 [87.4; 97.8]

[a]Not applicable, since TPED was not measured in the thumb

ligaments can easily be mistaken for Dupuytren cords (Tubiana et al. 1982; Rayan 2003).

Conclusion

Diagnosing Dupuytren Disease and determining the disease extent and severity of flexion contracture using Tubiana classification, TPED, and the area of nodules and cords have a high intra- and interobserver agreement. This agreement is high in general, but measurements are more difficult for the thumb and middle finger. In addition, the newly introduced measurement of the surface area of nodules and cords has a high agreement and is suitable for studying disease extent in cases without flexion deformities.

Conflict of Interest Statement For this chapter the authors have no conflict of interest to declare.

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