

Objective and subjective assessment of Dupuytren's contracture

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Summary

This paper describes the evaluation options of Dupuytren's contracture by subjective and objective methods. There are various classification schemes named after their authors, including graphical representation for objective evaluation of the disease. Subjective assessment was performed in the form of a questionnaire for patients. The QuickDASH with a small specification for Dupuytren's contracture is the most commonly used questionnaire. The Southampton Dupuytren's Scoring Scheme questionnaire appears to be a higher specification. The classifications allow evaluation of treatment success to determine prognosis of the disease. The analysis of articles is based on PubMed search from the years 1967–2022, with 28 relevant articles were retrieved. Based on this analysis, the Tubiana classification appears to be the most appropriate one for patients with Dupuytren's contracture. Of patient questionnaires, the Southampton Dupuytren's Scoring Scheme meets these parameters.

Key words

Dupuytren's contracture – classification – objective and subjective scoring – DASH – QuickDASH – Michigan Hand Questionnaire – Southampton Dupuytren's Scoring Scheme (SDSS) – ChatGPT – OpenAI

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Introduction

Dupuytren's contracture (DC) is a relatively common disease. It is a benign, slowly progressive fibroproliferative disease of the palmar aponeurosis or other sites (plantar aponeurosis – morbus Lederhose, penile aponeurosis – Peyron's disease) [1]. However, it carries many uncertainties, its aetiology is not clearly defined and there are different opinions on treatment. It is characterised by the formation of knots and bands in the palmar and digital fascia, which shorten and lead to contracture of the fingers, thereby limiting hand function [2]. The disease is named after the French surgeon Guillaume Dupuytren, who described and published facts on the disease in detail in 1831 [3].

In 1959, Luck divided the progression of the disease into three stages [4]. The first stage – proliferative, fibroblastic proliferation and nodule formation. Second stage – involutinal, fibroblasts are

not regulated and transform into myofibroblasts. Third stage – residual stage, type III collagen begins to deposit and this connective tissue begins to organise into bands that subsequently contract. There is a relative excess of type III collagen over type I collagen.

Due to the different stages of disease development in patients, there is a need to classify the different clinical pictures of the disease development. Over the years, different classification schemes with variable disease specificity have been developed. For the surgeon, it is crucial to objectify the condition before starting the treatment and to evaluate the results after a certain precise period of time in order to select the right treatment method. Treatment recommendations vary around the world and relate to patient preference and surgeon expertise. Guidelines for the appropriate treatment of each stage of the disease are still lacking. As each author prefers different

classification schemes, it is challenging to compare individual study results with each other on a global level. For this reason, any work evaluating disease classification is important.

Disease recurrence and Dupuytren's diathesis are complications that doctors encounter and it is good to be prepared for them. The first to introduce the concept of Dupuytren's Diathesis was Hueston in 1963. It is a condition where a patient with Dupuytren's contracture tends to have a more aggressive form and a greater risk of disease recurrence after surgery. The following four factors are considered to be risk factors: bilateral disease; family history of Dupuytren's disease; ectopic lesions and age at onset [5]. Hindocha found that patients with five risk factors (male sex, bilateral lesions, ectopic form, age < 50 years and positive family history) had a 71% chance of disease recurrence compared to patients without

Tab. 1. Meyerding classification.

Grade	Description
0	there is no deformity other than unnatural thickening of the palmar fascia and wrinkling of the skin and there is no contracture of the finger
I	definite contracture of one finger, but not > 60° of flexion in any one joint
II	involvement of > 1 finger, with definite contracture and inability to extend > 60°
III	contracture of ≥ 2 fingers and contracture ≥ 90° of 1 finger
IV	more or less contracture of all the digits, and the hand cannot be open or the thumb cannot be fully extended

Tab. 2. Karfik classification.

Type	Description
I – palm	manifestations in the palm only, no contracture
II – simple	multiple nodules in the palm, contracture of metacarpophalangeal joints, mainly in fingers IV and V, contractile bands up to proximal interphalangeal joints
III – complex	multiple independent lesions, severe contracture of multiple fingers, thumb involvement with adduction

Tab. 3. Iselin classification.

Grade	Description
I	fibrosis in the palm without extension impairment
II	fibrosis with contracture in the metacarpophalangeal joint
III	fibrosis with contracture in the metacarpophalangeal and proximal interphalangeal joints
IV	fibrosis with advanced contracture in the metacarpophalangeal and proximal interphalangeal joints and hyperextension of the distal interphalangeal joint

a risk factor in whom the likelihood is 21% only [6].

The aim of the work was to get an overview of the different classification schemes that are commonly used and, if possible, to select the most suitable one for both the patient and the physician.

The search was performed using the web PubMed.gov [7] where the MeSH Database was searched for the keywords "contracture, dupuytren", and "classification", which were selected from the Subheadings. A total of 40 articles from

the years 1967–2022 were found. This search was narrowed down by the keywords: "(scoring) OR (assessment) OR (staging)", which brought a result of 28 articles from 1978–2022. For all of these articles, the abstract was read by the authors and articles that contained some classification schemes were retrieved, as well as source articles that contained information on the issue of classification schemes for Dupuytren's contracture. All these articles were usable for compiling this review article.

Assessment of the issue

From the relevant articles, five classifications and four questionnaires were evaluated. All the classifications listed below were produced since the year 1936 up to the present. Patient questionnaires have been developed over time in the last 30 years.

The **Meyerding classification** was published in 1936 and is the oldest scheme for Dupuytren's contracture that has been traced [8]. It consists of five grades: zero, one, two, three and four (Tab. 1).

The **Karfik classification** is the most well-known classification in Czechia [9]. This classification was published in Dr. Karfik's dissertation in 1948 and, despite its popularity, it is not very accurate and does not allow to assess the postoperative outcome. The classification consists of three types of hand involvement: palm, simple, and complex types (Tab. 2).

The **Iselin classification** is another frequently used classification [10]. The first version was published together with Dieckmann in 1951. It was intended to serve as a basis for surgical indications and selection of a surgical method. As this first version did not meet these conditions, the author began to modify it in 1955, and from 1958, this classification was taught in courses in Nanterre. According to the author, it is easy to understand and remember because each of its elements corresponds to an easily recognizable clinical aspect and a specific therapeutic approach. It was not published until 1967 in the *Traité de Chirurgie de la Main*. It was widely used in French-speaking countries. The classification is divided into four grades: first, second, third and fourth (Tab. 3).

Mikkelsen's classification is based on Tubiana's original work from 1968, when the scoring of individual disease stages was abandoned [11]. This simplified classification was published in 1976 as a part of an epidemiological study of the incidence of Dupuytren's contrac-

ture in a small town in Norway. The classification is divided into 5 stages: first, second, third, fourth, and fifth (Tab. 4).

The **Tubiana classification** is the most commonly used and appears to be the most accurate. Published in 1968, it originally consisted of a classification for the fingers only and has gradually evolved to its present form [12]. The different stages are graded by 45° of flexion contracture and are divided into six grades: null, nodular, first, second, third and fourth. For each finger, we are able **to detect the disability from 0°** (physiological finding) to 200° (finger to palm contracture). Later, the individual degrees of contracture were scored from 0.5 to 4 points [13] (Tab. 5).

Furthermore, a classification for the 1st interdigital space was defined with a four-level scheme and scoring. We evaluate the angle between the 1st and 2nd metacarpal when the physiological angle is 45° or more. Each grading level represents a loss of full extension of 15°. On the thumb, we can measure flexion contracture in the metaphalangeal and the interphalangeal joint ranging from 0–160°, and the contracture of the 1st metacarpal joint ranging from 0–45° (Tab. 6).

In addition to the physical evaluation of Dupuytren's contracture, there is also a subjective evaluation in the form of a questionnaire for patients. The most commonly used questionnaire for the evaluation of the upper extremity musculoskeletal disorders is (Tab. 7) the QuickDASH questionnaire [14]. It is a shortened questionnaire with 11 questions, based on the Disabilities of Arm, Shoulder and Hand (DASH) questionnaire with 30 questions [15]. The questionnaires are valid, reliable and selective. They can be used for clinical trials and for research. The questionnaires have been translated into most of the world's languages and to date have been translated into 55 languages and dialects. The greatest disadvantage is their low specification for Dupuytren's con-

Tab. 4. Mikkelson classification.

Stage	Description
I	nodules or band without finger contracture
II	overall contracture (the total contracture of all joints in the finger) 1–45°
III	overall contracture 46–90°
IV	overall contracture 91–135°
V	overall contracture > 135°

Tab. 5. Tubiana classification – assessment of finger contracture.

Stage	Description	Points
0	no lesion	0
N	palmar or digital nodule without established flexion deformity	0.5
I	total flexion deformity 0–45°	1
II	total flexion deformity 45–90°	2
III	total flexion deformity 90–155°	3
IV	total flexion deformity > 135°	4

Tab. 6. Tubiana classification – assessment of first web contracture.

Stage	Description	Points
0	> 45° anteponition of first metacarpal	0
I	45–30°	1
II	30–15°	2
III	< 15°	3

tracture. The questionnaire is free to download for academic and research users [16]. The Michigan hand outcomes questionnaire (MHQ) is another questionnaire being used [17]. This questionnaire consists of 37 questions (Tab. 8) that are divided into 6 groups (overall hand function, activities of daily living, pain, work performance, aesthetics, and patient satisfaction with the outcome). The questionnaire is free after registration for academic and research users [18]. Higher specification appears to be found in the Southampton Dupuytren's Scoring Scheme (SDSS) questionnaire (Tab. 7) [19] the aim of which was to construct a simple scheme to quantify disability and ensure sensitiv-

ity to changes in Dupuytren's contracture. The questionnaire consists of five questions, which are divided as follows: discomfort, personal activities, home activities, work and social interactions, and hobbies. These questions can be answered on a five-point scale ranging from no difficulty to great difficulty.

Discussion

In an effort to incorporate new technologies that could potentially simplify, among other things, searching of articles, we have tried to use artificial intelligence, specifically, the ChatGPT chatbot from OpenAI launched in November 2022 [20]. This groundbreaking AI tool has become the fastest growing appli-

Tab. 7. The Southampton scoring scheme.

Please indicate how the condition affects you in each of the following areas:

How much trouble do you have with:	No problem	Minor inconvenience	Modest inconvenience	Definitely troublesome	Severe problem
discomfort					
personal activities, eg: washing face, dressing, washing hands, washing hair, putting on gloves					
domestic activities, eg; holding a glass/cup, opening jars, eating, cooking					
work / social interaction, eg: using the computer, writing, shaking hands, cosmetic appearance					
hobbies, eg. driving/cycling, racket sports, DIY, playing musical instruments, gardening					
score (staff to complete)					

Total

No problem = 0, minor inconvenience = 1, modest inconvenience = 2, definitely troublesome = 3, severe problem = 4; minimum score = 0; maximum score = 20.

ation with > 100 million monthly users worldwide [21]. It has been able to provide us with a large database of studies containing various forms of Dupuytren's contracture classifications. Unfortunately, subsequent efforts to track down these articles revealed that it had probably artificially created some of them. It will certainly be a very helpful

tool for future research, but cannot be fully relied upon at present. For this reason, the articles were searched using the PubMed.gov database. Of the five classification schemes listed above, the Karfik classification, which is simple, clear and easy to remember, was most commonly used in Czechoslovakia. Unfortunately, it is not useful for the prognosis

of the disease and for evaluation after surgery. Worldwide, the Tubiana classification is most commonly used. Both for its completeness, accuracy and for its scoring, we were able to assess the condition before and after surgery. Currently, in the Czech Republic, the older and younger generations of physicians use the Karfik and the Tubiana classifications, respectively. The impossibility of comparing the results of the treatment of patients between individual centres due to inconsistent use of classifications belongs to its major disadvantages. The commonly used MHQ, DASH and QuickDASH questionnaires for the evaluation of musculoskeletal disorders of the upper limb are also used in the evaluation of Dupuytren's contracture. Unfortunately, these questionnaires are not the most appropriate for this type of disorder due to their low specificity. In response to this finding, the SDSS questionnaire was developed. Compared to the QuickDASH, it is more specific for the

Tab. 8. Comparison of different classifications.

Classification	Stage/Grade	Description of stage
Meyerding	I	definite contracture of one finger, but not > 60° of flexion in any one joint
Karfik	II	multiple nodules in the palm, contracture of metacarpophalangeal joints, mainly fingers IV and V, contractile bands up to proximal interphalangeal joints
Iselin	III	fibrosis with contracture in the metacarpophalangeal and proximal interphalangeal joints
Mikkelson	III	overall contracture 46–90°
Tubiana	II	total flexion deformity 45–90°



Fig. 1. Contracture of the little finger.
Range of motion: metacarpophalangeal joint 0–0–90°, proximal interphalangeal joint 0–50–95°, distal interphalangeal joint 0–0–65°

disease of Dupuytren's contracture and appears to be a non-random questionnaire for patients with this condition. The author's experience with the classification schemes listed above is as follows: the Karfik classification is very general, but sufficient for basic assessment of the condition. In contrast, the Tubiana classification is more complex and considerably more precise and essential for scientific work. Independence is another important part in the measurement; the author recommends that the measurements should be performed by a trained physiotherapist. The comparison of all classification schemes in one patient is summarised in Fig. 1 and Tab. 8.

Conclusion

Patient classification at entry to treatment and outcome measurement at follow-up should be an integral part of any treatment plan. Among the questionnaires for patients with Dupuytren's contracture, the SDSS seems to be the best for comparing the success of the treatment.

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