

Research Article

Dupuytren's Disease - Reasons for Contract in Surgery

Bednarek M^{1*}, Staszkiwicz M², Brudnicki J¹,
Koziej M³ and Trybus M¹

¹Department of General Surgery, Jagiellonian University Medical College, Poland

²Department of Clinical Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Poland

³Cathedral of Anatomy, Jagiellonian University Medical College, Poland

*Corresponding author: Marcin Bednarek, Department of General Surgery, Jagiellonian University Medical College, Poland

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Abstract

Dupuytren contracture is one of the most frequently observed fibromatosis. It leads to fibrosis of fascial hand structure. This process causes in consequences fingers contracture and their dysfunction. Nowadays symptomatic treatment including surgical treatment or local application of hyaluronidase is still the only method which can be offered to patients.

The aim of this study was determination of reasons driving patients for Dupuytren contracture treatment. The analysis of correlation between these reasons and subjective assessment of hand function performed on the base of DASH, PEM, HFS questionnaires was done.

The most frequently claimed reason were difficulties in performing of some daily activities, fear concerning progress of the disease and aggravation of finger contracture and looks of the hand. Fear concerning consequences of lack of treatment were also reported.

226 patients (34 female and 192 male) treated due to the Dupuytren contracture in 2nd Department of General Surgery, Jagiellonian University in Cracow were included into this trial.

Statistic correlation between severity of disease and number of reasons for surgical treatment chosen by patients were found. The influence of motivation (number of reasons) on subjective assessment of hand function measured with DASH, HFS and PEM questionnaires was found.

Keywords: Dupuytren's Disease; Contract Surgery; DASH; HFS; PEM

Introduction

The progressive process of fibrosis of the fascial structures of the palmar hand surface leads to gradually increasing contracture of fingers [1-12]. The most common procedure is a symptomatic surgical treatment - excision of overgrown strands of the aponeurosis, which allows for the release of contracture, and thus - increases the range of movement of the fingers [1,2,6,7,13]. The predominant reason for the treatment of the affected patients is the contracture of the fingers causing difficulties in certain daily activities [2,6,12,14]. During the surgery eligibility, patients often provided other reasons motivating them to the treatment also. The aim of the study was to answer questions what these reasons are, whether the severity of the disease is an additional motivator for the treatment, and whether other reasons also had an impact on the patients' subjective assessment of their hand function and on the quality of life of these patients.

Material and Methodology

The study involved 226 patients (34 women and 192 men) treated surgically due to Dupuytren's contracture in the IInd Department of General Surgery, Jagiellonian University in Cracow between 2006 - 2017y. In 142 patients, pathology was observed bilaterally. The study was focused on affected hand that underwent surgical treatment and usually causing greater ailments for the patient.

After collecting the medical and epidemiological interview, the degree of disease was assessed according to Tubian, Michael and Tomin using a goniometer [15-17]. In the case where the disease

included more than one finger, it was assumed that the finger with the largest contracture marks the advancement of the disease process. The effect of Dupuytren's contracture on the quality of daily activities was assessed using the DASH questionnaire (Disability of the Arm, Shoulder and Hand) and the HFS questionnaire (Hand Function Scoring System), and the impact of this contracture on the quality of life - using the PEM (Patient Evaluation Measure) questionnaire [18-21]. All patients were asked a question what has prompted them to decide to undergo a surgical treatment. They were left free to choose one or more reasons. The assessment was made of the dependence between the disease progression process and the number of reasons given by the patients for surgery. Furthermore, the relationship between the number of reasons and the results obtained in the study questionnaires DASH, HFS and PEM was assessed. The results were subjected to statistical analysis.

Results

All patients ranged for a surgical treatment received the DASH, HFS and PEM questionnaires to complete. The obtained results of this study are presented in (Table 1).

The influence of the degree of the fingers contraction on the subjective assessment of hand function based on selected questionnaires was as follows: the results of all tests carried out did not have a normal distribution in the assessed groups (p from the Shapiro-Wilk test was below 0.05), so the analyses were performed using the Kruskal-Wallis test. The value of $p < 0.05$, and thus the level of hand function depends on the disease progression. To answer the

Table 1: The results of the subjective hand function assessment based on the DASH, HFS and PEM questionnaires.

DASH							
N	Mean	SD	Median	Min	Max	Q1	Q3
226	6,42	10,46	3,33	0	76,04	0	8,04
HFS							
N	Mean	SD	Median	Min	Max	Q1	Q3
226	28,41	5,76	26	25	60,42	25	30
PEM							
N	Mean	SD	Median	Min	Max	Q1	Q3
226	22,49	13,27	17	10	64	11	29,75

question of exact correlations, a post-hoc analysis was made. It was discovered that patients at the first stage of the disease were more capable (fewer points in DASH, HFS and PEM) than other patients (Table 2).

Patients who settled on surgical treatment reported various reasons, usually listing several of them. The most common of them were difficulties in certain daily activities such as giving a hand to greet, putting a hand in a pocket or glove, difficulty in washing / shaving and dressing. This concerned 172 patients (76.1%), slightly more often men - 77.08% than women - 75%. Concerns related to the progression of the disease and the increase in finger / fingers contracture occurred in 156 (69%) patients (52.9% in women, 71.8% in men). Hand appearance was a significant reason for making up the decision in 139 (61.5%) patients. Anxiety related to the consequences of lack of treatment occurred in 48.7% of patients: more often in men - 50.5% than in women - 37.2%. Other reasons were rare and were associated with difficulties in performing a specific professional work (e.g. car mechanic or musician) or spending free time (e.g. fishing,

amateur playing a musical instrument).

The correlation between the number of reasons for applying for surgical treatment and the stage of Dupuytren's contracture was found, stating such a relationship ($p < 0.001$). Patients with grade I had significantly fewer reasons than patients with grades II, III and IV. The results are presented in (Figure 1 & Table 3).

Statistical analysis showed significant correlations ($p < 0.001$) between the grade of Dupuytren's contracture and most of the reasons for applying for surgery. The correlation was not demonstrated in the case of fear of the consequences of non-treatment. The results are presented in (Table 4).

Chi-Square Test

There were assessed correlations between the number of reasons given by patients for undergoing surgery and the results obtained from the DASH, HFS and PEM questionnaires.

In all questionnaires used, the obtained results did not have a normal distribution (p from the Shapiro-Wilk test below 0.05), so the analysis was based on the Spearman correlation coefficient. When using the DASH and HFS questionnaire, the correlation coefficient between the number of reasons for treatment and the functional level is statistically significant ($p < 0.05$), so the two characteristics significantly correlate with each other.

This correlation is positive, which means that the more reasons to apply for surgery, the more points obtained in the DASH and HFS questionnaire (lower efficiency level), i.e. the lower the efficiency, the more reasons. In the case of using the PEM questionnaire to assess this relationship, it was shown that the correlation coefficient between the number of reasons for registering for surgery and the impact of hand function on quality of life is statistically insignificant ($p > 0.05$),

Table 2: Assessment of the effect of the severity of Dupuytren's contracture on the subjective assessment of hand function as measured by the DASH, HFS and PEM questionnaire.

Degree of progression	DASH								p*
	N	Mean	SD	Median	Min	Max	Q1	Q3	
1	91	2,13	4,97	0	0	36,61	0	1,79	<0,001 2,3,4 >1
2	5+	6,27	7,07	5,09	0	36,21	0,94	7,71	
3	52	11,1	13,76	7,5	0	68,75	4,39	11,87	
4	30	12,75	15,3	7,08	0	76,04	3,36	15,93	
Degree of progression	HFS								p*
	N	Mean	SD	Median	Min	Max	Q1	Q3	
1	91	26,16	4,17	25	25	60,42	25	25	<0,001 2,3,4 > 1
2	53	28,65	5,03	27,04	25	54	25	30	
3	52	31,42	7,49	29,77	25	58,33	27	32	
4	30	30,25	5,53	29,5	25	48,61	26	31,76	
Degree of progression	PEM								p*
	N	Mean	SD	Median	Min	Max	Q1	Q3	
1	91	17,15	10,74	13	10	58	10	18	<0,001 2,3,4>1
2	53	27,94	15,34	25	10	59	14	41	
3	52	26,44	12,34	25,5	10	64	16,75	35,25	
4	30	26,03	12,61	24	10	56	16,25	35,25	

*Test Kruskala-Wallis+ post-hoc test results (Dunn's test)

Table 3: The assessment of the effect of the severity of Dupuytren’s contracture on the number of reasons for applying for surgical treatment.

Degree of progression	Number of reasons for applying for surgical treatment								p*
	N	Mean	SD	Median	Min	Max	Q1	Q3	
Grade I	91	1,71	1,01	1	0	4	1	3	<0,001 S2, S3, S4 > S1
Grade II	53	2,62	1,15	3	0	4	2	3	
Grade III	52	2,9	1,12	3	1	4	2	4	
Grade IV	30	2,97	1	3	1	5	2	4	

*Lack of normality of distribution in groups, Kruskal-Wallis test + post-hoc analysis results (Dunn’s test)

Table 4: Evaluation of the correlations between the severity of Dupuytren’s contracture and individual reasons for applying for surgical treatment.

Reason	Grade I		Grade II		Grade III		Grade IV		p**
	n	%*	n	%*	n	%*	n	%*	
Hand appearance	19	20,65%	30	56,60%	34	65,38%	19	63,33%	<0,001
Difficulties in performing certain activities	27	29,35%	40	75,47%	45	86,54%	26	86,67%	<0,001
Disease progression	33	35,87%	35	66,04%	40	76,92%	21	70,00%	<0,001
Concern for the consequences of the lack of treatment	22	23,91%	22	41,51%	28	53,85%	11	36,67%	0,003
Others	59	64,13%	13	24,53%	7	13,46%	9	30,00%	<0,001

*Percentage does not add up to 100%, because it was a multiple-choice question.

Table 5: Assessment of the correlation of the number of reasons for applying for the procedure and the subjective assessment of hand function measured by the DASH and HFS questionnaire.

Studied features	Correlation coefficient	p	Direction of correlation	Strength of correlation
Number of reasons for applying for surgery and DASH	0,426	<0,001	positive	weak
Number of reasons for applying for surgery and HFS	0,429	<0,001	positive	weak
Number of reasons for applying for surgery and PEM	-0,069	0,292	---	---

so these two features do not correlate with each other significantly (Table 5).

Discussion

In 1831, a personal surgeon of the King of France Louis XVIII, Baron Guillaume Dupuytren described in detail the contracture of the fingers caused by hypertrophy and constriction of the aponeurosis [4,5,13,15,22,23]. This disease is usually bilateral [2,7,9-11]. It has a chronic progressive character and gradually leads to the limitation of hand function by impairing the range of movement of the fingers (limitation of active and passive extension) [1,2,7,9,24]. Most often, it is located on the ulnar part of the hand, and the contracture usually includes fingers IV, V and III [3-5,10,11,13,14,25-27]. It occurs much less frequently on the radial side of the hand, in the area of thumb and index [11,13,25-27]. Apart from increasing contraction of fingers over time, this disease usually does not cause any other ailments, which means that when adaptation to the deteriorating physical performance of the hand is possible, patients usually delay applying for the treatment [3,9,27]. Undoubtedly, factors causing this delay in the decision to undergo the treatment are the fear of the operation and its possible complications, anticipated pain in the postoperative period, absenteeism from work due to the treatment, temporary limitation of hand function in the course of wound healing, as well as, often the necessity of complementary rehabilitation treatment.

Despite the fact that nearly 200 years have passed since the first description of this disease, its aetiology is still unknown [1,8,9,11,15]. It is believed that its occurrence and development are to a certain extent affected by genetic factors, some diseases such as diabetes and

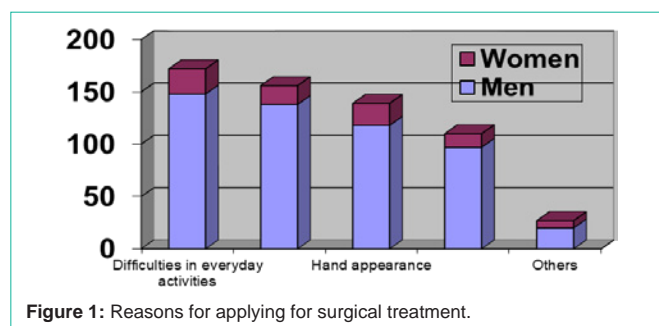


Figure 1: Reasons for applying for surgical treatment.

others, and also the use of stimulants (alcohol, cigarettes) [1,4,5,8-13].

As mentioned above, chronically progressive process of the disease allows patients to adapt significantly to gradually increasing contracture of the fingers [2,24]. After some time, however, the disease begins to obstruct the performance of certain everyday activities such as washing, dressing, putting on gloves or putting a hand in a pocket. In our patients’ sample, it was the main, dominant reason, given by 172 (76.1%) patients, for applying for surgical treatment. The next reason, i.e. the fear of deepening of the disease process, is closely related to the previous one. The gradual deterioration of contraction observed by a patient arouses his anxiety about the inevitable further limitation of hand function and speeds up his decision to undergo surgery. This reason was reported by 156 (69%) patients more often men 138 (71.8%) than women 18 (52.9%). A finger or fingers contraction causes visible deformation of the hand, its appearance begins to gradually deviate from the norm, and also makes it difficult

to give a hand to greet, which, in consequence may be embarrassing for the patient. This fact was reported in 139 cases (61.5% patients). The next reason given by the patients was the anxiety associated with consequences of existing contracture and the possibility of losing their current job position and the need to retrain to a lower fee - not requiring full functionality or even fear of dismissal. This concerned, among others, patients with advanced contracture who had difficulty at their workplace to put on obligatory protective gloves.

Dupuytren's contracture usually involves the IV and V radius of the hand [3-5,9-11,13,14,25-27]. Therefore, in many cases it does not limit the precise operations usually performed with fingers I-III³. On the other hand, in some professions full efficiency of all hand fingers is absolutely necessary, so for these patients it was the main reason for applying for the treatment. Among them were two musicians playing keyboard instruments, a professional violinist as well as a car mechanic. Finally, the main reason of one patient applying for surgery was the difficulty in realizing his passion, which is fishing.

In the studied group prevailed patients with grade I contracture, followed by grade II and III. In literature, the authors more often performed surgeries in the second and third stage of Dupuytren's contracture [22,23,28-30]. Statistical correlation was found between the severity of the disease and the number of reasons for applying for surgical treatment ($p < 0.001$), the higher the severity of Dupuytren's contracture, the greater the motivation of the patient for surgical treatment and more reasons reported by him.

The DASH (Disability of Arm, Shoulder and Hand) questionnaire, HFS (Hand Function Scoring System) and PEM (Patient Evaluation Measure) questionnaire were used to assess hand function of patients who applied for surgical treatment.

Hudak developed the DASH questionnaire in 1996 [18,19]. It is often used for the assessment of the upper limb function [1-3,7-9,15,24,31-34]. The average result obtained in our study before the operative treatment was 36.88 points, and the final result after entering the key with responses 6.42 points (SD = 10.46). The results were similar to the Högemann study - 3.44 points (0-52, 5) [21]. Higher values are given in the literature: Herweijer - 12.1pts (SD ± 2.9), Degreef - 15pts (0-69), Sobierajska 17.5pts (SD ± 14.88), Leciere - 24pts (SD ± 14), Skoff 37pts [3,15,32-34]. It should be noted, however, that the DASH questionnaire was developed for subjective assessment of the function of the entire upper limb, not just the hand. The co-occurrence of diseases located in the remaining parts of the upper limb and even the cervical spine can affect the final result of the questionnaire.

The HFS questionnaire was developed by Watts in 1998 for the subjective assessment of the posttraumatic hand function and improvement of this function in the course of rehabilitation treatment [21]. The average number of points obtained by patients in the HFS questionnaire was 28.41 (the SD +/- 5.76, 25-60). In the available literature, we did not find any research using this questionnaire to assess hand function in Dupuytren's contracture, although the results obtained by us are encouraging. In contrast to the DASH questionnaire, it assesses the hand function itself, not the function of the entire upper limb.

The PEM questionnaire developed by Macey and Burke in 1995

has a different construction than the two mentioned above. It aims to assess the quality of life of patients with various types of hand dysfunction [20]. The assessment with this questionnaire of the effect of Dupuytren's contracture on hand function after surgical treatment was made by Dias and Bray brook. They showed a statistically significant correlation between the degree of contracture and the PEM test ($p < 0.001$) [14].

In the conducted study, there was a close correlation between the stage of Dupuytren contracture and the subjective assessment of hand function, and thus the quality of life of patients measured by the DASH, HFS and PEM questionnaires ($p < 0.001$). A close correlation was also found between the severity of the disease and the number of reasons prompting patients to undergo surgery ($p < 0.001$). Using the selected questionnaires, a statistically significant correlation was also found between the limitation of hand function assessed by the DASH and HFS questionnaires and the number of reasons motivating for surgical treatment ($p < 0.05$). This correlation was not shown using the PEM questionnaire, which is probably related to its different construction. Slightly lower values of hand function in the fourth stage of the disease assessed by the DASH and HFS questionnaire may result from the long-term course of the disease and some adaptation of patients to the limited hand function. Furthermore, in older age subjective requirements for hand performance are usually lower.

Conclusion

The final decision to undergo surgical treatment is the result of various, frequently individual motivations appearing along with deepening of the symptoms of this primarily chronic disease process. No similar studies were found in the available literature.

References

1. Aykut S, Baydar M, Buyuk AF, Ozturk IA, Ozden E, Oztürk K. Surgical treatment results for Dupuytren's disease. *Acta Ortop Bras.* 2017; 25: 71-73.
2. Ball C, Pratt AL, Nanchahal J. Optimal functional outcome measures for assessing treatment for Dupuytren's disease: a systematic review and recommendations for future practice. *BMC Musculoskelet Disord.* 2013; 14: 131.
3. Degreef I, Vererfve PB, De Smet L. Effect of severity of Dupuytren contracture on disability. *Scand J PlastReconstr Surg Hand Surg.* 2009; 43: 41-2.
4. Descatha A, Carton M, Mediouni Z, Dumontier C, Roquelaure Y, Goldberg M, et al. Association among work exposure, alcohol intake, smoking and Dupuytren's disease in a large cohort study. (GAZEL) *BMJ Open.* 2014; 4: 1-8.
5. Descatha A, Bodin J, Ha C, Goubault P, Lebreton M, Chastang JF, et al. Heavy manual work, exposure to vibration and Dupuytren's disease? Results of a surveillance program for musculoskeletal disorders. *Occup Environ Med.* 2012; 69: 296-9.
6. Engstrand C, Krevers B, Kvist J. Factors affecting functional recovery after surgery and hand therapy in patients with Dupuytren's disease. *J Hand Ther.* 2015; 28: 255-59.
7. Forget NJ, Jerosch-Herold C, Shepstone L, Higgins J. Psychometric evaluation of the Disabilities of the Arm, Shoulder and Hand (DASH) with Dupuytren's contracture: validity evidence using Rasch modeling. *BMC Musculoskelet Disord.* 2014; 30: 361-373.
8. Knobloch K, Kuehn M, Vogt PM. Focused extracorporeal shockwave therapy in Dupuytren's disease -a hypothesis. *Med Hypotheses.* 2011; 76: 635-637.
9. Rodrigues JN, Becker GW, Ball C, Zhang W, Giele H, Hobby J, et al. Surgery for Dupuytren's contracture of the fingers. *Cochrane Database Syst Rev.* 2015; 9: 1-89.

10. Trojian TH, Chu SM. Dupuytren's disease: diagnosis and treatment. *Am Fam Physician*. 2007; 76: 86-89.
11. Yeh CC, Huang KF, Ho CH, Chen KT, Liu C, Wang JJ, Chu CC. Epidemiological profile of Dupuytren's disease in Taiwan (Ethnic Chinese): a nationwide population-based study. *BMC MusculoskeletDisord*. 2015; 16: 20.
12. Zuk G, Reinisch KB, Raptis DA, Fertsch S, Guggenheim M, Palma AF. Dupuytren Disease: Is There Enough Comprehensive Patient Information on the Internet? *Interact J Med Res*. 2017; 6: e7.
13. Shaw RB Jr1, Chong AK, Zhang A, Hentz VR, Chang J. Dupuytren's disease: history, diagnosis, and treatment. *PlastReconstr Surg*. 2007; 120: 44e-54e.
14. Dias JJ, Braybrooke J. Dupuytren's contracture: an audit of the outcomes of surgery. *J Hand Surg Br*. 2006; 31: 514-521.
15. Herweijer H, Dijkstra PU, Nicolai JP, Van der Sluis CK. Postoperative hand therapy in Dupuytren's disease. *DisabilRehabil*. 2007; 29: 1736-1741.
16. Hindocha S, Stanley JK, Watson S, Bayat A. Revised Tubiana's Staging System for Assessment of Disease Severity in Dupuytren's Disease – Preliminary Clinical Findings. *Hand*. 2008; 3: 80-86.
17. Tubiana R. Dupuytren's disease of the radial side of the hand. *Hand Clin*. 1999; 15: 149-159.
18. Budd HR, Larson D, Chojnowski A, Shepstone L. The QuickDASH score: a patient-reported outcome measure for Dupuytren's surgery. *J Hand Ther*. 2011; 24: 15-20.
19. Hudak PC, Amadio C, Bombardier C. Development of an upper extremity outcome measure: the DASH (Disabilities of The Arm, Shoulder and Hand). *Am J Ind Med*. 1996; 29: 602-608.
20. Macey AC, Burke FD. Outcome of hand surgery *J Hand Surg Br*. 1995; 20: 841-855.
21. Watts AMI, Greenstock M, Cole RP. Outcome Following the rehabilitation of hand trauma patients. *J Hand Surg Br*. 1998; 23: 485-489.
22. Elliot D The early history of contracture of the palmar fascia. Part 1: The origin of the disease: the curse of the MacCrimmons: the hand of benediction: Cline's contracture. *J Hand Surg Br*. 1988; 13: 246-253.
23. Elliot D. The early history of contracture of the palmar fascia. Part 2: The revolution in Paris: Guillaume Dupuytren: Dupuytren's disease. *J Hand Surg Br*. 1988; 13: 371-378.
24. Rodrigues J, Zhang W, Scammell B, Russell P, Chakrabarti I, Fullilove S, Davidson et al. Validity of the Disabilities of the Arm, Shoulder and Hand patient-reported outcome measure (DASH) and the Quickdash when used in Dupuytren's disease. *J Hand SurgEur Vol*. 2016; 41: 589-599.
25. Jagielski W, Zyluk A. Ocena wpływu ciezkości przykurczu Dupuytrona na sprawność ręki przed i po leczeniu operacyjnym. *ChirNarz Ruchu Ortop Pol*. 2005; 70: 423-437.
26. Kobus K, Wójcicki P, Dydymski T, Wegrzyn M, Hamlawi F. Ocena wyników leczenia chorych z przykurczem Dupuytrona w oparciu o analizę materiału własnego. *OrtopTraumatolRehabil*. 2007; 9: 134-140.
27. Rodrigues JN, Zhang W, Scammell BE, Davis TR. Dynamism in Dupuytren's contractures. *J Hand Surg Eur Vol*. 2015; 40: 166-170.
28. Flatt AE. The Vikings and Baron Dupuytren's disease. *Proc (Bayl Univ Med Cent)*. 2001; 14: 378-384.
29. Lennox IA, Murali SR, Porter R. A study of the repeatability of the diagnosis of Dupuytren's contracture and its prevalence in the grampianregion. *J Hand Surg Br*. 1993; 18: 258-261.
30. Brenner P, Krause-Bergmann A, Van VH. Dupuytren contracture in North Germany. Epidemiological study of 500 cases. *Unfallchirurg*. 2001; 104: 303-311.
31. Högemann A, Wolfhard U, Kendoff D, Board TN, Olivier LC. Results of total aponeurectomy for Dupuytren's contracture in 61 patients: a retrospective clinical study. *Arch Orthop Trauma Surg*. 2009; 129: 195-201.
32. Leclère FM, Mathys L, Vögelin E. Collagenase injection in Dupuytren's disease, evaluation of the ultrasound assisted technique. *Chir Main*. 2014; 33: 196-203.
33. Skoff HD. The surgical treatment of Dupuytren's contracture: a synthesis of techniques. *Plast Reconstr Surg*. 2004; 113: 540-544.
34. Sobierajska-Rek A, Dobosz M. Wczesne i odległe wyniki leczenia operacyjnego przykurczu Dupuytrona. *Pol Przegl Chir*. 2010; 82: 881-893.